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Moderators of psychological recovery from benign cancer screening results

M. Pelletier BSc, B. Knäuper DrPhil,† C.G. Loiselle PhD,† R. Perreault MD,† C. Mizrahi BCom,† and L. Dubé PhD†*

ABSTRACT

Objective

The sudden confrontation of a potential health threat such as cancer, even after the diagnosis turns out to be benign, can have enduring adverse psychological consequences, including persistent anxiety, cancer fears, and other manifestations of psychological distress. The present study examines factors that potentially moderate psychological recovery among women who face a breast cancer threat.

Design

Participants were adult women had just received a benign outcome from a breast cancer diagnostic procedure that had been conducted because of suspicion of breast cancer (a non-conclusive mammography or ultrasonography result, a referral from their doctor because of pain or family history, detection of a lump, a 6-month follow-up appointment after a breast abnormality from a previous screening or diagnostic procedure, or a fluid leak from one or both breasts). We measured several psychological traits at Time 1 (right after receipt of the "no cancer" feedback) and then each month for the next 3 months. Analyses examined the factors that hindered or facilitated psychological recovery from the cancer threat.

Results

Results showed that trait anxiety and family history of cancer hindered recovery and that older age and optimism facilitated recovery and lessened adverse psychological consequences. Self-regulatory strategies such as planful problem-solving, positive reappraisal, and mastery facilitated recovery.

Conclusions

Our findings shed light on the factors that are implicated in psychological recovery from a benign breast cancer outcome after a diagnostic procedure (ultrasonography, repeat or initial mammography, stereotactic biopsy, fine-needle aspiration, or ultrasound-guided biopsy). Those factors could be used to identify women who may experience prolonged psychological distress, so as to assist them when they face stressful diagnostic concerns.

KEY WORDS

Breast neoplasms, cancer screening, coping behavior, emotional adjustment, mammography, psychological recovery

1. INTRODUCTION

Breast cancer is the cancer most frequently diagnosed among Canadian women and the second leading cause of death from cancer in Canadians. In the setting in which the present study was conducted, 85% of women who undergo a diagnostic procedure because of suspicion of breast cancer emerge from that procedure with a benign diagnosis [2,3]. Thus, a large number of women are told during diagnostic testing that they do not, in fact, have breast cancer. There is robust evidence showing that, despite alleviation of the immediate threat of cancer, women who receive a benign diagnosis report persistent anxiety and other manifestations of psychological distress particularly intensely during the first 3–4 months after the diagnostic procedure [4–13]. In fact, recent research has shown that, compared with control subjects, these women report distress up to 8 months after the benign outcome [4].

Beyond the clinical relevance of studying this at-risk population, women who have just gone through a temporarily salient breast cancer threat represent, at a more general level, a prototypical case of individuals temporarily exposed to a health threat. If temporary health threats result in enduring psychological consequences, they present an important challenge to population health. For instance, a few studies have shown that the experience of anxiety is associated

with more information-seeking and prevention behaviors and higher compliance to screening behaviors [14]. However, the bulk of the findings show that women are less compliant to preventive lifestyle and early detection behaviors after a breast cancer threat than they were before the threat arose [15–20]. Among the numerous reasons for low compliance, research findings point convincingly to resistance to facing the anxiety associated with a perception of the risk of breast cancer [21].

In sum, confrontation with a sudden health threat, even after the diagnosis turns out to be benign, seems to have significant and enduring adverse psychological effects. The present study examines how women psychologically recover from the temporarily salience of a health threat and which factors help them in their recovery.

2. METHODS

2.1 Objectives and Research Design

Our study was designed to delineate the mechanisms and moderating factors that lead to psychological recovery from a breast cancer threat. Measures were taken at intake and in 3 monthly follow-ups. We expected that psychological recovery would improve from the intake measures to the 3rd monthly follow-up and that the degree and speed of recovery would be moderated by the women's age and family history of cancer and the psychological constructs of anxiety, emotion regulation, coping, hostility, mastery, and optimism.

Ethics approval from the participating hospitals and from McGill University was obtained.

2.2 Participants

Of 197 women who participated in the study, 4 dropped out, and 42 were excluded for missing 1 or more monthly questionnaires, leaving 151 women for evaluation. A family history of cancer was present for 95 of the women. The average age of the participants was 45.9 years, with 14 participants being less than 30 years of age, 23 being 30–39, 52 being 40–49, 46 being 50–59, 12 being 60–69, and 3 being 70 years of age or older. (Because of technical difficulties, the age of 1 participant is missing.) These women all underwent diagnostic procedures because of a suspicion of breast cancer and were subsequently informed of a benign outcome. The suspicions arose either because of any one or a combination of non-conclusive mammography or ultrasonography (n = 67), a referral from their doctor because of pain or family history (n = 30), detection of a lump (n = 28), a 6-month follow-up appointment after a breast abnormality from a previous inconclusive screening or diagnostic procedure (n = 15), or a fluid leak from one or both breasts (n = 2). (Again, because of technical difficulties, referral data for 25 participants are missing.) The diagnostic procedures that the women underwent included ultrasonography (n = 104), repeat or initial mammography (n = 75), stereotactic biopsy (n = 7), fine-needle aspiration (n = 6), and ultrasound-guided biopsy (n = 2).

2.3 Procedure

This longitudinal study recruited women with a benign outcome after a diagnostic procedure from two hospitals in the greater Montreal area. Upon the benign diagnosis being issued, a nurse informed potential participants of the study. Interested woman received a flyer describing the study in more detail and then, within the following week, a telephone call from the research assistant, who explained the study using a standardized script.

Each woman was assessed using the following inclusion criteria:

- Age 18 years or older
- Had undergone diagnostic procedures to follow up on a suspicion of breast cancer
- No prior history of cancer or other serious illnesses
- Able to read and understand English or French
- Access to a computer with Internet connectivity

Women who met the inclusion criteria and agreed to participate were scheduled for a visit within the subsequent week either at their home or in the laboratory located at McGill University. Participants signed the informed consent form at the beginning of the visit.

The intake questionnaire had 3 sections:

- Demographic information
- Measures of the hypothesized moderating mechanisms
- Main and secondary outcomes measures

Participants completed the main and secondary outcome measures 4 times: at intake (T1), and at 3 monthly follow-ups (T2, T3, T4). Questionnaires were completed in the participant's preferred language (English or French).

The follow-up questionnaires were administered online and completed from the participant's home. E-mail reminders to complete the monthly follow-up questionnaires (main and secondary outcome measures only) were sent to the participants.

2.4 Measures

2.4.1 Demographic Information

At intake, participants provided information about their age, reason or reasons for breast cancer suspicion, diagnostic procedure or procedures received, and family history of cancer.

2.4.2 Main and Secondary Outcome Measures

The main outcome measure used the Psychological Consequence Questionnaire (PCQ) [22] to assess psychological recovery and the adverse emotional, physical, and social psychological consequences of the cancer threat. This 12-item scale is a valid and reliable tool that was developed specifically for breast cancer screening settings [11–13]. A 5-point response scale, ranging from 0 ("not at all") to 4 ("quite a lot of the time"), was used, and the mean score for each subscale was computed. Higher scores are indicative of greater psychological distress. Internal consistency was 0.93 for the emotional subscale, 0.88 for the physical subscale, and 0.85 for the social subscale.

As a secondary outcome measure, subjective psychological adjustment to the cancer threat was assessed using the Profile of Mood States (POMS) [23]. The POMS is a valid and reliable tool that has been used extensively to measure mood in women dealing with breast cancer [24]. Using a 5-point scale ranging from 0 ("not at all") to 4 ("extremely"), participants endorsed the extent to which, during the preceding week, the 50 mood adjectives described them. The POMS yields a score on 6 subscales—Tension, Anger, Depression, Confusion, Vigor, and Fatigue—with internal consistencies (Cronbach alpha) of 0.94, 0.93, 0.94, 0.91, 0.95, and 0.94 respectively. With the exception of the Vigor subscale, higher scores reflect greater distress and more mood disturbance.

2.4.3 Hypothesized Psychological Mechanisms

Age, family history of cancer, and the psychological constructs of anxiety, emotion regulation, coping, hostility, mastery, and optimism were assessed at intake and were later used as hypothesized moderating mechanisms to psychological recovery after a breast cancer threat. Because the selected measures were administered at intake after a benign diagnosis, they were designed to assess dispositional trait characteristics and general methods of coping that would be impervious to situational factors—that is, a breast cancer threat.

Family history of cancer was assessed by asking participants whether a close relative such as a parent, grandparent, or sibling currently has or previously had cancer. Participants who denied a family history of cancer were coded "1"; those who responded affirmatively were coded "2."

The trait subscale of the State–Trait Anxiety Inventory [25] is a 20-item scale designed to measure an individual's stable tendency to respond anxiously when faced with threatening situations. A 4-point response scale, ranging from 1 ("not at all") to 4 ("very much so"), was used, and scores ranged from 20 to 80, with higher scores suggesting higher trait anxiety. In the present study, the internal consistency (Cronbach alpha) was 0.83.

The Emotion Regulation Questionnaire [26] is a 10-item measure designed to assess two stable strategies—expressive suppression and cognitive reappraisal—that are used to regulate affective experiences within and across emotional episodes [27]. A 7-point response scale ranging from 1 ("strongly agree") to 7 ("strongly disagree") was used, and a mean score was calculated for each strategy. In the present study, the internal consistency (Cronbach alpha) was 0.51 for the suppression subscale and 0.72 for the reappraisal subscale. Because of low internal consistency, the suppression subscale was excluded. Low scores on the cognitive reappraisal subscale were associated with a greater emphasis on reappraisal and on controlling the personal meaning that events have for the individual.

The Ways of Coping Questionnaire [28] used in this study consists of 36 items designed to assess 8 subscales tapping into problem-focused coping and emotion-focused coping. The Ways of Coping Questionnaire does not measure condition-specific approaches to coping with stressful events, but rather general coping strategies used by an individual [29]. A 9-point response scale ranging from 1 ("strongly agree") to 9 ("strongly disagree") was used, and subscale scores were calculated by summing the responses to the corresponding items. Subscales with an internal consistency (Cronbach alpha) below 0.70 were excluded from the analysis. The seeking social support subscale (0.96), which assesses efforts to find informational or emotional support, the planful problem-solving subscale (0.89), which assesses deliberate efforts to change the situation, and the positive reappraisal subscale (0.70), which describes efforts to create positive meaning by focusing on personal or religious growth, were included. Lower scores are associated with a higher frequency of using those coping strategies in stressful situations.

Trait hostility was assessed using the 27-item Cook–Medley Hostility Inventory [30], a subscale of the Minnesota Multiphasic Personality Inventory [31]. The Cook–Medley Hostility Inventory is a self-report questionnaire that taps three facets of hostility—namely cynicism, aggressive responding, and hostile affect—that are thought to reflect the cognitive, behavioural, and mood components of hostility respectively. For the present study, a 5-point response scale ranging from 0 ("not at all") to 4 ("very much") was used, and mean subscale scores were calculated. The internal consistency (Cronbach alpha) was 0.80 for the cynicism subscale, 0.48 for the aggressive responding subscale, and 0.50 for the hostile affect subscale. Because of low internal consistency, only the cynicism subscale was used in the present analysis. Higher scores indicate a higher degree of hostility, as characterized by the cognitive component of cynicism.

The global, dispositional trait of mastery was assessed using a 7-item instrument designed to evaluate the extent to which participants saw themselves as being in control of the forces affecting their lives [32].

This instrument asks participants to rate statements on a 9-point scale ranging from 1 ("strongly disagree") to 9 ("strongly agree"). Ratings were summed to obtain an overall mastery score ranging from 7 (low mastery) to 63 (high mastery). Internal consistency (Cronbach alpha) was 0.79.

The Life Orientation Test–Revised [33] is a 6-item scale designed to measure dispositional optimism and pessimism. A 9-point response scale ranging from 1 ("strongly agree") to 9 ("strongly disagree") was used, and total scores ranged from 9 to 54, with higher scores indicating more pessimism. In the present study, the internal consistency (Cronbach alpha) was 0.78.

2.5 Statistical Analysis

The dependent variables in our analyses were the main and secondary outcome measures, and the independent variables consisted of the hypothesized moderating mechanisms assessed at intake. The first goal of the data analysis was to examine the trend in psychological recovery after a cancer threat from T1 to T2, T3, and T4. To evaluate change across the 4 measurements, 9 one-way analyses of variance for repeated measures were used for each subscale of the main and secondary outcome measures. Bonferroni *post hoc* tests were applied to identify means that differed significantly from one another.

The second goal of the study was to use multiple regression analysis to investigate the factors that moderate psychological recovery from a cancer threat. First, all hypothesized moderating mechanisms were individually tested using simple regression analysis separately on each subscale of the PCQ and POMS. Then, variables involved in the speed of recovery from the cancer threat are shown through a significant simple regression analysis with an interaction between the longitudinal variable of time and a hypothesized moderating measure. Those interactions were calculated by multiplying the intake score on each of the moderating measures by the time variable, where T1 = 1, T2 = 2, T3 = 3, T4 = 4.

Next, the multiple regression models were formulated. A forward selection method was used to select the variables that should be included in the final model (Time, the 11 hypothesized moderating measures, and the interactions between Time and each of the 11 hypothesized moderating measures). Normal probability plots and residual scatter plots were used to test the normality assumptions, and tolerance and variance inflation factors were used to assess multicollinearity for each of the multiple regression models.

3. RESULTS

3.1 Changes in the Main and Secondary Outcome Measures

Table I presents the means and standard deviations for the main and secondary outcome measures assessed at T1, T2, T3, and T4. Mean scores for the perceived social psychological consequences subscale of the PCQ and the Vigor subscale of the POMS failed to demonstrate significant improvement from T1 to T4. Scores on the remaining PCQ and POMS subscales declined across time, with the most significant changes occurring between T1 and T3, and T1 and T4. The Tension subscale of the POMS was the only measure demonstrating improvement within the first monthly follow-up measurement (T1 to T2).

These descriptions were confirmed by repeated-measures one-way analysis of variance (Table I) for each of the subscales of the main and secondary outcome measures, with Time (T1, T2, T3, T4) as the repeated-measure variable. Significant changes in emotional psychological consequences and physical psychological consequences were revealed, but no significant improvement in social psychological consequences was found. For the emotional and physical PCQ subscales, Bonferroni *post hoc* tests indicated a significant reduction in psychological distress from T1 to both of T3 and T4 ($p < 0.05$). Further, a significant reduction in emotional psychological consequences was found between T2 and T4 ($p < 0.05$). No further *post hoc* differences were significant.

Significant reductions in POMS were revealed for the Tension, Anger, Depression, Confusion, and Fatigue subscales, but no significant improvement was found for the Vigor subscale. Bonferroni *post hoc* tests revealed a significant reduction in Tension from T1 to T2, and a significant improvement in Tension, Anger, Depression, Confusion, and Fatigue from T1 to T3 and T4 ($p < 0.05$). No further *post hoc* comparisons were significant.

3.2 Moderating Mechanisms

Table II presents the means and standard deviations of the moderating measures assessed at T1, with the exception of age and family history of cancer, which were described earlier, in the participants section.

3.2.1 Psychological Consequences Questionnaire Subscales

Emotional Subscale: Univariate regression analysis (Table III) revealed that greater emotional psychological consequences were associated with younger age, a family history of cancer, higher trait anxiety, lower cognitive reappraisal, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, family history of cancer, trait anxiety, cognitive reappraisal, seeking social support, planful problem-solving, positive reappraisal, cynicism, mastery, and optimism. On multivariate analysis (Table III), 26% of the variance in overall emotional psychological consequences was accounted for by 6 variables.

TABLE I Analysis of results from the Psychological Consequences Questionnaire (PCQ) and the Profile of Mood States (POMS) at intake and during follow-up

Dependent variable	*Pts (n)*	*Score[a] at*			
		Intake	*Follow-up*		
		(T1)	*(T2)*	*(T3)*	*(T4)*
PCQ					
Emotional[b]	150	1.42±0.96	1.23±0.95	1.10±0.92	1.05±0.88
Physical[c]	150	1.29±0.85	1.12±0.88	1.01±0.85	1.05±0.90
Social	150	0.96±0.88	0.82±0.86	0.81±0.92	0.78±0.84
POMS					
Tension[b]	144	1.31±0.90	1.13±0.86	0.99±0.91	0.99±0.95
Anger[b]	143	0.97±0.83	0.84±0.78	0.74±0.70	0.73±0.77
Depression[c]	143	0.95±0.91	0.83±0.92	0.71±0.85	0.74±0.88
Confusion[c]	144	1.00±0.88	0.91±0.87	0.80±0.87	0.79±0.88
Vigor	147	2.31±0.87	2.31±0.83	2.34±0.82	2.37±0.79
Fatigue[b]	144	1.48±0.95	1.35±1.00	1.20±0.92	1.19±1.02

[a] Mean ± standard deviation.
[b] $p < 0.001$.
[c] $p < 0.01$.
Pts = patients.

Physical Subscale: Univariate regression analysis (Table III) showed that greater physical psychological consequences were associated with younger age, a family history of cancer, higher trait anxiety, lower social support seeking, lower planful problem-solving, lower positive reappraisal, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, cognitive reappraisal, mastery, cynicism, and optimism. On multivariate analysis (Table III), 13% of the variance in overall physical psychological consequences was accounted for by 7 variables.

Social Subscale: Univariate regression analysis (Table III) showed that greater social psychological consequences were associated with younger age, a family history of cancer, higher trait anxiety, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, mastery, and optimism. On multivariate analysis (Table III), 13% of the variance in overall social psychological consequences was accounted for by 4 variables.

3.2.2 POMS Subscales

Tension Subscale: Univariate regression analysis (Table IV) showed that higher Tension was associated with younger age, a family history of cancer, higher trait anxiety, lower cognitive reappraisal, lower planful problem-solving, lower positive reappraisal, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, trait anxiety, cognitive reappraisal, seeking social support, cynicism, mastery, and optimism. On multivariate analysis (Table IV), 24% of the variance in overall tense affect was accounted for by 7 variables.

TABLE II Analysis of the hypothesized moderating mechanisms at intake

Moderating mechanism	*Pts (n)*	*Score[a] at intake (T1)*
Trait anxiety	149	45.75±9.68
Cognitive reappraisal	151	3.40±1.06
Seeking social support	150	20.60±11.83
Planful problem solving	150	24.63±10.78
Positive reappraisal	150	18.33±7.73
Cynicism	149	3.65±0.55
Mastery	151	45.15±0.75
Optimism	151	37.69±8.09

[a] Mean ± standard deviation.

Anger Subscale: Univariate regression analysis (Table IV) showed that higher Anger was associated with younger age, a family history of cancer, higher trait anxiety, higher cynicism, lower mastery, higher optimism, and lower planful problem-solving. Univariate regression analyses were also significant for the interactions between Time and age, mastery, and optimism. On multivariate analysis (Table IV), 22% of the variance in overall angry affect was accounted for by 6 variables.

TABLE III Univariate and multiple regression analysis[a] for intake scores and the Time variable on the Psychological Consequences Questionnaire subscales

Model	*Subscale*		
	Emotional	*Physical*	*Social*
Univariate regression			
Main effects			
Age	–0.012[b]	–0.009[c]	–0.011[c]
Familial cancer history	0.293[c]	0.275[b]	0.271[b]
Trait anxiety	0.023[b]	0.008[d]	0.013[c]
Cognitive reappraisal	0.105[c]		
Seeking social support		0.006[d]	
Planful problem-solving		0.009[c]	
Positive reappraisal		0.011[d]	
Cynicism	0.395[b]	0.263[b]	0.321[b]
Mastery	–0.036[b]	–0.020[b]	–0.024[b]
Optimism	–0.047[b]	–0.030[b]	–0.036[b]
Interactions with Time			
Age	–0.003[b]	–0.002[c]	–0.002[c]
Familial cancer history	–0.045[c]		
Trait anxiety	–0.001[d]		
Cognitive reappraisal	–0.020[d]	–0.018[d]	
Seeking social support	–0.004[b]		
Planful problem-solving	–0.003[d]		
Positive reappraisal	–0.004[c]		
Cynicism	–0.026[c]	–0.017[d]	
Mastery	–0.004[b]	–0.003[b]	–0.002[c]
Optimism	–0.005[b]	–0.004[b]	–0.003[b]
Multiple regression			
Main effects			
Time			
Age	–0.010[c]	–0.008[d]	–0.010[c]
Familial cancer history		0.185[d]	
Trait anxiety	0.022[b]	0.013[c]	
Cognitive reappraisal		–0.079[d]	–0.092[c]
Seeking social support			
Planful problem-solving	0.019[b]	0.015[b]	
Positive reappraisal			
Cynicism			
Mastery	–0.016[c]		–0.013[c]
Optimism	–0.022[b]	–0.022[b]	–0.029[b]
Interactions with Time			
Age			
Familial cancer history			
Trait anxiety			
Cognitive reappraisal			
Seeking social support			
Planful problem-solving			
Positive reappraisal			
Cynicism			
Mastery	–0.003[c]	–0.002[c]	
Optimism			
Constant	1.944[c]	1.457[c]	3.286[b]
R	0.514	0.371	0.372
R^2	0.264	0.138	0.139
Adjusted R^2	0.257	0.127	0.133
Cases (n)	145	145	145

[a] Unstandardized regression coefficient.
[b] $p < 0.001$.
[c] $p < 0.01$.

Depression Subscale: Univariate regression analysis (Table IV) showed that higher depressed affect was associated with younger age, a family history of cancer, higher trait anxiety, lower cognitive reappraisal, lower planful problem-solving, lower positive reappraisal, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, mastery, and optimism. On multivariate analysis (Table IV), 19% of the variance in overall depressed affect was accounted for by 6 variables.

Confusion Subscale: Univariate regression analysis (Table IV) showed that higher Confusion was associated with younger age, a family history of cancer, higher trait anxiety, lower planful problem solving, lower positive reappraisal, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, mastery, and optimism. On multivariate analysis (Table IV), 18% of the variance in overall confused affect was accounted for by 5 variables.

Vigor Subscale: Univariate regression analysis (Table IV) showed that higher Vigor was associated with older age, no family history of cancer, more planful problem-solving, more social support seeking, lower cynicism, higher mastery, and lower optimism. Univariate regression analyses were also significant for the interactions between Time and optimism. On multivariate analysis (Table IV), 17% of the variance in overall depressed affect was accounted for by 7 variables.

TABLE IV Univariate and multiple regression analysis[a] for intake scores and the Time variable on the Profile of Mood States subscales

Model	*Subscale*					
	Tension	*Anger*	*Depression*	*Confusion*	*Vigor*	*Fatigue*
Univariate regression						
Main effects						
Age	–0.011[b]	–0.009[b]	–0.008[c]	–0.008[c]	0.009[b]	–0.015[d]
Familial cancer history	0.293[d]	0.262[d]	0.326[d]	0.235[b]	–0.244[b]	0.301[d]
Trait anxiety	0.015[d]	0.010[b]	0.011[b]	0.010[b]		
Cognitive reappraisal	0.080[c]		0.099[b]			
Seeking social support					–0.009[b]	0.012[d]
Planful problem–solving	0.009[b]	0.009[b]	0.009[b]	0.011[b]	–0.012[d]	0.020[d]
Positive reappraisal	0.012[c]		0.010[c]	0.011[c]		0.018[d]
Cynicism	0.318[d]	0.365[d]	0.310[d]	0.265[d]	–0.192[b]	0.367[d]
Mastery	–0.030[d]	–0.024[d]	–0.031[d]	–0.030[d]	0.013[d]	–0.030[d]
Optimism	–0.049[d]	–0.039[d]	–0.041[d]	–0.042[d]	0.036[d]	–0.046[d]
Interactions with Time						
Age	–0.003[d]	–0.002[b]	–0.002[b]	–0.002[b]		–0.003[d]
Familial cancer history						
Trait anxiety	–0.002[c]					–0.002[b]
Cognitive reappraisal	–0.019[c]					
Seeking social support	–0.003[c]					
Planful problem-solving						
Positive reappraisal						
Cynicism	–0.023[c]					
Mastery	–0.004[d]	–0.004[d]	–0.003[d]	–0.003[d]		–0.003[d]
Optimism	–0.005[d]	–0.004[d]	–0.004[d]	–0.004[d]	0.002[b]	–0.005[d]
Multiple regression						
Main effects						
Time						
Age	–0.008[b]			–0.008[c]	0.008[b]	–0.016[d]
Familial cancer history		0.194[b]	0.219[b]		–0.195[b]	0.217[b]
Trait anxiety	0.012[b]	0.011[b]	0.010[c]			
Cognitive reappraisal					0.090[b]	
Seeking social support					–0.009[c]	
Planful problem-solving		0.014[d]	0.015[d]	0.015[d]	–0.010[c]	0.023[d]
Positive reappraisal	0.012[c]				0.016[b]	
Cynicism		0.139[c]				
Mastery			–0.017[d]	–0.017[d]		–0.017[d]
Optimism	–0.036[d]	–0.028[d]	–0.020[d]	–0.026[d]	0.034[d]	–0.028[d]

TABLE IV Continued

Model	*Subscale*					
	Tension	*Anger*	*Depression*	*Confusion*	*Vigor*	*Fatigue*
Multiple regression continued						
Interactions with Time						
Age		–0.002[b]	–0.002[b]			
Familial cancer history						
Trait anxiety						
Cognitive reappraisal						–0.027[b]
Seeking social support	–0.006[c]			–0.003[b]		
Planful problem solving	0.010[d]					
Positive reappraisal						
Cynicism						
Mastery	–0.005[d]					
Optimism						
Constant	2.243[d]	0.303	1.233[b]	2.720[d]	0.808[c]	3.063[d]
R	0.501	0.476	0.437	0.437	0.419	0.504
R^2	0.251	0.226	0.191	0.191	0.176	0.254
Adjusted R^2	0.241	0.218	0.182	0.184	0.166	0.246
Cases (n)	144	143	143	144	144	144

[a] Unstandardized regression coefficient.
[b] $p < 0.01$.
[c] $p < 0.05$.
[d] $p < 0.001$.

Fatigue Subscale: Univariate regression analysis (Table IV) showed that higher Fatigue was associated with younger age, a family history of cancer, lower planful problem-solving, lower positive reappraisal, lower social support seeking, higher cynicism, lower mastery, and higher optimism. Univariate regression analyses were also significant for the interactions between Time and age, trait anxiety, mastery, and optimism. On multivariate analysis (Table IV), 25% of the variance in the overall Fatigue subscale was accounted for by 6 variables.

4. DISCUSSION

Taken together, the findings show that sudden confrontation with a potential diagnosis of breast cancer can have enduring adverse psychological consequences, even after the diagnosis emerges as benign. In particular, older age and optimism are instrumental in recovery, and a family history of cancer and dispositional anxiety hinder psychological recovery from the cancer threat. Those results are consistent with findings in previous studies [34–36]. As might be expected, self-regulatory abilities and skills facilitate recovery. That is, people who are able to positively reappraise the threat by placing a greater emphasis on their ability to control the personal meaning of the event and to create a sense of positive personal growth recover better and experience fewer adverse psychological consequences. In addition, women who have increased mastery and ability to planfully solve problems and who seek informational and emotional support also demonstrate greater recovery.

4.1 Clinical Implications

The results of the present study have important clinical implications for the management of psychological distress after a benign breast cancer screening result. First, consistent with earlier research, younger age and a family history of cancer are associated with higher psychological distress. This risk profile can easily be identified in breast cancer screening settings and provides an opportunity to offer additional support to these women so that they can improve their coping abilities and long-term adjustment to a breast cancer threat when they undergo screening. Second, because coping mechanisms such as mastery and problem-solving are important and relevant personal resources for women facing a possible cancer diagnosis, those self-regulatory strategies can be emphasized in a pamphlet provided

after a benign diagnostic procedure. For women who are experiencing high and persistent levels of psychological distress, the self-regulatory strategies could potentially be enhanced within a therapeutic setting. Indeed, previous research [37] showed that mastery enhancement therapy can be a time-efficient and effective intervention for cancer patients by improving the patient's self-efficacy for coping. Further, patients with high anxiety levels are possibly at risk for slower psychological recovery and could therefore be identified early after a benign mammography result to prevent long-term psychosocial difficulties.

We hope that our findings will act as a catalyst for clinicians and researchers to refine the debriefing of women by medical staff upon delivery of benign diagnostic results. In addition, clinical practices (pamphlets accompanying the result letter, training of helpline respondents, Web-based interventions) can be developed and improved to include approaches such as enhancing coping strategies, optimism, and mastery, and reducing anxiety levels to help buffer the impact of such news for women who are at risk of experiencing prolonged psychological distress. The results reported here hold particular interest as more and more jurisdictions offer systematic population screening for breast cancer, most of which target younger women and those with a family history of breast cancer.

4.2 Limitations

Some limitations should be noted when interpreting the findings of the present study. One limitation is that the longitudinal design did not assess for general life events (for example, family-related experiences, life changes, or other events unrelated to cancer) in the time between T1 and T4 that may have contributed to the enduring psychological distress experienced by some women after the benign outcome from a suspicion of breast cancer. A second limitation of the study is that no healthy comparison control group was included to allow for the presence of such general life events. A third limitation is that no assessment was performed for false negatives, which occur when the diagnostic procedure appears benign even though breast cancer is present. In general, women under the age of 50 years are more likely than older women to have dense breasts as a result of a higher ratio of fibroglandular tissue to fatty tissue [38–41]. Because fibroglandular tissues and tumors have similar densities, younger women are at a higher risk than older women of both false-negative and false-positive results [42–44]. The present study did not conduct additional diagnostic testing in women with dense breasts to control for the false-negative possibility; however, the presence of a false negative would not affect the ensuing psychological distress, because the participants believed their diagnostic results to be benign. A fourth limitation is the missing referral data for 25 of the participants, which prevented an exploration of whether different suspicions leading to a breast cancer diagnostic procedure result in heightened psychological distress at T1 and T4. In fact, the women who underwent the diagnostic procedure as a result of a 6-month follow-up may already be at an increased level of psychological distress, given that previous research has shown that such distress can be intense for the first 3–4 months [4–13] and can last up to 8 months [4].

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6. CONFLICT OF INTEREST DISCLOSURES

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Correspondence to: Bärbel Knäuper, Department of Psychology, McGill University, 1205 Dr. Penfield Avenue, Montreal, Quebec H3A 1B1.
E-mail: bknauper@ego.psych.mcgill.ca

* Department of Adult Education and Counselling Psychology, Ontario Institute for Studies in Education, University of Toronto, Toronto, ON.
† McGill University, Montreal, QC.