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REGULAR ARTICLE

# The Double-Edged Sword of Reflective Pondering: The Role of State and Trait Reflective Pondering in Predicting Depressive Symptoms Among Women With Breast Cancer

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**Abstract**

***Background and Purpose*** Prior research has debated whether reflective pondering is a more constructive form of rumination than brooding, which is generally considered maladaptive. This study sought to investigate whether reflective pondering predicts depressive symptoms and whether reflective pondering is adaptive under certain conditions. We predicted that the effectiveness of reflective pondering could depend on concurrent coping strategies and the trait–state distinction.

***Method*** Women with breast cancer ($N$ = 309; $M$ age = 47.5) were assessed at four waves over 2 years. A time-lagged design was applied, with rumination (i.e., brooding and reflective pondering) and coping (i.e., engagement and disengagement) measured from T1 to T3, predicting depressive symptoms assessed from T2 to T4. These variables were measured by the Ruminative Response Scale, the Brief COPE, and the Hospital Anxiety and Depression Scale.

***Results*** Using hierarchical linear modeling, brooding, but not reflective pondering, predicted elevated depressive symptoms at both between- and within-person levels. The relationship between reflective pondering and depression was moderated by the coping strategies. Individual differences in reflective pondering predicted worse depressive symptoms, but higher use of engagement coping mitigated the detrimental effect. Within individuals, the co-occurrence of reflective pondering and disengagement coping predicted a subsequent decrease in depressive symptoms.

***Conclusions*** The emerging role of reflective pondering in the face of breast cancer-related stress appears to be a double-edged sword. Its impact on depression may depend on concurrent coping strategies and whether reflective pondering is assessed at state and trait levels.

**Keywords:** Reflective pondering · Brooding · Engagement and disengagement coping · Depressive symptoms · Breast cancer

Given the life-threatening and chronic nature of breast cancer, along with the associated physical hardships, many women with breast cancer struggle with depressed mood [1], resulting in short- and long-term challenges. Breast cancer is the most commonly diagnosed type of cancer among women worldwide, accounting for 24.2% and 30% of new cancer cases diagnosed worldwide and in the USA [2, 3], respectively, and 25.5% in Taiwan [4] between 2018 and 2019.

During the first year after surgery, over 60% of women report clinically significant levels of depressive symptoms [1, 5]. A nationwide population-based study in Taiwan indicated that breast cancer patients are at an increased risk of major depression (1.94 times higher than a matched cohort) and that depression was the highest during the first year after diagnosis [6]. Studies have reported that 15%–22% of women experience prolonged depression 1–2 years after surgery [7, 8]. Thus, longitudinal studies can help clarify the factors that predict increased depressive symptoms.

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Depression, either as a clinical diagnosis or through symptoms, predicts an elevated risk for mortality in cancer patients. In comparison with nondepressed cancer patients, the relative mortality risk in depressed patients increases by 19% [9]. Among risk factors for depression in women with breast cancer, it has been consistently shown that psychosocial factors play a pertinent role in the prediction and maintenance of depressive symptoms among cancer patients [7, 10]. In a systematic review of longitudinal predictors for the psychological adjustment of women with breast cancer, cancer-related rumination was a consistent predictor of prolonged depressive symptoms [11]. However, in this review, rumination was assessed as anxious preoccupation, a maladaptive coping strategy measured by the Mental Adjustment to Cancer scale [12].

Smith and Alloy reviewed 10 models of rumination [13] and concluded that rumination is more than just a coping strategy in that it can also indicate a vulnerability to the development and maintenance of depression. The most prolific model of rumination, the Response Styles Theory (RST) [14], asserts that rumination is a self-focused cognitive response to depression, characterized by passive and repetitive thinking about the causes and consequences of negative emotions, which prolongs and possibly exacerbates these symptoms.

### Rumination in the Context of Cancer

The cognitive processing theory postulates that cancer is a fertile ground for rumination [15, 16]. Receiving a diagnosis of cancer often gives rise to a perceived discrepancy between the meaning of the event and preexisting assumptions about the world [15]. The ensuing disruptions in many life domains may produce intensive cognitive and coping responses [17]. One common response is rumination, which may play a key role in the onset and maintenance of depression in cancer adjustment [18, 19]. Cancer-related rumination and negative attentional bias in the aftermath of cancer diagnosis and treatment contribute to psychological morbidity [11, 20, 21]. On the contrary, rumination, as a method of cognitively processing and actively thinking about cancer and its implications, has an important impact on cancer adaptiveness [15, 16]. Therefore, it is possible that different types of rumination play distinct roles in the context of cancer adjustment.

Breast cancer patients are particularly deserving of this focus as they comprise a large segment of the female cancer population (about 12% U.S. women will develop invasive breast cancer over the course of their lifetime) [3], and they are twice as likely than the general female population to have clinically important psychological morbidity, including depression, in the year after diagnosis [7]. It is important to investigate the cognitive process that interferes with or facilitates cancer adjustment. Longitudinal research is required to elucidate the relationship between rumination and depressive symptoms among breast cancer patients.

### Reflective Pondering Versus Brooding

The Ruminative Responses Scale (RRS), developed based on the RST, has been criticized for its conceptual overlap with depressive symptoms [22]. In addition, it has been argued that the conceptualization of rumination contains mixed functions such that some aspects of rumination overlap with the concept of reflection [13, 22]. In an attempt to purge the items that overlapped with depressive symptoms, Treynor et al. [22] narrowed the original RRS down to 10 items. Two forms of rumination have been identified in the new, shortened scale, known as brooding and reflective pondering. Brooding refers to passively dwelling on the negative causes and consequences of low mood and goal nonattainment (e.g., "Why do I have problems others do not have?" [22]). Although research has robustly linked brooding to depression [22, 23], reflective pondering has been distinguished from brooding as an intentional self-focus motivated by intellectual curiosity and the desire to problem-solve, which may facilitate self-knowledge and self-regulation (e.g., "Analyze your personality to try to understand why you are depressed" or "Write down what you are thinking about and analyze it" [22]). Brooding has an evaluative focus (i.e., self-criticism), whereas reflective pondering is rather nonjudgmental. Theorists have assumed that reflective pondering, with a motivation of epistemic curiosity (i.e., the desire for new knowledge), can be protective against depressive symptoms [24]. Research indicates that brooding is maladaptive and perpetuates depressive symptoms both in the general population and in cancer patients [23, 25, 26]. However, in contrast to the clear link between brooding and depression, the relationship between reflective pondering and depression remains largely unresolved [22, 24].

### Findings Regarding the Relationship Between Reflective Pondering and Depression

In noncancer populations, studies have shown that reflective pondering is negatively correlated [22, 27, 28] or unrelated [29, 30] to depression. Other studies, however, have found that reflective pondering, as with other forms of depressive rumination, is positively correlated with depression [31–33]. Similarly, among breast cancer survivors, instrumental rumination (similar to reflective pondering) was found to be negatively correlated with depressive symptoms [34]. By contrast, other studies of cancer survivors have shown that reflective pondering was associated

with maladaptive outcomes, including depressive symptoms [20]. In one longitudinal study among colon cancer patients, reflection (similar to reflective pondering) did not predict depression but predicted greater avoidance symptoms at follow-up [21]. Taken together, while reflective pondering has been argued to be functionally distinct from brooding [22], studies with cancer patients and the general population have returned mixed findings as to whether reflective pondering is maladaptive or adaptive.

Longitudinal research on the association between these ruminative styles, particularly reflective pondering and depression, is limited among cancer patients. Conclusions based on cross-sectional design are undermined by the intertwined concurrent correlations among brooding, reflective pondering, and depressive symptoms [27]. To develop a model that demonstrates how brooding and reflective pondering prospectively predict depressive symptoms, longitudinal research is needed. It remains to be established whether reflective pondering, independent of brooding, predicts higher or lower depressive symptoms among breast cancer patients.

### Trait Versus State Reflective Pondering

Rumination has been conceptualized as an underlying trait that drives an individual to respond to triggers with repetitive thinking of the negative consequences and meaning [13]. Although research has conceptualized rumination as a stable response style [14, 24, 35], other studies have recognized rumination as a transitory response to stress that fluctuates over time [13, 22, 32, 36], possibly perpetuated by a desire for mastery or control [36]. Indeed, certain aspects of a ruminative process are transitive and state like, as seen in a host of experimental studies that induce participants to dwell on self-focused thoughts (cf. [37]). However, no study has specifically examined the effects of both state and trait rumination on depression. We reasoned that state rumination, as a coping response to stress or the discrepancy between one's desired and actual situation, can be distinguished from trait rumination. This study focused on trying to understand whether state and trait rumination contribute to depression in different ways. To elaborate upon the above issues, we adopted a repeated-measure design across a 2 year span. We followed women who underwent breast cancer surgery, from 3 to 24 months postsurgery, and conducted a time-lagged analysis to examine whether a fluctuation in reflective pondering between (trait-like) and within (state-like) individuals has an effect on depressive symptoms.

### The Goal Progress Theory

In accordance with the goal progress theory, we argue that reflective pondering has a problem-solving intention and is driven by a perceived discrepancy between an individual's current situation and their goals [23]. Reflective pondering provides an opportunity for effective problem-solving or goal attainment [24, 36]. Other researchers have argued that reflective pondering reflects an attempt to find meaning and learn from an experience [16] or that it is a process in which the individual deliberately turns inward to understand and solve his or her problems [38].

Conversely, reflective pondering can be maladaptive when an individual is unable to adopt effective strategies for closing the gap between their current state and desired goals [36]. We located one cross-sectional study that considered the interaction between reflective pondering and active coping [25]. With undergraduate students as participants, an increased use of reflective pondering was related to more symptoms of depression when combined with low levels of active coping [25]. Therefore, we propose that reflective pondering can be maladaptive if the individual is unable to actively cope with stressors. According to the goal progress theory, we postulated that the function of reflective pondering depends on the progression of coping strategies.

### The Current Study

The question guiding this study was whether reflective pondering is predictive of depressive symptoms following cancer and, if so, whether the effects depend on certain conditions. Taken together, the studies reviewed above imply that the impact of reflective pondering on depression can be obscured by brooding. Although our primary focus was reflective pondering, the inevitably intertwined relationship between brooding and reflective pondering should be taken into consideration when addressing the independent effect of reflective pondering on depression. In addition, we aimed to consider whether trait-like reflective pondering and state-like reflective pondering have different effects on depression.

Finally, along with the argument that reflective pondering is a cognitive process with the intent of meaning-making and goal attainment, we predicted that the effect of reflective pondering on depression would be contingent on the concurrent coping strategies adopted [25, 36]. Guided by theoretical frameworks [39], we classified coping strategies as *engagement* versus *disengagement* coping. Engagement coping includes active coping and planning, support seeking, and cognitive restructuring. Disengagement coping reflects an attempt to escape feelings of distress, including denial, behavioral disengagement, and self-blame. An engagement/disengagement or approach/avoidance distinction on forms of coping has been widely used in studying psychological adjustment to cancer [39]. This distinction maps well onto the

goal-based model [36, 40] that forms the basis of our understanding of reflective pondering, as it offers an individual the opportunity to problem-solve a perceived discrepancy between their actual and desired states. Meta-analyses have indicated that engagement coping is mostly beneficial for mental health, while disengagement coping typically predicts poorer outcomes [41, 42].

This study used multiwave, longitudinal data from a sample of women in Taiwan who had undergone surgery for breast cancer. We first examined the concurrent impact of brooding and reflective pondering on depression. Second, we focused on elucidating pathways through which reflective pondering can become maladaptive or adaptive as evidence by its effect on subsequent depression. Based on previous research, we hypothesized that brooding would predict worse depressive symptoms, but the effect of reflective pondering would depend on the coping strategies used. Specifically, we investigated the possibility that engagement and disengagement coping strategies moderate the impact of reflective pondering on depression. Third, the relationship between rumination (i.e., brooding and reflective pondering) and depression was examined as a function of between-person (i.e., trait-like) and within-person (i.e., state-like) differences. Both trait rumination and state rumination can contribute to depressive symptoms in response to cancer-related stress. As an exploratory aim, we examined whether trait and state reflective pondering have different effects on depression among women who have undergone breast cancer surgery. We also tested the interactions between reflective pondering and engagement and disengagement coping strategies at the trait and state levels.

## Methods

### Participants and Procedures

Recruitment of participants took place at a medical center in Taiwan. From 2010 to 2012, lists of women who underwent breast cancer surgery were provided by breast cancer case managers. For reasons unrelated to the current investigation, research assistants approached patients during hospitalization for their surgery. Eligible participants were 18 years or older, aware of the diagnosis of breast cancer, with no previous diagnosis of cancer, and no serious psychiatric history. Three to four months following surgery ($M$ = 94 days; median = 92 days; range = 53–152 days), participants completed the first assessment (T1), followed by assessments at 3 (T2), 9 (T3), and 21 (T4) months after the initial assessment. The intervals between assessments were based on the key periods in breast cancer treatment and recovery (i.e., postsurgery): 3 months (beginning of adjuvant treatment), 6 months (active treatment phase), 12 months (completion of active treatment/reentry phase), and 24 months (survivorship) postsurgery. Each assessment took place during routine follow-up appointments. Those who did not come to the clinic were contacted by phone and questionnaires were mailed to them. Each assessment was compensated with a $4 gift card. The study was approved by the institutional review board of the study site (reference number: 100807) and was conducted in accordance with the Declaration of Helsinki. All participants gave written informed consent.

Of 359 women who consented to participate in the study, 326 (92%) women completed the T1 assessment. Due to the time-lagged design, participants who completed only one assessment were excluded. The final pool of participants included 309 women. Of these, 304 completed T2, 300 completed T3, and 296 completed T4. There were a total of 877 observations. Of the 33 women who provided no data at all and the 17 women who completed only one assessment (a total of 50 excluded), the most common reason for declining participation was that it was considered too burdensome ($n$ = 20), including cognitive burden. Other reasons included being too busy at the time ($n$ = 9), physical discomfort ($n$ = 8), being overwhelmed with the cancer diagnosis ($n$ = 7), and lost contact or moved ($n$ = 6). Compared to participants, nonparticipants ($n$ = 50) were older ($t$ = 4.68, $p$ < .001) and less educated ($t$ = −6.70, $p$ < .001), but no significant differences were seen on marital status, disease stage, type of surgery, or type of adjuvant therapy (i.e., radiotherapy, chemotherapy, or hormonal therapy).

Participants' ages ranged from 25 to 72 years ($M$ = 47.5 years, standard deviation [$SD$] = 8.8). The majority of participants (86.0%) were married. Data were collected on education levels: 16.8% had less than high school, 15.1% were high school graduates, and 68.1% were college graduates or above. Almost one third of the women (31.8%) reported an average monthly household income of less than $1,000, 30.9% reported $1,000–$1,999, 19.5% reported $2,000–$2,999, and 10.3% reported an income of above $3,000. Data were collected on participants' stage of breast cancer: Stage 0 (15%), Stage I (35%), Stage II (36%), Stage III (13%), and Stage IV (1%). Most women (77.7%) were treated with either adjuvant radiation therapy or chemotherapy, 39.8% were treated with both radiation therapy and chemotherapy, and 69.4% received hormonal therapy. The majority of women had undergone lumpectomies (58.0%), whereas the rest had mastectomies.

### Measures

Rumination and coping were measured at T1–T3, and depression was assessed at T2–T4. Demographic data were collected via self-report at T1, and medical data were collected via medical chart review.

The revised RRS [22] is a 10-item self-report measure of the tendency to ruminate in response to a dysphoric mood. The RRS measures repetitive thinking that is not confounded with depression content. Following a factor analysis of the RRS, Treynor et al. [22] identified two distinct types of rumination: brooding and reflective pondering. Each subscale comprised five items. Research has demonstrated that the RRS has high internal consistency (Cronbach's α of approximately .90) and acceptable convergent and predictive validity [22]. For the RRS, participants rated each item on a four-point Likert scale ranging from 1 (almost never) to 4 (almost always).

The Brief COPE [43], composed of 28 items measuring 14 coping strategies, is one of the most widely used instruments for assessing strategies for coping with various life-threatening or health-related events. For each coping strategy, participants were asked to indicate the extent to which they used it to deal with their cancer experience. Items were scored using a four-point Likert scale ranging from 1 (I haven't been doing this at all) to 4 (I've been doing this a lot). The score of each coping strategy ranged from 2 to 8. Substance use was excluded because participants mostly indicated very little use of this coping strategy ($M$ = 2.15, $SD$ = 0.25), resulting in 13 coping strategies for analysis.

Depressive symptoms were measured using the depression subscale of the Hospital Anxiety and Depression Scale (HADS) [44]. The HADS-depression is a seven-item scale that assesses symptoms of depression among medical patients. Participants rated each item on a four-point scale. The total scores ranged from 0 to 21. Responses were summed across items, with higher values indicating greater depressive symptoms. The Cronbach's α coefficients in the present sample were .78, .77, and .75 at T2, T3, and T4, respectively.

### Statistical Analysis

To establish the factor structure of the RRS for this study, prior to conducting the main analysis, the sample was randomly divided into two groups for exploratory and confirmatory factor analyses (EFA and CFA). The factor structure that resulted from EFA was then tested with a CFA to assess the adequacy in the current sample. For the Brief COPE, the classification of coping strategies was based on the EFA results and existing theoretical frameworks [39].

The main investigation was designed to test a two-level (within-person and between-person) hierarchical model, in which two to four waves of data were nested within each participant. The analyses were focused on two key questions: (a) to what extent do within-person changes in subtypes of rumination and coping predict subsequent within-person changes in depression and (b) to what extent do between-person differences (i.e., individual differences) in subtypes of rumination and coping predict overall levels of depression? Lagged analyses were conducted using hierarchical linear modeling (HLM), which was performed with the software package (HLM7) [45]. Within-person variance can be conceptualized as a state-like construct, and between-person variance can be conceptualized as a trait-like construct.

Subtypes of rumination and coping were centered on individual means, thereby generating two terms for each variable: the between-person variance, representing each individual's mean scores averaged across all waves, and the within-person variance, representing deviations relative to each individual's mean across all waves. Using HLM allowed us to test the directionality of the causal relationship by measuring the association between within-person predictors and time-lagged outcome variables (i.e., predictors at $\text{time}_t$ were correlated with outcome variables at $\text{time}_{t+1}$).

The outcome measure (i.e., depression) and the key predictor measures (i.e., rumination and coping) were within-person (Level 1) variables. Individual participants' mean levels of each rumination and coping subtypes were between-person (Level 2) variables, as were the demographic and medical covariates. Adding participants' within-person average level of rumination and coping subtypes to between-person level equations enabled us to differentiate predictors in the within-person effect from those in the between-person effect. It was hypothesized that, in addition to having direct effects on depression, coping would moderate the effects of reflective pondering. Therefore, Reflective Pondering × Engagement Coping and Reflective Pondering × Disengagement Coping, at within- and between-person levels, were entered into the model.

Analyses were first conducted to determine whether there were any significant bivariate relationships between depression (i.e., HADS-depression scores) and the demographic and medical variables, including age, education, marital status, cancer stage, type of surgery, and reception of adjuvant treatment. We included those significant covariates into the regression model. All predictors were entered together into the HLM analysis. Regression coefficients were estimated using restricted maximum-likelihood estimation [46]. One advantage of HLM is its ability to use all available data at the within-person level [47]. At the between-person level, each variable was missing data for no more than two cases (0.6%), which were replaced with the between-person mean value. Unstandardized beta weights in regression were reported as γ weights in the HLM models.

If any interaction term was significant, the interaction was plotted following the procedure illustrated by Preacher et al. [48], with conditional values of moderators set at 1 $SD$ above and below the mean. Since we assumed

**Table 1.** Descriptive statistics and correlations among variables within and between individuals

| Variable | *M* | *SD* | ICC | 1. | 2. | 3. | 4. | 5. |
|---|---|---|---|---|---|---|---|---|
| 1. Brooding | 7.48 | 2.00 | .43 | — | .61*** | .29*** | .48*** | .31*** |
| 2. Reflective pondering | 10.20 | 2.75 | .52 | .66*** | — | .40*** | .43*** | .14*** |
| 3. Engagement coping | 52.03 | 10.26 | .64 | .32*** | .50*** | — | .31*** | −.20*** |
| 4. Disengagement coping | 10.63 | 2.81 | .52 | .58*** | .51*** | .36*** | — | .30*** |
| 5. Depressive symptoms | 4.38 | 3.14 | .67 | .37*** | .18** | −.28*** | .40*** | — |

Correlations below the diagonal represent between-person (aggregated) scores ($n$ = 309) and within-person are shown above the diagonal (*observations* = 877). Within-person correlations refer to concurrent associations between variables across all the time points at which it was measured (i.e., all the correlations were obtained at the same wave).

*ICC* intraclass correlation coefficient; *SD* standard deviation.

**$p < .01$, ***$p < .001$.

that rumination, coping, and depression would not only vary between individuals but also fluctuate over time, we partitioned the variance of each variable into between and within individual to assess the extent to which the total variance in these variables was due to the within-person change relative to differences between individuals. This was achieved by analyzing the intraclass correlation (ICC) [46]. In the current study, the ICC indicates the percentage of the variance in each variable that is due to stability across the study period (i.e., between person). Therefore, 1 − ICC represents the percentage of the variance contributed by the within-person change over time [49].

## Results

### Establishing Factor Structures for the RRS and the Brief COPE

A principal-components EFA with Promax rotation was conducted on the 10 RRS items for Subsample 1 ($n$ = 149). Two factors emerged with eigenvalues greater than 1 (accounting for a combined 57.72% of the variance), and an examination of the scree plot supported the two-factor solution. All variables had factor loadings greater than .43. The two factors corresponded well with the brooding and reflective pondering subscales, except for Item 4 ("Think why do I always react this way?"), which was intended to load on the brooding scale but ended up loading on the reflective pondering scale in our sample.

We then conducted a CFA to assess the adequacy of our two-factor model for Subsample 2 ($n$ = 163). This model was confirmed with better model fit ($\chi^2$/degrees of freedom [*df*] = 2.13, nonnormed fit index [NNFI] = .98, root mean square error of approximation [RMSEA] = .060, and standardized root mean square residual [SRMR] = .054) than the original two-factor model ($\chi^2/df$ = 3.28, NNFI = .96, RMSEA = .086, and SRMR = .069). The factor structure was consistent with that found in a Taiwanese undergraduate sample [50]. The sum of each subscale was calculated (with scores ranging between 4 to 16 for brooding and 6 to 24 for reflective pondering). In this study, the internal consistency coefficients (Cronbach's α) of the brooding and reflective pondering dimensions were .81, .82, and .82 and .83, .86, and .85 from T1 to T3, respectively.

In classifying coping strategies as either engagement versus disengagement coping, we were guided by existing theoretical frameworks [39] and a factor analysis of our data. An EFA of 13 coping strategies revealed a two-factor solution, consistent with the engagement and disengagement scales found in previous research [17]. Self-distraction did not load (i.e., factor loading less than .40) on either factor and was excluded from the model. Two summary scales were created: *engagement coping* (active coping, use of emotional support, use of instrumental support, venting, positive reframing, planning, humor, acceptance, and religion) and *disengagement coping* (denial, behavioral disengagement, and self-blame). The internal consistency coefficients (Cronbach's α) were .92, .88, and .90 and .71, .72, and .78 for engagement and disengagement coping, respectively, from T1 to T3.

### Means, Zero-Order Relationships, and ICCs

Table 1 shows the descriptive statistics and bivariate relationships among the variables. Brooding, reflective pondering, and disengagement coping had positive relationships with depressive symptoms, and engagement coping had a negative relationship with depressive symptoms on both within- and between-individual levels.

Table 1 also shows the ICC for each of the rumination, coping, and depression variables. Within-individual variance was substantial for each variable as indicated by calculating 1 − ICC. All variables demonstrated comparable variance in stability and change over time. For example, for brooding, 43% of the variance was due to

**Table 2.** Correlations at each wave ($n$ = 309; observations = 877)

| | 1. Brooding | | | 2. Reflective pondering | | | 3. Engagement coping | | | 4. Disengagement coping | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 | T1 | T2 | T3 |
| 2. Reflective pondering | .62*** | .57*** | .63*** | | | | | | | | | |
| 3. Engagement coping | .30*** | .18** | .35*** | .35*** | .40*** | .44** | | | | | | |
| 4. Disengagement coping | .50*** | .39*** | .56*** | .43*** | .41*** | .47*** | .23*** | .33*** | .34*** | | | |
| 5. Depressive symptoms (T + 1) | .29*** | .35*** | .29*** | .20*** | .13* | .09 | −.19*** | −.28*** | −.15** | .35*** | .25*** | .31*** |

Correlations between Variables 1–4 (i.e., brooding, reflective pondering, engagement coping, and disengagement coping) were concurrent (i.e., measured at the same wave); correlations between Variables 1–4 and depressive symptoms were prospective (i.e., T with T + 1); T1–T4 reflects 3, 6, 12, and 24 months postsurgery, respectively.

***$p$ < .001, **$p$ < .01, *$p$ < .05.

**Table 3.** Results of the hierarchical linear modeling predicting depressive symptoms

| Predictors | Depressive symptoms | | | |
|---|---|---|---|---|
| | Γ | *SE* | *T* | Effect size *r* |
| Constant | 4.74 | 0.18 | 26.75*** | |
| Between-person level ($n$ = 309) | | | | |
| Education | −0.22 | 0.17 | −1.30 | .07 |
| Brooding | 0.45 | 0.10 | 4.50*** | .25 |
| Reflective pondering | 0.11 | 0.08 | 1.37 | .08 |
| Engagement coping | −0.17 | 0.02 | −9.35*** | .47 |
| Disengagement coping | 0.37 | 0.07 | 5.62*** | .31 |
| Reflective pondering × Engagement | −0.02 | 0.01 | −3.45*** | .19 |
| Reflective pondering × Disengagement | 0.001 | 0.02 | 0.09 | .01 |
| Within-person level (observations = 877) | | | | |
| Brooding | 0.20 | 0.06 | 3.46*** | .19 |
| Reflective pondering | −0.07 | 0.05 | −1.58 | .09 |
| Engagement coping | −0.02 | 0.02 | −0.96 | .05 |
| Disengagement coping | 0.02 | 0.04 | 0.47 | .03 |
| Reflective pondering × Engagement | 0.002 | 0.003 | 0.86 | .05 |
| Reflective pondering × Disengagement | −0.02 | 0.01 | −2.07* | .12 |

Education was coded as 1 (6 years or less), 2 (9 years), 3 (12 years), and 4 (more than 12 years).

*SE* standard error.

*$p$ < .05, **$p$ < .01, ***$p$ < .001.

stability across the study period and 57% of the variance was due to change over time.

Table 2 shows the concurrent correlations among the study predictors (brooding, reflective pondering, engagement, and disengagement coping) at each wave from T1 to T3 and prospective correlations between these predictors and depression at $T_{t+1}$.

## HLM Analysis: Relationships Between Rumination, Coping, and Depression

Among demographic and illness variables, only education ($r$ = −.19, $p$ = .002) was significantly correlated with depressive symptoms. Consequently, it was entered into the HLM as a covariate. Table 3 presents the results of the HLM analysis predicting depressive symptoms. At the between-person level, scores on the brooding and disengagement coping significantly predicted greater depression scores and higher scores on the engagement coping predicted lower depression. Conversely, trait reflective pondering did not significantly influence depression.

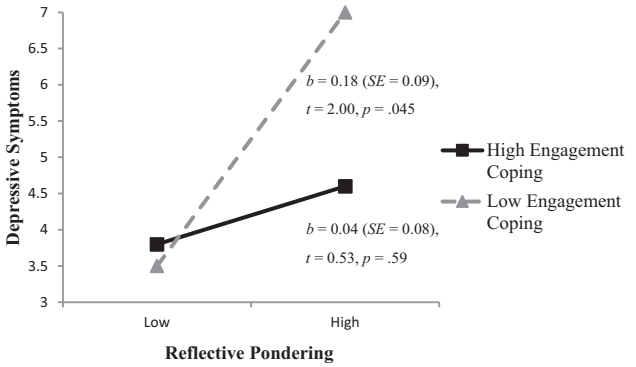


**Fig. 1.** Trait reflective pondering interacted with engagement coping predicting depressive symptoms. High and low levels correspond to 1 standard deviation above or below the mean, respectively.

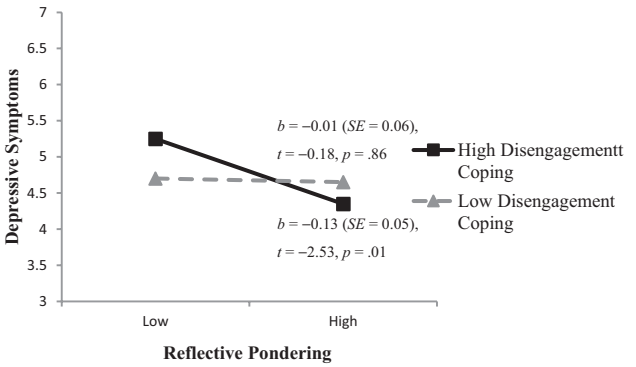


**Fig. 2.** State reflective pondering interacted with disengagement coping predicting depressive symptoms over time. High and low levels correspond to 1 standard deviation above or below the mean, respectively.

There was a significant Reflective Pondering × Engagement Coping interaction at the between-person (trait) level. Engagement coping moderated the effects of reflective pondering on depression symptoms. Higher reflective pondering significantly predicted higher depression when engagement coping was low. However, when levels of engagement coping were high, reflective pondering did not predict depression, suggesting that high engagement coping buffered the negative effect of reflective pondering. Figure 1 illustrates the reflective pondering–depression slopes when engagement coping was higher than average (+1 *SD*) and lower than average (−1 *SD*). The Reflective Pondering × Disengagement Coping interaction was not significant at the between-person level.

At the within-person (state) level, HLM assessed the effect of the predictor variables on depressive symptoms at the next wave. When individuals had higher brooding than their T1–T3 average, they also had higher than average depressive symptoms (i.e., their T2–T4 average). However, there was no main effect of reflective pondering or engagement/disengagement coping on depression at the within-person level. Disengagement coping significantly moderated the effects of reflective pondering on depression at the within-person level. As illustrated in Figure 2, when disengagement coping was higher than usual, higher reflective pondering predicted lower depression. The Reflective Pondering × Engagement Coping interaction was not significant at the within-person level.

## Discussion

This longitudinal study, with four waves of data collection, examined the effects of two types of rumination (brooding and reflective pondering) and engagement and disengagement coping on depressive symptoms among Taiwanese women who had undergone breast cancer surgery. We partitioned each variable into the within-person and between-person effects to examine the state and trait effects, respectively, and extended the investigation to consider interactions between reflective pondering and coping strategies.

Our findings supported a two-factor model of rumination, namely, brooding, and reflective pondering [22, 23] and were consistent with studies describing similar forms of rumination [32, 35, 51]. Our results also support previous findings that brooding and reflective pondering have different effects on depressive symptoms and, although brooding is typically considered a more maladaptive form of rumination, the function of reflective pondering depends on the coping strategies used.

As expected, stronger brooding was associated with greater depressive symptoms at within- and between-person levels. These results were consistent with Watkins's repetitive thought model, which proposes that negative and abstract thought content exacerbates mood disturbance [24].

The relationship between within- and between-person reflective pondering and depression was dependent upon the coping strategies adopted. Although stronger reflective pondering at the between-person level (i.e., trait reflective pondering) was related to a higher level of depressive symptoms in women utilizing less engagement coping, the negative impact of reflective pondering was dampened when the individual reported a greater tendency toward engagement coping. At the within-person level, increased use of reflective pondering (i.e., state reflective pondering) predicted lower levels of depressive symptoms only when individuals used more disengagement coping than usual. These results suggest that state reflective pondering had a protective effect when individuals tried to cope by disengaging.

### Trait Reflective Pondering and Engagement Coping

At the between-person level of our HLM analysis, engagement coping significantly moderated the effect of trait reflective pondering on depressive symptoms,

which parallels the findings of Marroquín et al. [25] and Thompson et al. [52]. According to the RST [14], any form of ruminative response style is maladaptive and serves as a cognitive vulnerability to a prolonged depressed mood [35]. The present study added to our knowledge that engagement coping protects women with breast cancer from this potentially harmful effect of trait reflective pondering on depression. On the contrary, echoing previous findings, the HLM results suggest that trait reflective pondering can lead to increases in depression if there is not also an adaptive coping style present (i.e., engagement coping) [25, 52].

Echoing the goal progress theory, reflective pondering refers to an individual's tendency to focus on a perceived mismatch between their current state and their desired state, which leads them to ponder why such a discrepancy exists [13, 24, 36]. In our framework, trait reflective pondering is the tendency to turn inward and engage in cognitive problem-solving when one encounters an actual–desired state discrepancy. Trait reflective pondering as a stable response style overlaps with worry [53]. Individuals with such a trait can become mired in unproductive and repetitive thinking of the plight. It is important that the consequence of cognitive processing be determined by the direction of action [36]. Engaging in cognitive readjustment or implementing actions that reduce the actual–desired state discrepancy is at best protective and eliminates the vicarious cycle [36, 40].

One explanation for our finding that trait reflective pondering interacts with engagement coping is that individuals who tend to engage in reflective pondering are highly self-focused and likely to dwell on the reasons for being in their current state rather than their desired state. Without a protective coping strategy, these individuals can become trapped in perseverative reflective pondering, thereby resulting in increased depressive symptoms [54]. Adaptive coping strategies that can help individuals work through goals and reach a resolution include both problem-focused coping (such as planning, active coping, and instrumental behavior) and emotion-focused coping (such as acceptance, positive reframing, and humor) [23, 36, 55].

### State Reflective Pondering and Disengagement Coping

This study has added to our understanding of cognitive models of rumination by considering the state-like nature of reflective pondering. In light of the goal progress theory [36], the findings imply that state reflective pondering may serve as an adaptive coping strategy, reflecting attempts at problem-solving. State reflective pondering appears to protect against depression when it occurs concurrently with disengagement coping, lending support to the notion that state reflective pondering is not a maladaptive form of rumination [22, 23, 25]. In reaction to the stress of breast cancer diagnosis and treatment, transitory reflective pondering may be used to find meaning [16] or turn inward for problem-solving [38] and consequently benefit mental health.

While disengagement coping is known for its ability to elicit or exacerbate depressive symptoms [41, 42], women who use disengagement to cope with their breast cancer condition but still engage in self-reflection, meaning finding, and cognitive elaboration of their current problems may be somewhat protected from depression. That is, our results suggest that state reflective pondering can prevent the mood deterioration that would otherwise be produced by disengagement coping. State reflective pondering may serve as a purposeful and instrumental coping strategy to regulate negative affect [13, 22, 36].

As the interaction between state reflective pondering and disengagement coping occurred at the within-person level, it implies that, when women with breast cancer disengage from their current stress, state reflective pondering is adaptive because it offers an opportunity to clarify the problem and move toward goal attainment, thereby alleviating depressive symptoms. Mirroring the compensatory hypothesis [56], for individuals whose repertoire includes adaptive and maladaptive strategies, state reflective pondering can be construed as an adaptive strategy most likely to lower depressive symptoms when levels of concurrent maladaptive strategies are also high [56]. Following this hypothesis, self-focused state reflective pondering may offer women with breast cancer an opportunity to examine their current problem and analyze the discrepancy that appears when they try to disengage from distress or engage in self-blame, thereby ameliorating depressive symptoms.

### Clinical Implications

Many people with cancer struggle with "why me" questions [15], and the existential angst that arises from a cancer diagnosis is substantial. The drive to understand both why one developed breast cancer and what it means encourages unavoidable repetitive thinking [15, 16]. Although brooding is more clearly maladaptive, reflective pondering is not inherently depressogenic for women with breast cancer. Therefore, it is important to target distinct types of self-focused thoughts in psychotherapy for breast cancer patients. For individuals who engage in frequent brooding, increasing experiential self-focus and motivation for epistemic curiosity can help alleviate depression [24]. Brooding makes individuals susceptible to impaired capacity to generate and

implement solutions [37], making it strongly associated with depression. Several interventions have been found to reduce brooding, including mindfulness-based cognitive therapy [26] and cognitive control training [57].

For the assessment of ruminative thinking, our findings support the importance of distinguishing reflective pondering from brooding, as well as the characterization of brooding as more negative in valence than reflective pondering [24]. The difference between reflective pondering and brooding might have practical applications for interventions to encourage reflection with an open mind but discourage thinking with self-criticism and a judgmental stance [22].

In addition, our findings indicate that rumination can be considered a temporary state [36] or a trait tendency [14], especially reflective pondering. Making the distinction between passive/active, negative/positive, and stable/temporary ruminative processes is critical for informing the focus of psychological intervention. Interventions aimed at increasing patients' capacity to cope with cancer may be improved from a prior evaluation of whether such ruminative engagement is a habitual response style or a tentative strategy in response to stress. The former plays a role in depressive symptoms [14], but our findings highlight that the negative impact of trait reflective pondering on depression is buffered by a goal-engaged coping style. Women with trait reflective pondering may benefit from interventions that facilitate engagement coping or increase mastery in dealing with cancer-related stress [55, 58]. The latter is deemed an adaptive regulation strategy in response to existing stress, and it is helpful when disengagement coping is high. For women who avoid dealing with problems directly, interventions should focus on enhancing their state reflective pondering. This can be achieved by reflecting on the discrepancy between current and desired states or searching for new perspectives and enhancing self-knowledge [40]. It is, therefore, important in the interventions targeting reflective pondering to assess and monitor the coping strategies used by breast cancer patients, as these strategies are the determinant of outcomes. Differentiation between engagement and disengagement is determined by whether the coping strategies aim at managing the negative emotions and stress associated with cancer or escaping the threat or distress. Interventions should target such strategies accordingly.

### Cultural Implications

Women in our study reported lower levels of brooding and reflective pondering than other samples of cancer patients [26] and undergraduates from western countries ($M = 2.08–2.45$) [23, 25]. Chinese culture has a deep-rooted belief in fatalism, which is implicated in the idea of *Yuan* (predestined relationship or destiny). Yuan, the attribution of an undesirable life event to fate, may make cancer more tolerable to Taiwanese women [59]. Hence, they may be less likely to ruminate over the discrepancy between current and desired status. Moreover, collective cultures place a strong emphasis on connectedness, social relationships, and a sense of social identity. To replenish one's sense of identity, people from collective cultures rely on their stock of social knowledge and action-oriented self-reflection [60]. Accordingly, Taiwanese women with a tendency for reflective pondering need to adopt an adaptive coping style to restore their inner equilibrium and reduce their vulnerability to depressive symptoms. When reflective pondering serves as a coping strategy, to the extent that it reflects action-oriented self-reflection, it can buffer the negative effect brought by disengagement coping. These possible cultural implications are tentative hypotheses that require further investigation.

### Limitations

It is important to note that these data were collected from women with breast cancer, so generalizability to other types of cancer or different health-related problems is limited. Women are more likely than men to ruminate [35], and our results may not generalize to male cancer patients, which deserves future attention. It is also noteworthy that participants who dropped out of the current study tended to be older and less well educated than those who contributed data, which may also affect generalizability. Future research should continue to examine the clinical implications of reflective pondering for cancer patients using samples with a wider range of individual variation.

We partitioned the sample variance into within- and between-person levels in an attempt to reflect state and trait reflective pondering. However, the assessments were solely reliant on self-assessment, which is well-known for its potential recall and social desirability bias. The next step is to adopt an experimental design or experience sampling methodology to minimize such biases [52]. In addition, even with a time-lagged study design, causation cannot be inferred from the results. Furthermore, it should be noted that within-person reflective pondering had a small effect on depression and, therefore, should be interpreted cautiously. Further research is required to replicate this finding.

In the current study, we did not examine the effects of the time lags between assessments. In a post hoc analysis, the effect of time was added to the HLM analysis but it did not make a significant contribution to the variance in depression. In addition, it is possible that rumination and coping at certain time points may have had stronger prospective effects on subsequent depression, but we did not test the possibility. Future research should explore

whether there are critical stages in cancer patients' trajectory wherein rumination and coping are most likely to influence depression.

Finally, although we focused on depressive symptomology, reflective pondering might be involved in multiple aspects of cancer adjustment. One consensus is that reflective pondering plays a prominent role in the development of posttraumatic growth [15, 16]. Future studies should examine these diverse aspects (e.g., anxiety and posttraumatic growth) and their role in reducing depressive symptoms.

Despite these limitations, the present study highlights the relationships between reflective pondering and depression and the moderating role of engagement and disengagement coping strategies. This study is unique in that it distinguishes state from trait reflective pondering.

## Conclusion

To summarize, both state brooding and trait brooding were positively associated with depressive symptoms, but the effects of reflective pondering depended on whether it was a state or trait and on the concurrent coping strategies employed. As a trait, in accordance with the RST [14], rumination as a response style is vulnerability to depression [35]. Among participants who did not use engagement coping, trait reflective pondering was associated with higher depressive symptomatology. However, as a state, reflective pondering can be placed within the wider context of coping and emotion regulation strategies [13], which involve meaning-making and learning from life experience. Future research is needed to replicate and elucidate these complex relationships.

We consider reflective pondering to be a double-edged sword. When reflective pondering is characterized as a stable self-focused style, among individuals who are less engaged copers, reflective pondering has a deleterious effect on mood. However, among those who opt to tentatively retreat from stressors (disengagement), a state of reflective self-focus is helpful.

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**Compliance with Ethical Standards**

**Authors' Statement of Conflict of Interest and Adherence to Ethical Standards** The authors declare that they have no conflict of interest.

**Authors' Contributions** A.W.T.W. and W.Y.H. conceptualized the study; A.W.T.W. and C.S.C. recruited, enrolled, and conducted data collection for the project; A.W.T.W. analyzed the data; all authors contributed to and approved the final version of the paper.

**Ethical Approval** This research involves human participants. All procedures were approved by the Institutional Review Board.

**Informed Consent** Informed consents were received from all participants.

## References

1. Dunn LB, Cooper BA, Neuhaus J, et al. Identification of distinct depressive symptom trajectories in women following surgery for breast cancer. *Health Psychol.* 2011;30:683–692.
2. Bray F, Ferlay J, Soerjomataram I, Siegel RL, Torre LA, Jemal A. Global cancer statistics 2018: GLOBOCAN estimates of incidence and mortality worldwide for 36 cancers in 185 countries. *CA Cancer J Clin.* 2018;68:394–424.
3. Siegel RL, Miller KD, Jemal A. Cancer statistics, 2019. *CA Cancer J Clin.* 2019;69:7–34.
4. Health Promotion Administration. Taiwan Cancer Registry. 2018. Available at https://www.hpa.gov.tw/Pages/TopicList.aspx?nodeid=2269. Accessibility verified January 5, 2019.
5. Bidstrup PE, Christensen J, Mertz BG, Rottmann N, Dalton SO, Johansen C. Trajectories of distress, anxiety, and depression among women with breast cancer: Looking beyond the mean. *Acta Oncol.* 2015;54:789–796.
6. Hung YP, Liu CJ, Tsai CF, et al. Incidence and risk of mood disorders in patients with breast cancers in Taiwan: A nationwide population-based study. *Psychooncology.* 2013;22:2227–2234.
7. Burgess C, Cornelius V, Love S, Graham J, Richards M, Ramirez A. Depression and anxiety in women with early breast cancer: Five year observational cohort study. *BMJ.* 2005;330:702.
8. Mehnert A, Koch U. Psychological comorbidity and health-related quality of life and its association with awareness, utilization, and need for psychosocial support in a cancer register-based sample of long-term breast cancer survivors. *J Psychosom Res.* 2008;64:383–391.
9. Pinquart M, Duberstein PR. Depression and cancer mortality: A meta-analysis. *Psychol Med.* 2010;40:1797–1810.
10. Den Oudsten BL, Van Heck GL, Van der Steeg AF, Roukema JA, De Vries J. Predictors of depressive symptoms 12 months after surgical treatment of early-stage breast cancer. *Psychooncology*. 2009;18:1230–1237.
11. Brandão T, Schulz MS, Matos PM. Psychological adjustment after breast cancer: A systematic review of longitudinal studies. *Psychooncology.* 2017;26:917–926.
12. Watson M, Law MG, Santos MD, et al. The Mini-MAC: Further development of the mental adjustment to cancer scale. *J Psychosoc Oncol.* 1994;12:33–46.
13. Smith JM, Alloy LB. A roadmap to rumination: A review of the definition, assessment, and conceptualization of this multifaceted construct. *Clin Psychol Rev.* 2009;29:116–128.
14. Nolen-Hoeksema S. Responses to depression and their effects on the duration of depressive episodes. *J Abnorm Psychol.* 1991;100:569–582.
15. Janoff-Bulman R. *Shattered Assumptions: Towards a New Psychology of Trauma*. New York, NY: Free Press; 1992.
16. Joseph S. *What Doesn't Kill Us: The New Psychology Of Posttraumatic Growth*. New York, NY: Basic Books; 2011.
17. Bellizzi KM, Blank TO. Predicting posttraumatic growth in breast cancer survivors. *Health Psychol.* 2006;25:47–56.
18. Compas BE, Beckjord E, Agocha B, et al. Measurement of coping and stress responses in women with breast cancer. *Psychooncology.* 2006;15:1038–1054.
19. Creswell JD, Lam S, Stanton AL, Taylor SE, Bower JE, Sherman DK. Does self-affirmation, cognitive processing,

or discovery of meaning explain cancer-related health benefits of expressive writing? *Pers Soc Psychol Bull.* 2007;33: 238–250.
20. Lam KF, Lim HA, Tan JY, Mahendran R. The relationships between dysfunctional attitudes, rumination, and non-somatic depressive symptomatology in newly diagnosed Asian cancer patients. *Compr Psychiatry.* 2015;61:49–56.
21. Thomsen DK, Jensen AB, Jensen T, et al. Rumination, reflection and distress: An 8-Month prospective study of colon-cancer patients. *Cogn Ther Res.* 2013;37:1262–1268.
22. Treynor W, Gonzalez R, Nolen-Hoeksema S. Rumination reconsidered: A psychometric analysis. *Cogn Ther Res.* 2003;27:247–259.
23. Joormann J, Dkane M, Gotlib IH. Adaptive and maladaptive components of rumination? Diagnostic specificity and relation to depressive biases. *Behav Ther.* 2006;37:269–280.
24. Watkins ER. Constructive and unconstructive repetitive thought. *Psychol Bull.* 2008;134:163–206.
25. Marroquín BM, Fontes M, Scilletta A, Miranda R. Ruminative subtypes and coping responses: Active and passive pathways to depressive symptoms. *Cogn Emot.* 2010;24:1446–1455.
26. Schellekens M, van den Hurk D, Prins J, et al. Mindfulness-based stress reduction added to care as usual for lung cancer patients and/or their partners: A multicentre randomized controlled trial. *Psychooncology*. 2017;26:2118–2126.
27. Takano K, Tanno Y. Self-rumination, self-reflection, and depression: Self-rumination counteracts the adaptive effect of self-reflection. *Behav Res Ther.* 2009;47:260–264.
28. Arditte KA, Joormann J. Emotion regulation in depression: Reflection predicts recovery from a major depressive episode. *Cogn Ther Res.* 2011;35:536–543.
29. Burwell RA, Shirk SR. Subtypes of rumination in adolescence: Associations between brooding, reflection, depressive symptoms, and coping. *J Clin Child Adolesc Psychol.* 2007;36:56–65.
30. Cox S, Funasaki K, Smith L, Mezulis AH. A prospective study of brooding and reflection as moderators of the relationship between stress and depressive symptoms in adolescence. *Cogn Ther Res.* 2012;36:290–299.
31. Roelofs J, Huibers M, Peeters F, Arntz A, van Os J. Rumination and worrying as possible mediators in the relation between neuroticism and symptoms of depression and anxiety in clinically depressed individuals. *Behav Res Ther.* 2008;46:1283–1289.
32. Rude SS, Little Maestas K, Neff K. Paying attention to distress: What's wrong with rumination? *Cogn Emotion*. 2007;21:843–864.
33. Verhaeghen P, Joorman J, Khan R. Why we sing the blues: The relation between self-reflective rumination, mood, and creativity. *Emotion.* 2005;5:226–232.
34. Soo H, Sherman K. Rumination, psychological distress and post-traumatic growth in women diagnosed with breast cancer. *Psychooncology.* 2015;24:70–79.
35. Roberts JE, Gilboa E, Gotlib IH. Ruminative response style and vulnerability to episodes of dysphoria: Gender, neuroticism, and episode duration. *Cogn Ther Res.* 1998;22: 401–423.
36. Martin LL, Tesser A. Some ruminative thoughts. In: Wyer RS, Jr, ed. *Advances in Social Cognition*. Vol. 6. Mahwah, NJ: Lawrence Erlbaum; 1996:1–47.
37. Lyubomirsky S, Layous K, Chancellor J, Nelson SK. Thinking about rumination: The scholarly contributions and intellectual legacy of Susan Nolen-Hoeksema. *Annu Rev Clin Psychol.* 2015;11:1–22.
38. Stockton H, Hunt N, Joseph S. Cognitive processing, rumination, and posttraumatic growth. *J Trauma Stress.* 2011;24:85–92.
39. Carver CS, Connor-Smith J. Personality and coping. *Annu Rev Psychol.* 2010;61:679–704.
40. Carver CS, Scheier M. *Principles Of Self-Regulation: Action And Emotion*. New York, NY: The Guilford Press; 1990.
41. Kvillemo P, Bränström R. Coping with breast cancer: A meta-analysis. *PLoS One.* 2014;9:e112733.
42. Franks HM, Roesch SC. Appraisals and coping in people living with cancer: A meta-analysis. *Psychooncology*. 2006;15:1027–1037.
43. Carver CS. You want to measure coping but your protocol's too long: Consider the brief COPE. *Int J Behav Med.* 1997;4:92–100.
44. Zigmond AS, Snaith RP. The hospital anxiety and depression scale. *Acta Psychiatr Scand.* 1983;67:361–370.
45. Raudenbush SW, Bryk AS, Cheong YF, Congdon R, du Toit M. *HLM 7: Hierarchical Linear And Nonlinear Modeling*. Lincolnwood, IL: Scientific Software International; 2011.
46. Raudenbush SW, Bryk AS. *Hierarchical Linear Models: Applications And Data Analysis Methods*. 2nd ed. Newbury Park, CA: Sage; 2002.
47. Bryk AS, Raudenbush SW. 1987. Bryk AS, Raudenbush SW. Application of hierarchical linear models to assessing change. Psychol Bull. 1987;101:147–158.
48. Preacher KJ, Curran PJ, Bauer DJ. Computational tools for probing interactions in multiple linear regression, multilevel modeling, and latent curve analysis. *J Educ Behav Stat.* 2006;31:437–448.
49. Snijders TA, Bosker RJ. Standard errors and sample sizes for two-level research. *J Educ Behav Stat.* 1993;18:237–259.
50. Chow C-C. *Investigating the Effect of Depressive Rumination on Working Memory Capacity in Non-Clinical Samples*. National Taiwan University; 2008. Taipei, Taiwan
51. Bagby RM, Parker JD. Relation of rumination and distraction with neuroticism and extraversion in a sample of patients with major depression. *Cogn Ther Res*. 2001;25:91–102.
52. Thompson RJ, Mata J, Jaeggi SM, Buschkuehl M, Jonides J, Gotlib IH. Maladaptive coping, adaptive coping, and depressive symptoms: Variations across age and depressive state. *Behav Res Ther.* 2010;48:459–466.
53. Wells A, Matthews G. Modelling cognition in emotional disorder: The S-REF model. *Behav Res Ther.* 1996;34: 881–888.
54. Koster EH, De Lissnyder E, Derakshan N, De Raedt R. Understanding depressive rumination from a cognitive science perspective: The impaired disengagement hypothesis. *Clin Psychol Rev.* 2011;31:138–145.
55. Wang AW-T, Tu PC, Liu TJ, Yeh DC, Hsu WY. Mental adjustment at different phases in breast cancer trajectory: Re-examination of factor structure of the Mini-MAC and its correlation with distress. *Psychooncology.* 2013;22:768–774.
56. Aldao A, Nolen-Hoeksema S. When are adaptive strategies most predictive of psychopathology? *J Abnorm Psychol.* 2012;121:276–281.
57. Swainston J, Derakshan N. Training cognitive control to reduce emotional vulnerability in breast cancer. *Psychooncology.* 2018;27:1780–1786.
58. Wang AW-T, Cheng C-P, Chang C-S, et al. Does the factor structure of the Brief COPE fit different types of traumatic events? A test of measurement invariance. *Eur J Psychol Assess*. 2018;34:162–173.
59. Yang KS. Theories and research in Chinese personality: An indigenous approach. In: Kao HSR, Sinha D, eds. *Asian Perspectives on Psychology*. New Delhi, India: Sage; 1996:236–262.
60. Hwang K-K. The Mandala model of self. *Psychol Stud*. 2011;56:329–334.