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Examination of moderators of expressive writing in patients with renal cell carcinoma: the role of depression and social support

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Abstract

Objective—To identify groups most likely to benefit from an Expressive Writing (EW) intervention, we examined psychosocial variables as intervention moderators. We hypothesized that EW would be particularly effective for participants with high levels of depressive symptoms and social support at study entry.

Methods—Patients (n = 277; 60.6% male) with kidney cancer were randomly assigned to either an expressive (EW) or neutral writing (NW) condition. Intervention outcomes included measures of depressive symptoms (CESD), cancer-related symptoms (MDASI), fatigue (BFI), and sleep disturbances (PSQI) assessed at baseline, 1, 4, and 10 months later. Moderators were measured at baseline.

Results—As hypothesized, depressive symptoms and social support moderated intervention efficacy. When examining both moderators simultaneously, EW appeared to be most effective in terms of cancer-related symptoms ($p < 0.05$) and depressive symptoms ($p < 0.01$) for participants with elevated depressive symptoms who received high levels of social support at baseline relative to their counterparts in the NW condition. Moreover, participants in EW with high levels of social support at baseline reported lower levels sleep disturbances ($p = 0.005$) than their counterparts in NW.

Conclusions—Recognition of baseline depressive symptoms and social support as intervention moderators may lead to improved patient selection for EW interventions, as EW may be particularly beneficial regarding QOL outcomes for patients that have social support available including participants with depressive symptoms. EW may not be beneficial, or potentially even contraindicated, for participants lacking social support.

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Conflict of interest

None of the authors have any or potentially any conflict of interest to disclose.

Introduction

Written emotional or expressive disclosure, known as expressive writing (EW), is a brief and simple experimental procedure that is designed to induce the processing of a stressful or traumatic event by prompting participants to write about their deepest thoughts and feelings regarding the stressful experience. Most studies examining the effectiveness of EW have been conducted in medically healthy populations; yet, some investigations have used this paradigm to test EW as a therapeutic intervention targeting the psychological and physical symptoms of people coping with a medical illness including chronic disease [1–3]. In the cancer literature, evidence regarding quality of life (QOL) benefits is inconsistent. For instance, we recently demonstrated that men and women with renal cell carcinoma (RCC; kidney cancer) who were asked to write about their deepest thoughts and feelings regarding their cancer diagnosis and treatment (EW group) reported fewer cancer-related symptoms and improved physical QOL relative to those writing about health-related topics in a factual manner (neutral writing (NW) control group) [4]. In a feasibility trial, we found treatment effects in terms of fewer sleep disturbances and more vigor [5] and other investigators revealed fewer somatic symptoms [6] in patients engaging in emotional writing relative to control group participants. In contrast, some trials have failed to demonstrate significant treatment gains [7–10]. Other research has found that EW improved psychological and physiological symptoms only for a subset of participants particularly those who were at study entry low in avoidance coping [11], emotional support [6] and neuroticism [12], high in social constraints [8,13] or more recently diagnosed [6].

These inconsistencies in the literature may be related to between-study moderators (e.g., writing instructions, study setting, eligibility criteria) as well as within-study moderators such as person factors, social resources and treatment variables as a *Psychological Bulletin* meta-analysis [2] of 146 experimental disclosure studies suggested. For instance, based on this meta-analysis, participants with elevated stress were more likely to benefit from experimental disclosure in regard to their self-reported health. Similarly, the behavioral intervention literature in psycho-oncology has increasingly recognized the importance of examining treatment moderators [14]. In fact, a recent meta-analysis of 61 behavioral trials [15], albeit excluding EW studies, demonstrated that pre-intervention depressive symptoms or psychological distress moderated the efficacy of psychosocial/behavioral treatments for people diagnosed with cancer so that those with elevated psychological distress at study entry showed greater mood/mental health improvements compared to those with lower distress levels. Because the majority of psychosocial intervention research does not select for participants with elevated symptom burden, some have argued, that this frequently used “all-comers” approach to patient recruitment may result in small treatment gains for QOL indicators such as depression, as the typical cancer patient enrolled in psychosocial trials tends to be not depressed [16]. Based on these assertions, EW may be most effective for individuals with elevated depressive symptoms compared to their non-depressed counterparts. However, to the best of our knowledge, previous studies have not examined depressive symptoms as a moderator of EW interventions in cancer populations.

In addition to psychological risk factors, participants’ social milieu may be relevant to benefits associated with writing about their cancer experience [8,13]. According to the

Social Cognitive Processing Model [17], individuals' social environment can facilitate or hinder the cognitive/emotional processing of a stressful experience (e.g., cancer) so that individuals who lack opportunities to safely disclose cancer concerns with supportive others may be at risk for worse long-term adjustment [18]. Additionally, although not yet empirically validated, authors have argued that, based on social integration theory [2], talking about one's writings with members of one's social network may facilitate or magnify the effectiveness of EW. Based on these previous models, the current study examined participants' psychosocial resources as an additional intervention moderator. Moreover, unlike previous research examining intervention moderators in isolation [6,19–21], discounting shared variance of these factors, we will examine them simultaneously accounting for unique effects as well as the interaction between the two most theoretically and empirically relevant moderators, depressive symptoms and social support, to delineate groups who are most likely to benefit from an EW intervention.

Current research

The current study presents a priori secondary analyses of a large randomized controlled trial (RCT) of EW in RCC on QOL outcomes that are relevant to cancer populations as outcome measures (i.e., overall cancer-related symptoms, fatigue, sleep disturbances, and depressive symptoms). Because previous work primarily focused on women with breast cancer [6,7,9,11,22], we evaluated the benefits of EW in a non-sex –specific cancer. In the original report [4], we reported that patients in the EW reported fewer cancer-related symptoms and improved QOL relative to those in the NW group 10 months post-intervention. We also demonstrated that the effects of EW on cancer-related symptoms were partially mediated through reduced intrusive thoughts and avoidance behaviors 1 month post-intervention. Because our previous work [4,5] also revealed evidence for treatment effects regarding sleep disturbances and fatigue, we also examined these outcomes in the current report.

Here, we examined if baseline depressive symptoms and social support moderate the effects of EW intervention on QOL outcomes (i.e., cancer related symptoms, depressive symptoms, sleep disturbances, and fatigue). Specifically, we hypothesized that participants with elevated depressive symptoms and high levels of social support will benefit more from the EW intervention than their counterparts in the NW control condition.

Methods

Participants

The current data are part of a large RCT of EW targeting QOL outcomes in patients with RCC [4]. Newly diagnosed patients with stage I–IV RCC, a Zubrod performance status of < 2, no serious intercurrent medical illness requiring hospitalization and who were at least 18 years old and able to read, write, and speak English were eligible to participate in the study. Patients who were unable to provide consent, were on immunosuppressive drugs, had a history of primary or secondary immunodeficiency, and/or participated in psychotherapy (self-identified) were excluded from the study.

Procedures

Research staff identified eligible patients and approached them during a clinic visit. Participants provided written informed consent prior to all data collection. All participants completed baseline (T1) assessment of questionnaires prior to randomization and were then randomly assigned to either the Expressive Writing (EW) or Neutral Writing (NW) groups. Participants in both groups completed three additional assessments 1 month (T2), 4 months (T3), and 10 months (T4) after completing the intervention. Participants received a \$20 gift card for each assessment. All procedures were approved by the Institutional Review Board.

Description of intervention

We followed the general writing procedures as originally outlined by Pennebaker and Beall [23] with modifications based on our pilot work [5,8]. On four separate occasions, participants in the EW group were asked to write about their deepest emotions and thoughts concerning their cancer experience (e.g., how the diagnosis and treatment interferes with their lives; treatment-related decision making; fears about the future). Participants in the NW group wrote about health behaviors (i.e., dietary behaviors, physical activity, substance-use behaviors (if any), and sleep habits). Participants in both groups were asked to complete four 20-minute writing assignments in their home over a 10-day period with at least 1 day and no more than 3 days between sessions. A research assistant prompted participants with a phone call to begin and then stop writing. Participants were provided with a pre-addressed, stamped envelope for mailing each completed writing sample as they were completed. A more detailed description of trial procedures is found elsewhere [4].

Measures

Self-report measures assessing intervention outcomes and moderators involve validated instruments that are frequently used in cancer populations. Intervention outcomes were assessed at T1–T4. Moderators and covariates were measured at T1.

Main study variables—*Cancer-related symptoms* were assessed with the MD Anderson Symptom Inventory (MDASI) [24]. The MDASI consists of 13 core symptoms that are common across all cancer diagnoses and treatments. Patients rate symptom severity and interference with daily activities. Higher scores denote greater severity and interference. Here we report on the total score and Cronbach's alpha was .97.

Depressive Symptoms were assessed using the Center for Epidemiologic Studies Depression Scale (CES-D) [25], a 20-item self-report measure of 20 items focusing on the affective component of depression. Alpha was .89. A score of 16 is considered the cut-off criterion for "caseness" indicating further screening for a depressive disorder is warranted. Higher scores represent greater symptomology.

Fatigue was measured with the Brief Fatigue Inventory (BFI) [26], a nine-item questionnaire asking participants to rate the severity of their fatigue and how much it interfered with their lives. Higher scores represent worse fatigue. Alpha was .82.

Sleep disturbances: The Pittsburgh Sleep Quality Index (PSQI), an 18-item questionnaire including seven sub-scales (i.e., subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medications, and daytime dysfunction) and a total score was used to assess sleeping problems over the past month [27]. The total score is presented here. Higher scores represent greater problems with sleep. The alpha for the global sleep quality index was .81.

Social Support was assessed with the Medical Outcomes Study Social Support Survey (MOS-SSS), a 20-item social support questionnaire developed for the chronically ill [28]. Participants rated their perceived availability of emotional/informational support, tangible support, positive interactions, and affectional support. The total score is presented here, higher scores denote more social support and the alpha was .95.

Covariate measures

Demographic and Medical Factors: Some demographic items (e.g., age, sex, education, employment, income, religious affiliation, and marital status) were included in the baseline questionnaires. Medical data (e.g., stage, date of diagnosis, treatment regimens, and disease progression) were extracted from patients' charts.

Intrusive thoughts and avoidance behaviors were measured with the Impact of Events Scale (IES), a 15-item scale assessing thought intrusion and avoidance during the past week [29]. Higher scores represent greater intrusive thoughts and avoidance behaviors, and the total score was used. Alpha was .97. (This assessment is included here as it was proposed as an intervention mediator in the original report and revealed to be a predictor of differential drop outs.)

Data analyses

We performed descriptive analyses (e.g., frequencies, means, correlations, etc.) to characterize the sample. As a manipulation check, we performed linguistic word count analyses with the Linguistic Inquiry Word Count (LIWC) [30] software, which confirmed that the writing samples of participants in the EW group contained significantly more emotional language than those of the NW group ($F = 93.17$, $P < .0001$).

The primary purpose of these planned secondary analyses was to examine baseline depressive symptoms and social support as intervention moderators. Because age, sex, and stage at diagnosis are important prognostic factors in RCC [31–34], these variables were included as a priori covariates in all main analyses. Additionally, due to systematic dropout differences as reported in the original report, we controlled for participants' education and baseline levels of IES scores. Accounting for the nested data structure of the repeated measure design, we performed multilevel modeling (MLM) analyses using Proc MIXED (SAS, 9.2.2 version) to test the study hypotheses. We examined the hypothesized moderators (i.e., baseline depressive symptoms and baseline social support) for each of the QOL outcomes (i.e., cancer-related symptoms, fatigue, sleep disturbances, and depressive symptoms). We specified a random intercept and an unstructured covariance matrix and treated assessment time as a categorical covariate. To test our hypothesis, we examined the

3-way interaction of writing group x depressive symptoms x social support for each of the outcomes while controlling for lower level terms (2-way interactions and main effects) as well as aforementioned covariates. Aggregate scores of follow-up assessments (i.e., T2-4) were examined. Significant interactions were probed using simple slope analyses following the procedure specifically developed for multilevel modeling by Preacher, Curran, and Bauer [35] and illustrated by graphing the interaction with the moderator at 1 SD above and below the mean. In case of a lack of significant 3-way interaction, 2-way interactions were examined. Because group main effects were previously reported [4], we did not report them here if the 2- and 3-way interactions were not significant. Effect sizes were calculated using $r = [\ell^2/(\ell^2 + df)]^{1/2}$ [36].

Regarding attrition, instead of using list-wise deletion for cases with missing data, Proc MIXED uses all collected data and a likelihood-based estimation method to calculate variance and covariance structures for missing data so that attrition is less of a concern [37]. Additionally, in the original report of this RCT, we revealed that analyses involving multiple imputations for missing data points did not alter any of the findings.

Results

Recruitment and sample attrition

We approached 761 eligible patients of which 355 consented to participate in the study; however, 68 were lost to follow-up prior to baseline assessments, 5 actively withdrew (death in family (n = 2); too busy (n = 3)), 3 patients became ineligible (misdiagnosis of RCC) and 2 died prior to randomization resulting in a baseline sample of 277 patients who were randomized to the EW (n = 138) and NW (n = 139) groups. Prior to the T2 assessment, 2 patients died and 66 were lost to follow-up (EW: n = 31; NW: n = 35) resulting in n = 105 in EW and n = 104 in NW. Before the T3 assessment, 1 patient died and before the T4 assessment, 8 patients died so that 13 patients died over the course of study participation with similar rates per group. Details regarding attrition can be found in the original report [4]. Chi-square tests and t-tests comparing baseline demographic and medical characteristics and outcome measures of study completers versus non-completers revealed no significant differences except for education ($\chi^2 = 14.63$, $P = .005$) and IES scores ($t = 2.14$, $P = .023$); completers were more likely to have had higher education (i.e., more likely to have graduate and postgraduate education) and lower IES scores at baseline compared to non-completers. No significant group differences were found in regard to demographic and medical factors or any of the baseline study variables.

Baseline sample characteristics

Of the baseline sample (n = 277), 60.6% of participants were male, 78.1% were Caucasian/white, 70.6% were married, 74.6% completed some college or higher, 62.4% reported an annual income of more than \$50,000, 54.1% were full-time employed, and 47.7% were diagnosed with advanced disease (stages III and IV). Participants' mean age was 58.1 years ($SD \pm 9.8$ years; range 31–84 years) with a mean time since diagnosis of 82.5 days ($SD \pm 60.72$ days; range: 0–273 days). Regarding depressive symptoms, 20.5% of the sample

met the CES-D caseness criterion (score ≥ 16). A detailed description of demographic and medical sample characteristics has been previously reported [4].

Descriptive analyses

Descriptive results (mean, SD, correlation coefficients) of study variables are presented in Table 1.

Depressive symptoms and social support as intervention moderators

Cancer-related symptoms—As predicted, the interaction of group $\times$ depressive symptoms $\times$ social support was significant ($F(2,145) = 6.42, p = 0.01; r = 0.20$). Participants in the EW group reporting high depressive symptoms at baseline had lower cancer-related symptoms during follow-up period (i.e., aggregated across T2-4) if they also reported high levels of social support at baseline compared to their counterparts in the NW group ($t = -2.10, p < 0.05$). In contrast, for those with low depressive symptoms neither group assignment ($t = -0.90, p = 0.37$) nor level of baseline social support were significantly associated with cancer-related symptoms ($t = -1.04, p = 0.30$). Figure 1a illustrates this finding.

Depressive symptoms—The hypothesized interaction of group $\times$ baseline depressive symptoms $\times$ baseline social support was significant ($F(2,164) = 21.16, p < 0.0001; r = .34$) for depressive symptoms during follow-up period. Participants in the EW group reporting high baseline depressive symptoms reported lower depressive symptoms during follow-up if they also had high levels of social support compared to their counterparts in the NW group ($t = -2.72, p < 0.01$). In contrast, for those with low depressive symptoms at baseline, neither group assignment ($t = -1.05, p = 0.30$) nor levels of baseline social support were significantly associated with cancer-related symptoms ($t = -1.07, p = 0.29$). Figure 1b illustrates this finding.

Fatigue—The group $\times$ depressive symptoms $\times$ social support interaction was not significant ($F(2,159) = 1.63, p = 0.20$). Thus, we reduced the model to examine 2-way interactions. The group $\times$ depressive symptoms ($F = 0.92, p = 0.34$) and the group $\times$ social support ($F = 2.34, p = 0.13$) interactions were not significant.

Sleep disturbances—The group $\times$ depressive symptoms $\times$ social support interaction was not significant for sleep disturbances ($F(2,118) = 1.48, p = 0.23$). A reduced model revealed a significant group $\times$ social support interaction ($F = 5.90, p = 0.02; r = .22$). In the EW group, participants with low levels of social support reported greater sleep disturbances during follow-up period than those reporting high levels of social support at baseline ($t = 2.56, p = 0.01$) and those in the NW group reporting low levels of social support at baseline ($t = 2.90, p = 0.005$). For participants in the NW group, social support was not significantly related to sleep disturbances ($t = -0.97, p = 0.51$). Figure 2 portrays this finding. The group $\times$ depressive symptoms interaction ($F(2,121) = 5.52, p = .12$) was not significant.

Discussion

The purpose of this research was to examine baseline levels of depressive symptoms and social support as moderators of an EW intervention for patients with kidney cancer. We expected that participants with elevated depressive symptoms at baseline and high levels of baseline social support would especially benefit from writing about their cancer experience. Based on our findings, EW participants with high depressive symptoms *and* high levels of social support fared significantly better (i.e., fewer cancer-related and depressive symptoms) compared to their counterparts in the NW control condition. Consequently, unlike previous research, we did not demonstrate that those with elevated depressive symptoms, independent of social support, are more likely to reveal treatment gains compared to those with low psychological risk [15]. In fact, these data may suggest that, in the absence of a socially supportive environment, EW may not be effective for those with elevated depressive symptoms. Nevertheless, it is important to note an important distinction between this study and previously synthesized research. For one, Schneider and colleagues' meta-analysis [15] predominately included intervention studies that involved clinician-administered coping-skills training or cognitive-behavioral therapy and social support offered by the therapist is clearly an active ingredient of these types of interventions. Here, we examined a brief (4 sessions of 20 minutes each), entirely self-administered intervention and this difference in treatment approach may explain why our findings do not map on to the previous literature. Consequently, it makes sense that social support from one's network is needed for EW to be effective particularly for individuals with elevated depressive symptoms who may lack internal resources to cope and are likely to rely on others to reaffirm the self [38,39].

Although prudence is warranted in interpreting these findings as participants were not selected based on these psychosocial characteristics, we submit they significantly contribute to the literature, inform future intervention research, and may have clinical relevance. In the larger context of the intervention literature, these findings point to the importance of not only examining intervention moderators but also the interactions of moderators as they are crucial to elucidating treatment efficacy. Typically, as a field, we tend to examine group main effects and let statistical conventions influence our decisions regarding secondary analyses. More specifically, if a trial results in null findings, we are motivated to examine if the intervention was effective for a subgroup of participants. Yet, intervention researchers may need to examine subgroup analyses regardless of the main effects, as interventions may be contraindicated for subgroups of people, as demonstrated here. Based on our findings, EW was associated with greater sleep disturbances for those lacking social support compared to their counterparts in the NW condition. Although more research is needed to explain this finding, it could be that, consistent with the tenants of Social Cognitive Processing Model, a supportive social network is needed to down regulate negative emotions that may have been triggered through the writing sessions. In the absence of social support, participants' sleep may be disturbed as they may continue to process the stressor on their own at night time. Further research is needed to reveal the underlying mechanism of the role of social support in EW.

This research is also unique because instead of focusing on one moderator, as is typically done, we examined the interaction between theoretically relevant moderators to reveal a

more complete picture. Here, we revealed that it is not psychological risk per se predicting treatment efficacy but psychological vulnerability in conjunction with social resources that was associated with treatment gains regarding cancer-related and depressive symptoms. To the best of our knowledge, this study is unique in examining depressive symptoms and their interaction with social support as moderators of intervention efficacy in a cancer population. Although social support is generally considered protective against depressive symptoms in cancer patients [40], the significant interaction may capture individual differences in regard to social support utilization with the onset of depressive symptoms. More research, however, is needed to examine the interplay between social support and depressive symptoms for patients undergoing cancer treatment and the underlying mechanisms of this interaction by which EW intervention efficacy is impacted.

Although clinical recommendations are premature at this point, the current data suggest that a clinical application of these findings may best begin by pre-intervention screening of depressive symptoms and social support as clinical guides for whom the intervention may be indicated and possibly contraindicated. EW would seem most appropriate as a self-administered intervention only for patients with adequate social support. For those with low social support, particularly when also suffering from depressive symptoms, EW may be not effective. Our study excluded patients participating in any form of psychological care including support groups; however, EW may be beneficial for patients receiving concurrent psychosocial interventions or who report high levels of social support and depressive symptoms. Future research extending these findings is necessary to substantiate these initial recommendations. However, erring on the side of caution, these data suggest that safety procedures for at risk patients may be needed including offering access to mental health support (social work/psychiatry/psychology) and monitoring as appropriate should participants have an adverse response to this type intervention.

Despite its contribution to the literature and potentially clinical practice, this study has limitations. The current sample was relatively non-distressed as patients in psychotherapy were excluded from the study; however, the exclusion criteria was intended to safeguard from intervention confounds. As patients with lower level of education were more likely to withdraw from the study, our sample may also potentially reveal a selection bias regarding education and our results may not generalize towards less educated patients.

In summary, there is evidence that EW affects participants differentially based on baseline characteristics. This intervention may be beneficial regarding QOL outcomes for patients that have social support available including participants with depressive symptoms. EW may not be beneficial or potentially even contraindicated for participants lacking social support.

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Figure 1.

Significant interaction of writing group [Expressive Writing (EW) and Neutral Writing (NW)] x baseline depressive symptoms (CES-D) x baseline social support (MOS-SSS) plotted by high and low baseline depressive symptoms (mean $\pm$ 1SD) for those with high and low baseline social support (mean $\pm$ 1SD) for: **a)** cancer-related symptoms (MDASI) and **b)** depressive symptoms (CES-D) across the follow up period controlling for age, sex, education, stage at diagnosis and baseline level of cognitive intrusion scores. Higher scores represent greater symptoms

Figure 2.

Significant interaction of writing group [Expressive Writing (EW) and Neutral Writing (NW)] x baseline social support (MOS-SSS) plotted for those with high and low baseline social support (mean $\pm$ 1SD) predicting sleep disturbances (PSQI) across the follow up period controlling for age, sex, education, stage at diagnosis and baseline level of cognitive intrusion scores. Higher scores represent greater symptoms

Table 1

Descriptive results of main study variables at baseline

Variable	Descriptive Results			
	Correlation Coefficient			Mean ± SD (Range)
	1	2	3	
MDASI				1.33 ± 1.35 (0–6.0)
BFI	.73**			2.51 ± 2.12 (0–8.7)
PSQI	.47**	.46**		6.66 ± 4.0 (0–18)
CESD	.60**	.54**	.38**	10.05 ± 8.42 (0–39)
MOS-SSS	-.19*	-.27*	-.19*	86.84 ± 15.74 (14.5–100.0)

* P < .01;
** P < .001.

Abbreviations: SD, Standard Deviation; MDASI, MD Anderson Symptom Inventory; BFI, Brief Fatigue Inventory; PSQI, Pittsburgh Sleep Quality Index; CES-D, Center for Epidemiologic Studies Depression; MOS-SSS, Medical Outcomes Study Social Support Survey