

PAPER

Emotion regulation and emotional distress: The mediating role of hope on reappraisal and anxiety/depression in newly diagnosed cancer patients

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Abstract

Purpose A proportion of newly diagnosed cancer patients may experience anxiety and depression. Emotion suppression has been associated with poorer psychoemotional outcomes, whereas reappraisal may be an adaptive emotion regulation strategy. Few studies have examined potential mechanisms linking reappraisal to psychoemotional outcomes in cancer patients. This study aims to replicate findings on reappraisal and suppression and further examines if hope mediates the association between reappraisal and anxiety/depression in patients newly diagnosed with cancer.

Methods Participants were 144 adult cancer patients (65.3% female, mean age = 48.96 years, SD = 9.23). Patients completed a set of study questionnaires, including the Emotion Regulation Questionnaire, Adult Hope Scale, and the Hospital Anxiety and Depression Scale. Path analysis was used to examine if hope mediated the association between reappraisal and anxiety/depression.

Results Prevalence of anxiety was 39.6% and depression was 25.0%. Reappraisal and hope were correlated with lower anxiety and depression, whereas suppression was correlated with higher anxiety and depression. The hypothesized mediation model provided fit to the data, comparative fit index = 0.95, Tucker-Lewis index = 0.94, root-mean-square-error of approximation = 0.05. There was a significant indirect effect of reappraisal on anxiety and depression via hope, $b = -0.95$, SE = 0.42, 95% confidence interval = -1.77 to -0.12 , whereas the direct effect of reappraisal was nonsignificant.

Conclusion The study findings suggest that hope mediated the association between reappraisal and anxiety/depression outcomes. Moreover, the high prevalence of anxiety and depression implies a need for healthcare providers to attend to the psychoemotional needs of newly diagnosed cancer patients.

KEYWORDS

anxiety, cancer, depression, emotion regulation, hope, oncology

1 | INTRODUCTION

Patients with cancer often experience anxiety and depression. The prevalence of self-reported anxiety in newly diagnosed cancer patients is estimated to be between 19.0% and 22.6%, whereas depression is between 12.9% and 16.5%.¹ Although the prevalence of anxiety and depression may vary depending on the illness severity,¹ an extensive

body of research has consistently shown high rates of self-reported emotional distress, anxiety, and depression in patients with cancer.²⁻⁴ These adverse experiences may also persist over time and adversely affect patients' emotional well-being.^{5,6} Importantly, comorbid anxiety and depression in cancer have been associated with increased use of health care services, poorer quality of life, and poorer treatment outcomes.⁷⁻⁹ There is thus a need to

understand protective factors that may help patients manage emotional distress and facilitate optimal transitions to cancer survivorship.

1.1 | Emotion regulation: cognitive reappraisal and expressive suppression

Although research has examined a range of emotion regulation strategies, 2 emotion regulation strategies, cognitive reappraisal and expressive suppression, have been more extensively studied based on theory.^{10–13} On the basis of the process model of emotion regulation, reappraisal refers to the self-regulatory cognitive process of changing the way one thinks about an emotion eliciting situation before the emotion is fully elicited, whereas suppression refers to the effortful behavioral inhibition of emotion expression after the emotion is elicited.^{10,14} Reappraisal, in particular, has been shown to be especially effective in buffering the adverse effects of stressful life events.^{15,16} Previous research has shown that higher reappraisal and/or lower suppression were associated with better psychoemotional outcomes, including lower anxiety, depression, and stress-related symptoms in patients with cancer or other chronic illnesses.^{17–21}

1.2 | Reappraisal and hope: clarifying the pathway to adaptive emotion regulation

Different ways of reappraisal appear to have different effects on the effectiveness of emotion regulation.^{22,23} In particular, agency-focused reappraisals has been shown to reduce regulation-related physiological arousal response, such as thinking that one has the ability to change a situation or has the capacity or necessary skills to manage a situation.²² Although studies have shown that reappraisal can be a protective emotion regulation strategy in clinical populations, there is a paucity in studies examining potential mechanisms or cognitions that may explain the association between reappraisal and psychoemotional outcomes. Pathways from reappraisal to lower anxiety/depression remain unclear.

Given the potential role of agency in facilitating effective emotion regulation,²² we propose that hope or hopeful cognitions may be one possible pathway from reappraisal to adaptive emotion regulation. Specifically, hope theory posits that hope is a positive motivational state resulting from both goal-directed agency and pathway cognitions; agency refers to the individual's drive and perceived ability to achieve relevant goals, whereas pathways refer to the individual's ability to think of ways to achieve goals, or to think of alternative plans should the primary route be impeded.^{24,25} Studies have shown that higher hope was associated with lower anxiety and depression, and higher quality of life in patients with cancer or other chronic illnesses.^{26–29}

1.3 | Present study

To address the gaps identified in current literature, this study examines the role of reappraisal, suppression, and hope in anxiety and depression in a sample of patients newly diagnosed with cancer. First, we aim to replicate previous findings on emotion regulation and anxiety/depression. Specifically, we hypothesized that higher reappraisal and

lower suppression are associated with lower anxiety and depression. Second, we investigated if hope is a potential mechanism linking reappraisal and psychoemotional outcomes. We hypothesized that the association between reappraisal and anxiety/depression is mediated by hope.

2 | METHODS

2.1 | Participants and procedure

The present study is part of a larger study investigating psychiatric and psychological factors in newly diagnosed adult cancer patients.³⁰ Participants were 144 adult cancer patients (65.3% female, mean age = 48.96 years, SD = 9.23) recruited from breast care, chemotherapy, and radiation therapy treatment centers, and medical oncology outpatient clinics at the National University Cancer Institute Singapore. Patients were included in the study if they were adult patients aged 21 to 65 years, newly diagnosed with cancer (received a cancer diagnosis within 3 months at the time of participation), and had no previous history of cancer (the diagnosis of cancer was not attributed to metastatic or recurrent causes). Patients provided informed consent and completed a set of study questionnaires.

Ethical approval was granted by the Domain Specific Review Board of the National Healthcare Group of Singapore.

2.2 | Measures

2.2.1 | Anxiety and depression

The Hospital Anxiety and Depression Scale (HADS)³¹ was used to measure the severity of patients' anxiety and depressive symptoms. The HADS is a 14-item self-report questionnaire designed for use in a hospital outpatient setting, with subscales for anxiety (7 items) and depression (7 items). Items were rated from 0 (not at all) to 3 (most of the time). Higher scores indicate higher levels of anxiety and/or depression. In addition, a cutoff score of more than 7 on the HADS subscales indicate possible clinical caseness.³¹ Cronbach alpha for the HADS in this study was 0.83 for anxiety and 0.81 for depression subscales.

2.2.2 | Emotion regulation

The Emotion Regulation Questionnaire (ERQ)³² was used to measure patients' use of emotion regulation strategies. The ERQ is a 10-item self-report questionnaire with subscales for cognitive reappraisal (6 items) and expressive suppression (4 items). An example of an item for reappraisal is "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm"; an example of an item for suppression is "I keep my emotions to myself". Items were rated from 1 (strongly disagree) to 7 (strongly agree). Higher scores indicate greater tendencies to use reappraisal and/or suppression to regulate emotions. Cronbach alpha for the ERQ in this study was 0.81 for reappraisal and 0.86 for suppression subscales.

2.2.3 | Hope

The Adult Hope Scale (AHS)²⁵ was used to measure patients' level of hope. The AHS is a 12-item self-report questionnaire measuring

agency (4 items) and pathway (4 items), with 4 filler items (not included in scoring). An example of an item for agency is "My past experiences have prepared me well for my future"; an example of an item for pathway is "I can think of many ways to get out of a difficult situation". Items were rated from 1 (definitely false) to 8 (definitely true). Higher scores indicate higher levels of hopeful cognition. Cronbach alpha for the AHS in this study was 0.87.

2.2.4 | Physical symptom severity

The Edmonton Symptom Assessment Scale (Revised version; ESAS-R)³³ was used to measure patients' experiences of physical symptoms. The ESAS-R is a 10-item self-report measure of 9 symptoms: pain, fatigue, drowsiness, nausea, appetite loss, breathlessness, depression, anxiety, overall well-being, and an optional unspecified tenth symptom. Items were rated from 0 (least severity) to 10 (worst severity). To assess physical symptom severity, items on anxiety, depression, and overall well-being were omitted for the present study. Cronbach alpha for the ESAS-R was 0.82.

2.2.5 | Demographic and clinical variables

Demographic information included patients' age, sex, marital status, education, and monthly household income. Clinical information included the site of cancer diagnosis, cancer stage (early = stage I or II, advanced = stage III or IV), time since diagnosis (months), number and type of cancer treatment received or receiving (chemotherapy, radiotherapy, and/or surgery), and the number of medical comorbidities.

2.2.6 | Statistical analyses

Preliminary analyses were conducted using SPSS 20.0 (SPSS Inc, Chicago, Illinois). Separate 1-way ANOVAs and Pearson correlation were conducted to examine demographic and/or clinical group differences in anxiety and depression. Variables significantly associated with anxiety and/or depression were accounted for as covariates in subsequent analyses.

Confirmatory factor analysis and path analysis were conducted in R (version 3.2.2)³⁴ using the lavaan package.³⁵ Given the potential overlaps between the constructs of reappraisal and suppression (both are emotion regulation strategies) and between reappraisal and hope (both are cognitive constructs), confirmatory factor analysis was conducted to test the measurement model with reappraisal, suppression, and hope. On the basis of the verified measurement model, path analysis was then used to test if hope mediated the associations between reappraisal and anxiety/depression. Under a structural equation modeling framework, path analysis allows for the simultaneous analysis of all variables in the model instead of multiple separate analyses. First, confirmatory factor analysis was conducted to examine the measurement model with latent variables for reappraisal, suppression, and hope. Model fit was assessed based on a nonsignificant χ^2 , comparative fit index (CFI) of more than 0.95, Tucker-Lewis index (TLI) of more than 0.95, and root-mean-square-error of approximation (RMSEA) of less than 0.06.^{36,37} Next, the hypothesized path model was constructed to examine the direct effects of reappraisal on anxiety and depression, and suppression on anxiety and depression, with hope

as a mediator between reappraisal and anxiety/depression. In addition, an alternative mediation model was also tested to explore if reappraisal mediated between hope and anxiety/depression. Bootstrapping of confidence intervals (CI) was used to examine the significance of indirect effects from reappraisal to anxiety/depression via hope.

3 | RESULTS

3.1 | Demographic and clinical information

Table 1 presents the demographic and clinical information of the sample. There were 144 patients newly diagnosed with cancer (65.3% female, mean age = 48.96 years, SD = 9.23, range 22 to 64 years). The mean time since diagnosis was 1.85 months (SD = 0.82). In addition, 8.3% of the patients had a history of and/or current psychiatric disorder; 39.6% of the patients met cutoff criteria for clinically significant anxiety, whereas 25.0% of the patients met cutoff criteria for clinical depression.

3.2 | Preliminary analyses

Results from preliminary analyses showed that only physical symptom severity was associated with anxiety, $r_{141} = 0.50$, $P < .001$, and

TABLE 1 Demographic and clinical characteristics of the study sample (N = 144)

	n (%)
Age (M ± SD)	48.96 ± 9.23
Sex	
Male	50 (34.7)
Female	94 (65.3)
Ethnicity	
Chinese	90 (62.5)
Malay	21 (14.6)
Indian	16 (11.1)
Others	17 (11.8)
Marital status	
Married	111 (77.1)
Single/widowed/divorced	33 (22.9)
Cancer site	
Breast	45 (31.3)
Gastrointestinal	26 (18.1)
Gynecological	17 (11.8)
Head and neck	15 (10.4)
Hematological	21 (14.6)
Lung	13 (9.0)
Pancreatic	6 (4.2)
Renal	1 (0.7)
Cancer stage	
Early	93 (64.6)
Advanced	51 (35.4)
HADS caseness	
Clinical anxiety	57 (39.6)
Clinical depression	36 (25.0)

HADS, Hospital Anxiety and Depression Scale.

depression, $r_{141} = 0.63$, $P < .001$, whereas all other demographic or clinical variables were not associated with anxiety or depression, $P_s > .05$. There were also no group differences in anxiety and depression across gender, marital status, and cancer stage, $P_s > .05$. Physical symptom severity was thus included as a covariate in subsequent analyses.

Table 2 presents the correlation results. Anxiety was positively associated with depression. Higher reappraisal was associated with lower anxiety and depression, whereas higher suppression was associated with higher anxiety and depression. In addition, higher hope was associated with lower anxiety and depression, and higher reappraisal.

3.3 | Path analysis

Table 3 presents the results from confirmatory factor analysis. The measurement model provided fit to the data, $\chi^2(df) = 159.58$ (122), $P = .013$, CFI = 0.97, TLI = 0.96, RMSEA = 0.05. All items from the ERQ loaded accordingly on reappraisal, $\beta_s = 0.35$ to 0.90, $P_s < .001$, and suppression, $\beta_s = 0.65$ to 0.98, $P_s < .001$. Similarly, all items from the AHS loaded significantly on hope, $\beta_s = 0.61$ to 0.79, $P_s < .001$.

Following from previous research and preliminary analyses, the hypothesized path model was constructed to examine the effect of reappraisal and suppression on anxiety/depression, with hope as a mediator between reappraisal and anxiety/depression. The hypothesized model provided adequate fit to the data, $\chi^2(df) = 229.40$ (166), $P = .001$, CFI = 0.95, TLI = 0.94, RMSEA = 0.05.

Results from path analysis suggest that reappraisal has a significant direct effect on hope, $b = 0.96$, SE = 0.37, $\beta = 0.35$, $P = .009$, and hope has a significant direct effect on anxiety, $b = -0.98$, SE = 0.25, $\beta = -0.36$, $P < .001$, and depression, $b = -1.06$, SE = 0.22, $\beta = -0.39$, $P < .001$. The direct effects of reappraisal on anxiety and depression were not significant, $P_s > .05$. Suppression has a significant direct effect on anxiety, $b = 0.66$, SE = 0.25, $\beta = 0.21$, $P = .007$, but not depression, $P = .084$.

More importantly, the findings suggest that the hope mediated the association between reappraisal and anxiety/depression. There was a significant indirect effect of reappraisal on anxiety via hope, $b = -0.95$, SE = 0.42, 95% CI = -1.77 to -0.12. Similarly, there was a significant indirect effect of reappraisal on depression via hope, $b = -1.02$, SE = 0.43, 95% CI = -1.87 to -0.18. Together, the path model accounted for 37.6% of variance in anxiety, and 53.8% of variance in depression. Figure 1 illustrates the results from path analyses.

TABLE 3 Factor loadings on reappraisal, suppression, and hope

Items	Factors	β	SE
ERQ1	Reappraisal	0.35**	0.15
ERQ3	Reappraisal	0.55**	0.14
ERQ5	Reappraisal	0.62**	0.11
ERQ7	Reappraisal	0.83**	0.11
ERQ8	Reappraisal	0.90**	0.10
ERQ10	Reappraisal	0.71**	0.13
ERQ2	Suppression	0.65**	0.15
ERQ4	Suppression	0.68**	0.16
ERQ6	Suppression	0.98**	0.15
ERQ9	Suppression	0.72**	0.16
AHS1	Hope	0.75**	0.15
AHS2	Hope	0.65**	0.16
AHS4	Hope	0.70**	0.15
AHS6	Hope	0.79**	0.15
AHS8	Hope	0.62**	0.15
AHS9	Hope	0.62**	0.14
AHS10	Hope	0.67**	0.15
AHS12	Hope	0.61**	0.14

AHS, Adult Hope Scale; ERQ, Emotion Regulation Questionnaire.

** $P < .001$.

Lastly, an alternative path model was examined to explore if reappraisal mediated between hope and anxiety/depression. The alternative model showed a slightly poorer fit to the data, $\chi^2(df) = 256.65$ (168), $P < .001$, CFI = 0.93, TLI = 0.91, RMSEA = 0.06. In addition, the indirect effect of hope on anxiety via reappraisal was not significant, $b = -0.002$, SE = 0.09, 95% CI = -0.18 to 0.17, and the indirect effect of hope on depression via reappraisal was also not significant, $b = -0.03$, SE = 0.08, 95% CI = -0.18 to 0.12. The findings did not support the alternative hypothesis that reappraisal mediated between hope and anxiety/depression.

4 | DISCUSSION

Extending from previous research on emotion regulation¹⁰⁻¹² and hope,²⁴⁻²⁶ the present study aimed (1) to examine if reappraisal, suppression, and hope were associated with anxiety and depression in a sample of patients newly diagnosed with cancer and (2) to test if hope

TABLE 2 Results from preliminary analyses on the associations between reappraisal, suppression, hope, and anxiety/depression outcomes

Pearson's r	M \pm SD	Anxiety	Depression	Reappraisal	Suppression	Hope	Physical symptoms
Anxiety	6.76 \pm 4.06	1					
Depression	5.23 \pm 4.10	0.60***	1				
Reappraisal	31.31 \pm 6.96	-0.25**	-0.23**	1			
Suppression	15.64 \pm 6.64	0.22**	0.18*	0.18*	1		
Hope	47.03 \pm 11.16	-0.49***	-0.55***	0.42***	-0.05	1	
Physical symptoms	24.21 \pm 17.94	0.50***	0.63***	-0.12	0.15	-0.31***	1

* $P < .05$,

** $P < .01$

*** $P < .001$

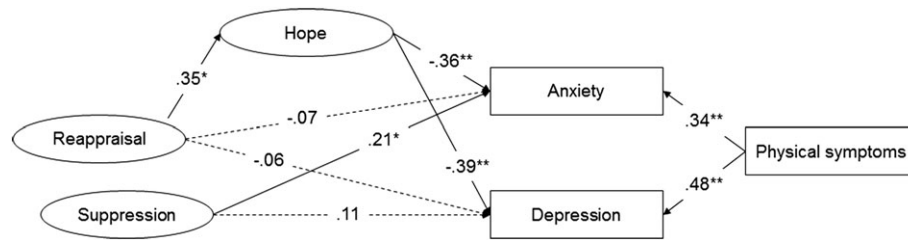


FIGURE 1 Mediation path model with adjustment for physical symptom severity. Paths depict standardized beta coefficients of direct effects of reappraisal on anxiety and depression, direct effects of suppression on anxiety and depression, direct effect of reappraisal on hope, and direct effects of hope on anxiety and depression. * $P < .01$, ** $P < .001$

mediated the association between reappraisal and anxiety/depression. The results supported our hypotheses: high reappraisal and lower suppression were associated with lower anxiety and depression, and hope mediated the association between reappraisal and anxiety/depression.

4.1 | Factors associated with anxiety and depression

A significant proportion of patients experienced anxiety and depression. More than a third of the patients were within range for borderline clinical anxiety and a quarter of the patients were within range for clinical depression. This was higher compared with previously reported prevalence rates for newly diagnosed cancer patients (19.0%–22.6% with anxiety, 12.9%–16.5% with depression).¹ Given the high prevalence of anxiety and depression observed, it may be important for clinicians and health providers to identify symptoms of emotional distress in newly diagnosed patients so that timely psychoemotional support can be provided when necessary.

Second, findings on emotion regulation and psychoemotional outcomes were consistent with previous research. Higher reappraisal was found to be associated with lower anxiety and depression, whereas higher suppression was found to be associated with higher anxiety and depression. The findings converge with studies which also observed that higher reappraisal and/or lower suppression were associated with lower anxiety, depression, and stress in clinical populations.^{17–21} Taken together, reappraisal appears to be an adaptive emotion regulation strategy, whereas suppression of emotions appears to be associated with adverse consequences. However, given the cross-sectional data, it is also plausible that patients with higher anxiety and depression were less likely to engage in reappraisal, and more likely to engage in suppression. Further studies are needed to determine the directionality of association based on longitudinal data. In addition, reappraisal was found to be positively associated with hope. This provided preliminary support for the potential role of hope as a mediator between reappraisal and anxiety/depression.

4.2 | Hope as a pathway from reappraisal to adaptive emotion regulation

Accordingly, results from path analysis showed that hope fully mediated the association between reappraisal and anxiety and depression. Although reappraisal did not have significant direct effects on either anxiety or depression, the indirect effects of reappraisal on anxiety and depression via hope were significant. Given that hope involves the individual's motivation and perceived self-competency (agency),

and the ability to plan toward goal attainment (pathways),^{24,25} our results are supported by previous research, which showed that hope was positively associated with a range of optimal psychoemotional outcomes, including lower anxiety and depression, and better well-being in patients.^{26–29}

Additional results from path analysis showed that suppression had a significant direct effect on anxiety but not depression. Contrary to our hypothesis, we did not fully replicate previous findings on the association between suppression and poorer psychoemotional outcomes.^{17–21} One reason may be that the association between suppression and depression was confounded by other variables in the path model such as reappraisal, hope, anxiety, and/or physical symptom experienced. Further studies are required to explicate the role of expressive suppression on anxiety and depression in the current population. Importantly, there is a need to consider the relative contribution of different self-regulatory processes at different time points of the illness trajectory. Compared with patients in posttreatment survivorship, newly diagnosed cancer patients may be more likely to be focused on diagnostic and/or treatment-related concerns than achieving psychosocial well-being.³⁸ Thus, hope-mediated reappraisals about starting treatment and accomplishing primary treatment goals may have played a more significant role in adaptive emotion regulation than emotion expression in the current sample of newly diagnosed patients. Lastly, the study also did not find support for an alternative model with reappraisal as a mediator between hope and anxiety/depression.

In summary, findings from the current study suggest that hope-oriented cognitions may be a mediating pathway from reappraisal to adaptive emotion regulation.

4.3 | Study limitations

Some limitations to the present study should be considered. First, although path analysis was used to determine the direct and indirect effects of reappraisal, suppression, and hope on anxiety/depression outcomes, the study design remains cross-sectional and causal relations cannot be inferred. Specifically, longitudinal studies with 3- or 2-wave designs are needed for mediation effects to be reliably established. The current path analysis was also limited by a relatively small sample size. In addition, there may be overlaps between the constructs reappraisal, suppression, and hope. However, the current study tested the measurement model of emotion regulation and hope constructs, and path analysis was conducted based on the verified measurement model. Second, the study measures were based on self-report. Future studies may consider additional physiological

measures or clinician-assessed anxiety and depression, or obtain corroborative information based on informant report. Third, although measures for emotion regulation and hope have been previously validated in nonclinical populations, the measures have yet to be validated with cancer patients in Singapore. Fourth, the present study examined only patients newly diagnosed with cancer, it is uncertain if current findings are generalizable to patients receiving diagnoses of recurrent or metastatic cancer. Finally, the study only focused on 2 emotion regulation strategies (reappraisal and suppression) and hope. The role of additional internal resources such as other emotion regulation or coping strategies, or external resources such as caregiver and/or social support should also be considered in future studies.

4.4 | Clinical implications

The study findings provided new evidence for the role of hope as a mediator between reappraisal and anxiety/depression outcomes in patients newly diagnosed with cancer. Potential clinical implications from the study results include a need for health care providers to recognize and attend to psychoemotional needs of newly diagnosed patients. Routine monitoring and screening for anxiety and depressive symptoms may help health care providers identify patients who may be at risk for psychoemotional distress and provide timely interventions as appropriate. In addition, the mediation findings suggest that supportive interventions that facilitate hopeful cognitions may benefit newly diagnosed cancer patients experiencing anxiety and depressive symptoms. Such interventions may aim to (1) to facilitate goal-setting by encouraging patients to formulate feasible treatment-related or psychosocial life goals in their adjustment to cancer survivorship, (2) to facilitate flexible generation of alternative/contingency plans, and (3) to build mastery and motivation by facilitating the reappraisal of obstacles as challenges instead of threats to goal attainment, or by emphasizing/praising progressive successful attainment of subgoals. Although further studies are required as the current findings are preliminary, efforts in identifying early protective factors that may reduce emotional distress and/or maintain or promote psychosocial well-being are important for improving patient care.

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CONFLICT OF INTEREST

The authors declare no conflict of interests.

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