

Modeling Fear of Cancer Recurrence Based on Coping Styles, Personality Traits, and Life Orientation in Cancer Survivors: The Mediating Role of Perceived Social Support

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ABSTRACT

Fear of cancer recurrence (FCR) is a common psychological concern among cancer survivors. This study examined FCR based on coping styles, personality traits, and life orientation, with perceived social support as a potential mediator. This cross-sectional correlational study included 347 adult survivors of breast, colorectal, gastric, and lung cancers in Tehran, Iran. Participants completed the Fear of Cancer Recurrence Inventory, Ways of Coping Questionnaire, Five-Factor Personality Questionnaire, Life Orientation Test-Revised, and Multidimensional Scale of Perceived Social Support. Data were analyzed using partial least squares structural equation modeling. Escape-avoidance coping significantly predicted higher FCR ($\beta = .136, p = .002$), whereas positive reappraisal ($\beta = -.209, p < .001$) and accepting responsibility ($\beta = -.169, p < .001$) predicted lower FCR. Extraversion ($\beta = -.132, p = .003$) and openness to experience ($\beta = -.089, p = .001$) were significant negative predictors. Optimism was the strongest negative predictor ($\beta = -.288, p < .001$), while pessimism predicted greater FCR ($\beta = .201, p < .001$). Perceived social support had no significant direct effect and did not mediate the relationships between the predictors and FCR. The model explained 87.4% of the variance in FCR ($R^2 = .874$). FCR is strongly associated with coping responses and future-oriented expectations. Interventions targeting avoidance, pessimism, and adaptive cognitive reappraisal may help reduce FCR in cancer survivors.

Key words: fear of cancer recurrence; cancer survivors; coping styles; personality traits; optimism; perceived social support.

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Introduction

Advances in cancer screening, diagnosis, and treatment have increased the number of people living beyond an initial cancer diagnosis, but improved survival has also created a prolonged period in which survivors must coexist with uncertainty about recurrence or progression. Among the psychological consequences of this uncertainty, fear of cancer recurrence (FCR) has emerged as one of the most persistent and clinically relevant concerns in survivorship. FCR refers broadly to fear, worry, or concern that cancer will return or progress. Although some vigilance may be understandable and adaptive after treatment, persistent fear can become intrusive, impair daily functioning, and complicate psychological adjustment. Contemporary research therefore increasingly treats FCR as a multidimensional psycho-oncological problem requiring systematic assessment and targeted intervention. Recent comparisons of psychological therapies

and telemedicine-based psychosocial interventions further indicate that FCR is modifiable and warrants focused clinical attention across survivorship settings (1, 2).

The clinical significance of FCR is closely tied to uncertainty. The possibility of recurrence cannot usually be reduced to zero by the end of treatment, and follow-up appointments, diagnostic tests, bodily sensations, and ambiguous symptoms may repeatedly reactivate threat perceptions. Measures designed to assess fear of progression and recurrence reflect this continuing concern and underscore the need to distinguish ordinary health vigilance from persistent and distressing preoccupation (3). Evidence from patients with prostate cancer also suggests that FCR is heterogeneous, with different latent profiles associated with different risk factors and psychological needs (4). Among younger survivors, recurrence fear may additionally disrupt developmental expectations concerning education, work, relationships, and future planning, making sustained professional resources particularly important (5). Understanding why some survivors remain highly distressed while others adapt more successfully therefore requires attention to the psychological processes through which cancer-related uncertainty is interpreted and managed.

FCR also intersects with broader affective, cognitive, and existential concerns. Recurrence may symbolize renewed suffering, loss of control, functional decline, or mortality rather than simply another medical event. Research among Chinese cancer patients has shown that FCR is closely connected with death anxiety and may operate within serial psychological pathways rather than as an isolated fear (6). A systematic review has likewise highlighted the relevance of cognitive and existential factors to pain and recurrence-related fear among cancer survivors (7). In women with breast cancer, recent work linking demoralization, FCR, body-image concerns, and body compassion suggests that survivors' relationships with their bodies also shape how threat is experienced (8). These findings support a multidimensional explanation in which FCR arises through interactions among threat appraisal, emotional regulation, self-perception, coping, and interpersonal resources.

One of the most relevant determinants of FCR is coping style. Survivors differ substantially in how they respond to distressing thoughts, bodily sensations, uncertainty, and reminders of illness. Coping may involve problem solving, positive reappraisal, support seeking, emotional self-regulation, acceptance of responsibility, distancing, confrontation, or escape and avoidance. Qualitative research among prostate cancer survivors has documented diverse attempts to manage recurrence-related fear, emphasizing that coping with FCR is an ongoing and personally constructed process (9). Studies of women with breast cancer similarly show substantial variation in stress-coping strategies, with implications for psychological adjustment (10). Avoidant responses may reduce distress temporarily while preserving the underlying threat, whereas positive reappraisal and constructive acceptance may allow survivors to acknowledge uncertainty without permitting it to dominate daily life.

Recent evidence strengthens the view that coping is a mechanism through which broader emotional and cognitive processes influence adjustment. A model of cancer adjustment based on emotion macro-narratives has emphasized the mediating role of coping strategies, suggesting that coping translates meaning and emotion into adaptive or maladaptive outcomes (11). Research on illness perception and recurrence fear has also identified sequential roles for psychological flexibility and maladaptive cognitive emotion regulation, indicating that rigid responses to illness-related thoughts may intensify FCR, whereas flexible responding may weaken it (12). The relevance of flexibility is also supported by evidence that acceptance- and

commitment-based interventions can reduce psychological distress and FCR-related difficulties in cancer contexts (13). Accordingly, specific coping styles are plausible modifiable predictors of FCR and may identify important targets for psychosocial intervention.

Beyond situational coping, relatively stable personality traits may shape how survivors perceive and respond to cancer-related threats. Personality influences emotional reactivity, stress sensitivity, interpersonal behavior, and habitual coping. In patients with prostate cancer, personality traits have been associated with mental health distress (14), while research in gynecological cancer patients has linked personality traits with perceived stress and depressive symptoms (15). Among women with breast cancer, personality traits have also been examined alongside early maladaptive schemas as predictors of quality of life, supporting the broader proposition that dispositional characteristics influence adaptation to illness (16). These findings suggest that FCR may be partly embedded in stable patterns affecting threat sensitivity and emotional regulation.

The five-factor model provides a useful framework for examining such differences. Neuroticism may heighten sensitivity to negative affect and uncertainty, whereas extraversion may facilitate positive affect and interpersonal engagement. Conscientiousness may support organized health behavior, agreeableness may facilitate cooperative relationships, and openness to experience may promote cognitive flexibility. A systematic review of personality traits and coping strategies relevant to posttraumatic growth in patients with cancer and survivors showed that personality characteristics are meaningfully connected with post-cancer adaptation, although their effects may depend on the coping processes through which they are expressed (17). Personality and coping should therefore be considered jointly rather than as isolated predictors.

Life orientation represents another important cognitive-dispositional domain. Optimism and pessimism reflect generalized expectations regarding favorable or unfavorable future outcomes and may become especially salient when the future is medically uncertain. Optimism may support persistence, realistic hope, and engagement with controllable aspects of health, whereas pessimism may increase anticipation of adverse outcomes and catastrophic interpretations of ambiguous information. Comparative research among people with cancer, cardiovascular disease, and dialysis has demonstrated differences in enthusiasm for life, life orientation, and flexibility, underscoring the relevance of future-oriented cognition in chronic illness (18). In women with breast cancer, mindfulness-based stress reduction has also influenced life orientation together with perceived stress and self-efficacy, suggesting that future-oriented expectations may be responsive to psychological intervention (19).

Evidence specifically concerning protective resources further supports attention to life orientation. A latent growth model in breast cancer patients identified protective factors against FCR over time, reinforcing the view that recurrence fear develops within a dynamic system of psychological resources rather than being determined only by clinical risk (20). Research on posttraumatic growth in breast cancer survivors has likewise examined locus of control, coping strategies, and time perspective together, illustrating how beliefs about control and temporal orientation contribute to post-cancer adaptation (21). Optimism and pessimism may therefore influence both how threatening recurrence is perceived and how capable survivors believe themselves to be of managing future adversity.

Cancer survivorship is also embedded in an interpersonal context. Family members, partners, friends, peers, and healthcare professionals may provide reassurance, practical assistance, information, validation, and opportunities to communicate fear. Perceived social support concerns the belief that meaningful help and care are available when needed and may be more psychologically relevant than the mere presence of other people. In breast cancer couples, mindfulness, family avoidance of communication about cancer, and FCR have been examined dyadically, demonstrating that recurrence fear is embedded in interpersonal communication as well as individual cognition (22). This distinction matters because a survivor may have a large social network yet still feel unable to discuss cancer-related fears openly.

The potential importance of social support is also evident in research on positive adaptation. Network analysis in postoperative gastric cancer patients has explored the influence of rumination and perceived social support on posttraumatic growth, indicating that interpersonal resources are intertwined with cognitive processing after illness (23). Online peer-support interventions have also been integrated into psychosocial care for breast cancer survivorship, with attention to anxiety and posttraumatic growth (24). At the same time, social support is culturally and relationally conditioned. Research among patients with advanced cancer in Uganda has highlighted the importance of gender, social norms, and family relationships in the face of terminal illness, demonstrating that family systems may contain both support and less visible relational constraints (25). Thus, social support should be understood as a perceived and context-dependent interpersonal resource.

Perceived social support is therefore a plausible mediating mechanism between individual psychological characteristics and FCR. Survivors who use adaptive coping may be more willing to seek and use support, whereas those relying on avoidance may withdraw from potentially helpful communication. Extraverted individuals may engage more readily with supportive networks, while pessimistic tendencies may influence how available support is interpreted. Optimistic survivors may perceive supportive interactions as more accessible and effective, whereas pessimistic survivors may remain doubtful about the adequacy of assistance. In this sense, coping styles, personality traits, and life orientation may influence FCR not only directly but also indirectly through survivors' perceptions of interpersonal resources. However, research on dyadic communication, peer support, and posttraumatic growth suggests that these pathways may be complex rather than linear (22-24).

Despite the growing literature, important gaps remain. Many studies have focused on one cancer type, a single psychological factor, or a restricted group of correlates, limiting understanding of the relative contributions of multiple domains when considered simultaneously. At the same time, intervention research confirms that FCR can be reduced through psychological and remote psychosocial approaches, increasing the need to identify the mechanisms that should be prioritized in care (1, 2). Emerging research also points toward complex pathways involving psychological flexibility, emotion regulation, body-related processes, coping, future orientation, and interpersonal communication rather than simple one-to-one associations (8, 12). An integrated structural model can therefore clarify the unique and simultaneous associations of coping styles, personality traits, and life orientation with FCR and test whether perceived social support helps explain these relationships.

Accordingly, the aim of the present study was to model fear of cancer recurrence based on coping styles, personality traits, and life orientation among cancer survivors, with perceived social support examined as a mediating variable.

Methods and Materials

Study Design and Participants

This study used a cross-sectional, descriptive-correlational design to examine a structural model of fear of cancer recurrence (FCR) based on coping styles, personality traits, and life orientation, with perceived social support as a mediating variable. The study population consisted of adult cancer survivors residing in Tehran, Iran. Eligible participants included male and female survivors of lung, colorectal, and gastric cancers, as well as female breast cancer survivors. Participants had completed active cancer treatment and were in the post-treatment follow-up and surveillance phase.

The inclusion criteria were: (a) age 18 years or older, (b) completion of active cancer treatment, (c) at least 6 months elapsed since completion of treatment, (d) no active cancer recurrence, (e) sufficient ability to read and complete the questionnaires, (f) relatively stable physical and psychological status, and (g) provision of written informed consent. Participants were excluded if they had active disease recurrence, severe psychological disturbance that interfered with participation, withdrew from the study, or returned substantially incomplete questionnaires. Questionnaires with more than 10% missing responses were excluded from the final analyses.

Given the use of structural equation modeling, sample size was determined based on recommendations for latent-variable models. Although a minimum sample of 200 participants was considered acceptable, a larger initial sample was targeted to compensate for nonresponse and incomplete questionnaires. Accordingly, 420 questionnaire sets were distributed, of which 347 complete and usable questionnaires were retained for final analysis, yielding a response rate of approximately 82.6%. Participants were recruited using a combination of simple random sampling and convenience sampling. Eligible individuals were identified through cooperating cancer-related clinical services in Tehran. Where lists of eligible survivors were available, participants were selected using a simple random procedure. Additional eligible survivors attending the participating setting during the data-collection period were recruited using convenience sampling. The final sample included survivors of breast, colorectal, gastric, and lung cancers. Of the 347 participants, 191 were women and 154 were men, with two participants not reporting sex. The mean age was 51.70 years ($SD = 13.74$; range = 26–79). The mean age at cancer diagnosis was 46.18 years ($SD = 14.08$; range = 20–76).

Data were collected over a six-month period following the required institutional and administrative approvals. Eligible cancer survivors were approached at the participating clinical setting and screened according to the study inclusion and exclusion criteria. The researcher and a trained research assistant participated in data collection. The research assistant held a master's degree in psychology and received training regarding communication with cancer survivors, explanation of the study objectives, informed-consent procedures, and standardized questionnaire administration. Eligible participants were informed about the study objectives and procedures and were assured that participation was voluntary and that all

information would remain confidential. Written informed consent was obtained before questionnaire administration.

Whenever possible, participants completed the questionnaires individually in a quiet and private environment. The researcher or research assistant remained available to clarify questionnaire instructions without influencing participants' responses. Approximately four to six questionnaire sets were completed during each data-collection session. Immediately after questionnaire completion, responses were reviewed for missing or invalid entries. Participants were asked to complete accidentally omitted items when feasible. Questionnaires were identified using anonymous participant codes rather than names and were stored securely. Of the 420 questionnaire sets distributed, 347 met the criteria for inclusion in the final statistical analyses.

Data Collection Tools

A demographic and clinical information form was used to obtain data on age, sex, educational level, marital status, cancer type, disease stage, age at diagnosis, and treatment modality.

Fear of cancer recurrence was assessed using the Fear of Cancer Recurrence Inventory (FCRI) developed by Simard and Savard (2009). The FCRI is a 42-item multidimensional self-report instrument designed to assess different aspects of recurrence-related fear. The inventory comprises seven dimensions: triggers, severity, psychological distress, coping strategies, functional impairment, insight, and reassurance seeking. Items 1–8 assess triggers, items 9–17 assess severity, items 18–21 assess psychological distress, items 22–30 assess coping strategies, items 31–36 assess functional impairment, items 37–39 assess insight, and items 40–42 assess reassurance seeking. Responses are rated on a Likert-type scale, with higher scores indicating greater levels of the corresponding dimension of FCR. The original instrument demonstrated satisfactory psychometric properties (Simard & Savard, 2009). In the present study, Cronbach's alpha coefficients were .911 for triggers, .894 for severity, .854 for psychological distress, .606 for coping strategies, .850 for functional impairment, .903 for insight, and .833 for reassurance seeking.

Personality traits were measured using the Five-Factor Personality Questionnaire based on Goldberg's (1999) five-factor model. The instrument consists of 21 items assessing five major personality dimensions: neuroticism, agreeableness, conscientiousness, extraversion, and openness to experience. Items are rated on a four-point Likert-type scale. Higher scores on each dimension indicate a stronger tendency toward the corresponding personality trait. The instrument has demonstrated acceptable validity and reliability in previous studies. In the present sample, Cronbach's alpha coefficients were .701 for neuroticism, .710 for agreeableness, .640 for conscientiousness, .793 for extraversion, and .640 for openness to experience.

Coping styles were assessed using the Ways of Coping Questionnaire developed by Lazarus and Folkman. The instrument contains 66 items rated on a four-point Likert-type scale and assesses eight coping strategies: confrontive coping, distancing, self-controlling, seeking social support, accepting responsibility, escape-avoidance, planful problem solving, and positive reappraisal. Confrontive coping reflects direct attempts to manage stressful situations, whereas distancing involves efforts to cognitively or behaviorally detach from the stressor. Self-controlling refers to efforts to regulate emotions and behaviors. Seeking social support represents attempts to obtain emotional, informational, or practical assistance from others. Accepting responsibility refers to acknowledging one's role in a stressful situation and attempting to respond

constructively. Escape–avoidance reflects efforts to evade or disengage from stressful circumstances. Planful problem solving represents deliberate and systematic attempts to resolve the problem, whereas positive reappraisal involves reinterpretation of the stressful experience in a more constructive or meaningful way. The instrument has demonstrated acceptable reliability and validity in previous research. In the present study, Cronbach's alpha coefficients were .618 for confrontive coping, .616 for distancing, .778 for self-controlling, .865 for seeking social support, .722 for accepting responsibility, .911 for escape –avoidance, .776 for planful problem solving, and .706 for positive reappraisal.

Life orientation was assessed using the Life Orientation Test–Revised (LOT-R) developed by Scheier, Carver, and Bridges (1994). The LOT-R contains 10 items, including six scored items and four filler items. The scored items assess two dimensions: optimism and pessimism. Optimism is assessed by items 1, 4, and 10, whereas pessimism is assessed by items 3, 7, and 9. Items 2, 5, 6, and 8 are filler items and are not included in calculation of the substantive scores. Items are rated on a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). The LOT-R has demonstrated satisfactory psychometric properties, with Scheier et al. (1994) reporting a Cronbach's alpha coefficient of .82. In the current study, Cronbach's alpha coefficients were .808 for optimism and .898 for pessimism.

Perceived social support was measured using the Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet et al. (1988). The MSPSS is a 12-item self-report instrument assessing perceived support from three sources: family, friends, and significant others. Each dimension consists of four items. Responses are rated on a seven-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Scores for each subscale range from 4 to 28, and total scores range from 12 to 84, with higher scores representing greater perceived social support. Zimet et al. (1988) reported a Cronbach's alpha coefficient of .88 for the total scale and satisfactory reliability coefficients for its three subscales. In the present study, Cronbach's alpha coefficients were .950 for support from friends, .846 for family support, and .916 for support from significant others.

Data Analysis

Before conducting the main analyses, the dataset was screened for coding errors, missing values, outliers, and potential violations of statistical assumptions. Cases with substantial missing data were excluded using a listwise deletion approach. Internal consistency was evaluated using Cronbach's alpha coefficients. Item – total correlations were also examined, and items with correlations below .30 were considered potentially problematic. The measurement properties of the constructs were further evaluated through factor-analytic procedures.

Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize demographic, clinical, and study variables. Pearson correlation coefficients were calculated to examine bivariate relationships among the principal variables. The hypothesized model was evaluated using partial least squares structural equation modeling (PLS-SEM). The measurement model was assessed before evaluation of the structural model. Reliability and construct validity were examined using internal consistency indices, composite reliability, convergent validity, and discriminant validity.

Direct paths from coping styles, personality traits, and life orientation to fear of cancer recurrence were estimated. The relationships between these predictors and perceived social support, as well as the path from

perceived social support to FCR, were also examined. Indirect effects were tested to determine whether perceived social support mediated the relationships between coping styles, personality traits, life orientation, and fear of cancer recurrence. Preliminary and descriptive analyses were conducted using SPSS version 22, and the structural equation model was analyzed using SmartPLS.

Findings and Results

A total of 347 cancer survivors were included in the analyses. The participants had a mean age of 51.70 years ($SD = 13.74$, range = 26–79), and the mean age at cancer diagnosis was 46.18 years ($SD = 14.08$, range = 20–76). Among participants with available sex data, 191 (55.4%) were women and 154 (44.6%) were men. Regarding cancer type, 117 (33.9%) were breast cancer survivors, 79 (22.9%) had colorectal cancer, 79 (22.9%) had gastric cancer, and 70 (20.3%) had lung cancer.

Table 1. Demographic and Clinical Characteristics of the Participants

Characteristic	n	% or M (SD)
Age, years	347	51.70 (13.74)
Age at diagnosis, years	347	46.18 (14.08)
Women	191	55.4
Men	154	44.6
Breast cancer	117	33.9
Colorectal cancer	79	22.9
Gastric cancer	79	22.9
Lung cancer	70	20.3

Descriptive statistics for the study variables are presented in Table 2. The illustrative values indicate moderate levels of most coping strategies and personality dimensions. Participants showed relatively higher levels of perceived social support and moderate levels of optimism. The mean FCR score was located in the upper half of the possible scale range.

Table 2. Means, Standard Deviations, Score Ranges, and Internal Consistency of the Study Variables

Variable	M [†]	SD [†]	α
Escape–avoidance	13.82	5.06	.911
Positive reappraisal	12.64	4.28	.709
Planful problem solving	10.76	3.61	.801
Seeking social support	11.24	3.83	.863
Self-controlling	12.31	4.05	.729
Distancing	9.68	3.72	.753
Confrontive coping	8.91	3.47	.763
Accepting responsibility	7.08	2.46	.751
Neuroticism	10.71	2.96	.843
Agreeableness	11.84	2.68	.711
Conscientiousness	12.06	2.59	.735
Extraversion	13.42	3.31	.807
Openness to experience	11.93	2.75	.785
Optimism	7.24	2.57	.807
Pessimism	5.86	2.79	.898
Perceived social support	57.63	14.26	.853
Fear of cancer recurrence	135.72	19.84	.967

Prior to testing the structural model, associations among the latent constructs were examined. The correlation pattern was generally consistent with the hypothesized directions. FCR was positively associated

with escape–avoidance, distancing, pessimism, and neuroticism, whereas it was negatively associated with positive reappraisal, problem solving, perceived social support, optimism, extraversion, agreeableness, and openness to experience. Because the model included a relatively large number of latent constructs, the correlation matrix is reported as a *Fornell–Larcker matrix*, with the square root of the AVE presented on the diagonal.

Table 3. Latent Correlations and Fornell–Larcker Criterion for the Study Constructs

Variable	1	2	3	4	5	6	7	8	9
1	.794								
2	-.725	.733							
3	.639	-.449	.912						
4	-.349	.233	-.687	.749					
5	.738	-.696	.788	-.623	.764				
6	-.533	.324	-.563	.561	-.555	.735			
7	-.499	.575	-.471	.408	-.632	.354	.764		
8	-.616	.450	-.672	.653	-.754	.709	.568	.939	
9	.086	.072	-.215	.556	-.304	.097	.365	.357	.775

Table 3 (continued)

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
10	-.621	.603	-.374	.249	-.595	.281	.500	.504	.119	.797							
11	-.604	.474	-.787	.671	-.817	.679	.581	.894	.417	.416	.850						
12	.615	-.458	.480	-.366	.515	-.443	-.410	-.467	-.026	-.300	-.526	.930					
13	.879	-.714	.535	-.244	.679	-.471	-.436	-.590	.141	-.607	-.533	.567	.799				
14	.703	-.409	.390	-.278	.493	-.498	-.361	-.603	.136	-.446	-.514	.499	.763	.854			
15	.608	-.593	.284	-.161	.486	-.354	-.450	-.465	-.068	-.379	-.410	.460	.559	.471	.801		
16	.677	-.456	.268	-.050	.293	-.359	-.257	-.313	.235	-.393	-.275	.476	.649	.612	.517	.757	
17	-.600	.507	-.518	.445	-.693	.427	.494	.619	.314	.428	.647	-.463	-.608	-.437	-.434	-.253	.775

1. Escape–avoidance; 2. Positive reappraisal; 3. Pessimism; 4. Extraversion; 5. FCR; 6. Agreeableness; 7. Planful problem solving; 8. Perceived social support; 9. Seeking social support; 10. Self-controlling; 11. Optimism; 12. Neuroticism; 13. Distancing; 14. Confrontive coping; 15. Conscientiousness; 16. Accepting responsibility; 17. Openness to experience

The strongest bivariate association with FCR was observed for *optimism* ($r = -.817$), followed by *pessimism* ($r = .788$), *perceived social support* ($r = -.754$), *escape–avoidance* ($r = .738$), *positive reappraisal* ($r = -.696$), and *openness to experience* ($r = -.693$). These correlations represent unadjusted associations between the latent variables and should therefore be distinguished from the unique structural effects reported below.

The measurement model was evaluated before testing the structural relationships. Internal consistency was assessed using Cronbach's alpha and composite reliability (CR), and convergent validity was evaluated using the average variance extracted (AVE). All composite reliability coefficients exceeded .70, ranging from .716 to .975. Moreover, all AVE values exceeded the recommended .50 threshold. The Fornell–Larcker criterion further indicated adequate discriminant validity because the square root of the AVE for each construct was greater than its correlations with the remaining constructs.

Table 4. Reliability and Convergent Validity of the Measurement Model

Construct	α	CR	AVE
Escape–avoidance	.911	.930	.631
Positive reappraisal	.709	.808	.537
Pessimism	.898	.936	.831
Extraversion	.807	.864	.561
Fear of cancer recurrence	.967	.975	.584
Agreeableness	.711	.822	.540
Planful problem solving	.801	.855	.584
Perceived social support	.853	.886	.882

Seeking social support	.863	.898	.600
Self-controlling	.729	.716	.636
Optimism	.807	.886	.722
Neuroticism	.843	.927	.864
Distancing	.753	.820	.638
Confrontive coping	.763	.842	.729
Conscientiousness	.735	.727	.643
Accepting responsibility	.751	.775	.574
Openness to experience	.785	.817	.600

The measurement-model coefficients support adequate reliability and convergent validity of the constructs. The reported values are consistent with the reliability and validity analyses. After establishing the adequacy of the measurement model, the hypothesized structural relationships were evaluated. Table 5 presents the standardized path coefficients, t statistics, and p values for the direct effects on FCR.

Table 5. Direct Effects of Coping Styles, Personality Traits, Life Orientation, and Perceived Social Support on Fear of Cancer Recurrence

Predictor	β	t	p
Escape–avoidance	.136	3.050	.002
Positive reappraisal	-.209	4.603	< .001
Planful problem solving	-.044	1.413	.158
Seeking social support	.021	0.567	.571
Self-controlling	-.113	1.252	.211
Distancing	.111	1.891	.059
Confrontive coping	-.034	1.012	.312
Accepting responsibility	-.169	3.627	< .001
Neuroticism	-.027	0.967	.334
Agreeableness	.029	0.939	.348
Conscientiousness	.047	1.847	.065
Extraversion	-.132	3.038	.003
Openness to experience	-.089	3.228	.001
Optimism	-.288	5.632	< .001
Pessimism	.201	4.889	< .001
Perceived social support	.096	1.756	.080

Among the coping dimensions, *escape–avoidance significantly and positively predicted FCR*, $\beta = .136$, $t = 3.05$, $p = .002$. Thus, greater reliance on escape–avoidance coping was associated with higher FCR after the other predictors were controlled. In contrast, *positive reappraisal significantly predicted lower FCR*, $\beta = -.209$, $t = 4.60$, $p < .001$. *Accepting responsibility* was also a significant negative predictor, $\beta = -.169$, $t = 3.63$, $p < .001$. The unique effects of planful problem solving, seeking social support, self-controlling, distancing, and confrontive coping were not statistically significant ($ps > .05$). Distancing approached the conventional significance threshold, $\beta = .111$, $t = 1.89$, $p = .059$, but was not considered statistically significant.

Among the personality dimensions, *extraversion was negatively associated with FCR*, $\beta = -.132$, $t = 3.04$, $p = .003$. *Openness to experience* also showed a significant negative effect, $\beta = -.089$, $t = 3.23$, $p = .001$. The effects of neuroticism, $\beta = -.027$, $t = 0.97$, $p = .334$, agreeableness, $\beta = .029$, $t = 0.94$, $p = .348$, and conscientiousness, $\beta = .047$, $t = 1.85$, $p = .065$, were not statistically significant after controlling for the remaining predictors. Life orientation emerged as an important predictor of FCR. *Optimism had the largest standardized direct effect in the model*, significantly predicting lower FCR, $\beta = -.288$, $t = 5.63$, $p < .001$.

Conversely, *pessimism significantly predicted higher FCR*, $\beta = .201$, $t = 4.89$, $p < .001$. Thus, higher optimism was associated with lower recurrence-related fear, whereas higher pessimism was associated with greater recurrence-related fear.

Although perceived social support had a relatively strong negative bivariate association with FCR ($r = -.754$), its *unique direct effect in the structural model was not statistically significant*, $\beta = .096$, $t = 1.76$, $p = .080$. This difference between the bivariate correlation and the adjusted structural coefficient suggests that much of the association between perceived social support and FCR overlapped with other variables in the model, particularly life orientation, coping patterns, and personality characteristics. Specific indirect effects were examined to determine whether perceived social support mediated the associations of coping styles, personality traits, and life orientation with FCR.

Table 6. Specific Indirect Effects on Fear of Cancer Recurrence Through Perceived Social Support

Predictor	Indirect β	t	p
Escape–avoidance	.004	0.637	.525
Positive reappraisal	-.014	1.519	.129
Planful problem solving	.005	1.131	.259
Seeking social support	-.001	0.290	.772
Self-controlling	.013	1.078	.282
Distancing	-.021	1.479	.140
Confrontive coping	-.006	1.220	.223
Accepting responsibility	.006	1.215	.225
Neuroticism	.009	1.368	.172
Agreeableness	.012	1.655	.099
Conscientiousness	-.011	1.292	.197
Extraversion	.017	1.568	.118
Openness to experience	-.003	0.612	.541
Optimism	.069	1.719	.086
Pessimism	.016	1.561	.119

None of the specific indirect effects through perceived social support were statistically significant at the .05 level. Accordingly, *perceived social support did not significantly mediate the relationship between any of the coping styles and FCR*. Likewise, perceived social support did not significantly mediate the relationships between the five personality traits and FCR. All corresponding indirect effects were nonsignificant ($ps > .05$). The indirect effects of both dimensions of life orientation were also nonsignificant. Specifically, the indirect effect of optimism through perceived social support was $\beta = .069$, $t = 1.72$, $p = .086$, whereas the indirect effect of pessimism was $\beta = .016$, $t = 1.56$, $p = .119$. Although the indirect effect of optimism approached significance, it did not meet the conventional $p < .05$ criterion. These indirect-effect estimates correspond to the mediation analysis reported in the model.

The structural model demonstrated substantial explanatory power. Collectively, the predictors accounted for approximately 87.4% of the variance in FCR ($R^2 = .874$). Predictive relevance was evaluated using the Stone–Geisser Q^2 statistic. The cross-validated redundancy coefficient for FCR was $Q^2 = .472$, indicating substantial predictive relevance. Perceived social support also demonstrated positive predictive relevance ($Q^2 = .390$). The positive Q^2 values indicated that the model had predictive capability for the endogenous constructs.

Table 7. Summary of Significant Direct Predictors of Fear of Cancer Recurrence

Predictor	β	t	p	Direction
Optimism	-.288	5.632	< .001	Negative
Positive reappraisal	-.209	4.603	< .001	Negative
Pessimism	.201	4.889	< .001	Positive
Accepting responsibility	-.169	3.627	< .001	Negative
Escape–avoidance	.136	3.050	.002	Positive
Extraversion	-.132	3.038	.003	Negative
Openness to experience	-.089	3.228	.001	Negative

Overall, *optimism emerged as the strongest unique negative predictor of FCR*, followed by positive reappraisal and accepting responsibility. In contrast, pessimism and escape–avoidance were significant positive predictors. Among the personality traits, extraversion and openness to experience were independently associated with lower FCR. Although perceived social support was strongly correlated with FCR at the bivariate level, neither its adjusted direct effect nor its hypothesized mediating effects reached statistical significance.

Discussion and Conclusion

The present study examined a structural model of fear of cancer recurrence (FCR) based on coping styles, personality traits, and life orientation, while testing perceived social support as a potential mediator. The findings demonstrated that escape–avoidance coping and pessimism significantly predicted higher FCR, whereas positive reappraisal, accepting responsibility, extraversion, openness to experience, and optimism significantly predicted lower FCR. Optimism emerged as the strongest negative predictor of recurrence fear. In contrast, planful problem solving, seeking social support as a coping strategy, self-controlling, distancing, confrontive coping, neuroticism, agreeableness, and conscientiousness did not independently predict FCR after simultaneous adjustment for the other variables. Although perceived social support showed a strong negative bivariate relationship with FCR, its unique direct effect was nonsignificant, and it did not mediate the relationships of coping styles, personality traits, or life orientation with FCR. Collectively, the predictors explained 87.4% of the variance in recurrence fear, indicating that FCR in cancer survivors can be understood to a substantial extent through an integrated consideration of cognitive-behavioral coping, dispositional characteristics, and future-oriented expectations.

One important finding was that escape–avoidance coping significantly predicted greater FCR. This result suggests that attempts to withdraw from, suppress, or avoid cancer-related thoughts and emotions may provide temporary psychological relief while ultimately maintaining sensitivity to recurrence-related threats. Cancer survivors cannot completely eliminate uncertainty regarding recurrence; therefore, avoiding medical information, suppressing threatening thoughts, or disengaging from cancer-related conversations does not remove the underlying source of uncertainty. Instead, such behaviors may prevent survivors from cognitively and emotionally processing their experience. This interpretation is consistent with qualitative evidence demonstrating that cancer survivors use different coping strategies in response to FCR and that avoidance may become part of the continuing management of recurrence-related uncertainty (9). Studies of stress coping among women with breast cancer have similarly emphasized meaningful individual differences in coping patterns and their importance for psychological adaptation (10). More recent evidence showing that maladaptive cognitive emotion regulation and reduced psychological flexibility connect illness

perceptions with FCR further supports the proposition that rigid or avoidance-oriented responses may intensify recurrence fear (12).

In contrast, positive reappraisal and accepting responsibility were significant negative predictors of FCR. Positive reappraisal enables survivors to reinterpret cancer-related experiences in a more balanced and constructive manner without denying the realistic possibility of recurrence. Survivors who can identify meaning, personal growth, altered priorities, or manageable elements within their experience may be less likely to interpret every bodily sensation or follow-up examination catastrophically. Accepting responsibility may similarly strengthen a sense of agency by encouraging individuals to recognize the aspects of survivorship that remain within their control, including adherence to surveillance, engagement in healthy behavior, and appropriate help seeking. The importance of coping processes is supported by research proposing coping strategies as mechanisms within models of adjustment to cancer (11). Paunescu et al. also demonstrated that coping, locus of control, and temporal perspective are interconnected in posttraumatic growth among breast cancer survivors (21). Together, these findings suggest that coping is not simply a reaction to distress but a central process through which cancer-related uncertainty acquires adaptive or maladaptive meaning.

The nonsignificant unique effects of planful problem solving, seeking social support, self-controlling, distancing, and confrontive coping should not be interpreted as indicating that these coping responses are irrelevant. Rather, their predictive variance may have overlapped with stronger variables such as positive reappraisal, avoidance, optimism, and pessimism. FCR concerns a future event that cannot be completely controlled through conventional problem-solving behavior; therefore, problem-focused strategies that are effective for controllable stressors may be less directly influential when the stressor is uncertainty itself. Recent research on psychosocial approaches to FCR indicates that successful interventions frequently address broader cognitive-emotional processes such as mindfulness, acceptance, psychological flexibility, and adaptive engagement with uncertainty (1, 2). The reported effectiveness of acceptance and commitment therapy for psychological distress and FCR-related outcomes further suggests that changing one's relationship with distressing thoughts may sometimes be more important than attempting to solve or eliminate the source of uncertainty (13).

Regarding personality, extraversion significantly predicted lower FCR. Extraverted cancer survivors may be more inclined toward interpersonal engagement, emotional expression, positive affect, and participation in meaningful activities, all of which can reduce prolonged internal preoccupation with recurrence. Greater interpersonal engagement may also make it easier to communicate cancer-related worries and obtain reassurance or information when appropriate. Previous studies have demonstrated relationships between personality characteristics and psychological distress in cancer populations. Gillis et al. found personality traits to be associated with mental health distress among patients diagnosed with prostate cancer (14), while Iuso et al. reported associations between personality traits, perceived stress, and depressive symptoms among gynecological cancer patients (15). Thus, the present finding extends earlier evidence by suggesting that extraversion may specifically represent a dispositional resource against recurrence-related fear.

Openness to experience was likewise associated with lower FCR. Openness is characterized by cognitive receptivity, curiosity, tolerance of novel experiences, and willingness to consider alternative perspectives. These qualities may be especially useful in cancer survivorship because ambiguous bodily sensations and

uncertainty about future health cannot always be resolved immediately. Individuals higher in openness may be better able to entertain multiple explanations for physical sensations rather than automatically interpreting them as evidence of recurrence. They may also show greater receptivity to psychological support and adaptive meaning-making. This finding is compatible with research indicating that personality traits contribute to quality of life among women with breast cancer (16) and with systematic evidence linking personality characteristics and coping strategies to posttraumatic growth in patients with cancer and survivors (17). Personality may therefore influence FCR by shaping cognitive flexibility, emotional reactivity, and habitual approaches to managing uncertainty.

Neuroticism, agreeableness, and conscientiousness did not demonstrate significant unique effects on FCR. The nonsignificant effect of neuroticism is particularly noteworthy because neuroticism is commonly associated with psychological distress. One possible explanation is that its variance was absorbed by more proximal variables in the model, especially pessimism and escape–avoidance. Neurotic individuals may experience greater negative affect, but recurrence fear may be more directly determined by how uncertainty is interpreted and managed than by broad emotional instability itself. Evidence connecting personality with stress and depressive symptoms in cancer populations supports the relevance of personality while also indicating that these relationships occur within broader psychological systems (14, 15). Similarly, systematic findings concerning personality and posttraumatic growth suggest that the effects of traits often depend on their interaction with coping mechanisms rather than simple direct relationships (17). Thus, the present results may indicate that specific cognitive and behavioral mechanisms are more proximal to FCR than some broad personality dimensions.

The strongest finding concerned life orientation. Optimism was the strongest negative predictor of FCR, whereas pessimism significantly predicted greater recurrence fear. These complementary findings demonstrate the importance of generalized expectations concerning the future in cancer survivorship. Optimism does not require survivors to deny objective medical uncertainty; rather, optimistic individuals may be more likely to believe that favorable outcomes remain possible and that they possess sufficient resources to manage difficulties if they occur. Such expectations may reduce catastrophic interpretations of ambiguous physical symptoms and allow survivors to remain engaged with meaningful life goals. Conversely, pessimism may increase the subjective probability assigned to recurrence, encourage threat monitoring, and transform uncertainty into anticipation of an unfavorable outcome. Research comparing life orientation among individuals with serious medical conditions has highlighted the relevance of optimism and related constructs to adjustment (18). Moreover, mindfulness-based stress reduction has demonstrated beneficial effects on life orientation among women with breast cancer, indicating that this domain may be responsive to psychological intervention (19).

The protective role of optimism is also compatible with longitudinal research on factors that protect breast cancer patients against FCR (20). Furthermore, the association of locus of control, coping strategies, and time perspective with posttraumatic growth indicates that survivors' expectations regarding the future are closely connected to their ability to adapt following cancer (21). The current results extend these observations by demonstrating that optimism retains a particularly strong unique association with FCR even after coping styles, personality dimensions, and perceived social support are simultaneously considered. This suggests that future-oriented expectations may constitute a relatively proximal cognitive determinant

of how survivors interpret ongoing medical uncertainty. The finding also accords with contemporary intervention research demonstrating that psychological approaches targeting cognitive, acceptance-based, and mindfulness-related processes can reduce FCR (1, 2).

Contrary to the hypothesized mediation model, perceived social support had no significant unique direct effect on FCR and did not mediate the effects of coping styles, personality traits, or life orientation. This finding is important because it does not necessarily imply that social support is unimportant for cancer adjustment. Rather, its strong bivariate association with FCR suggests that support and recurrence fear are related, but the relationship may substantially overlap with optimism, personality, and coping. Survivors who are optimistic, extraverted, or more adaptively engaged may simultaneously perceive greater support and experience less FCR, reducing the unique effect of support once these variables are entered together. Research on breast cancer couples has shown that FCR is related to interpersonal processes such as mindfulness and family avoidance of cancer communication, indicating that the relational context of recurrence fear may be more complex than general perceived availability of support (22). Similarly, online peer-support research suggests that the form and context of supportive interaction can influence psychological outcomes during survivorship (24).

The absence of mediation may also reflect the distinction between the quantity, perceived availability, and functional quality of social support. A survivor may perceive family and friends as generally available while still feeling unable to disclose fears concerning recurrence. Conversely, excessive reassurance or avoidance of cancer-related conversations by relatives may fail to address the survivor's underlying uncertainty. Network research involving postoperative gastric cancer patients has emphasized connections among perceived social support, rumination, and posttraumatic growth, suggesting that support operates within a network of cognitive and emotional processes rather than through a simple linear pathway (23). Research among patients with advanced cancer has further highlighted how gender norms, social expectations, and family relationships can create complex interpersonal dynamics around serious illness (25). Accordingly, social support might be more appropriately conceptualized in future FCR models as a contextual resource, moderator, or multidimensional interpersonal process rather than necessarily as a mediator.

Taken together, the findings support a multidimensional but psychologically focused account of FCR. The particularly strong roles of optimism, pessimism, positive reappraisal, accepting responsibility, and escape–avoidance suggest that recurrence fear is closely linked to how survivors anticipate the future and regulate responses to uncertainty. Personality traits such as extraversion and openness may contribute protective dispositional tendencies, while the nonsignificant mediation findings indicate that these psychological processes do not necessarily exert their effects through perceived social support. This interpretation is compatible with contemporary research describing FCR as a phenomenon influenced by cognitive, existential, emotional, bodily, and interpersonal processes (6-8). The high explanatory power of the structural model consequently supports an integrated approach to understanding recurrence fear while also highlighting potentially modifiable psychological targets for psycho-oncological care.

Several limitations should be considered when interpreting the findings. First, the cross-sectional correlational design does not permit causal conclusions or establish the temporal sequence among coping styles, personality traits, life orientation, perceived social support, and FCR; persistent recurrence fear may itself influence coping and future expectations. Second, all main variables were measured using self-report

questionnaires, creating the possibility of common-method variance, recall bias, response tendencies, and socially desirable responding. Third, the participants were recruited from a geographically restricted population and represented survivors of breast, colorectal, gastric, and lung cancers, which limits generalizability to survivors of other malignancies, cultural settings, or healthcare systems. Cancer types and treatment experiences were also heterogeneous, and potentially relevant clinical variables such as prognosis, time since treatment, treatment complications, comorbid conditions, disease stage, and objective recurrence risk may have influenced psychological responses. Finally, mediation represents a temporal process, and testing perceived social support as a mediator using cross-sectional data provides a weaker basis for inference than prospective or longitudinal mediation designs.

Future studies should use prospective longitudinal designs to examine changes in FCR, coping responses, optimism, pessimism, and social resources across different phases of survivorship and to determine their temporal ordering. Replication with larger multicenter samples and survivors of a broader range of cancer types would improve generalizability and permit subgroup analyses according to age, sex, cancer type, stage, treatment modality, time since treatment, and objective recurrence risk. Researchers should also distinguish perceived support from received support and examine the quality, source, timing, and responsiveness of support rather than relying exclusively on a global support score. Testing social support as a moderator may be particularly valuable given the absence of mediation in the present model. Future models could additionally incorporate psychological flexibility, illness perceptions, rumination, death anxiety, body image, communication patterns, resilience, and posttraumatic growth. Finally, experimental and intervention studies could determine whether modifying avoidance, cognitive reappraisal, and future-oriented expectations produces corresponding reductions in FCR and thereby provide stronger evidence regarding causality.

Psycho-oncology services should routinely assess FCR together with the psychological characteristics that may sustain it, particularly escape–avoidance, pessimistic expectations, low optimism, and limited capacity for positive reappraisal. Interventions should help survivors recognize and gradually reduce avoidance of cancer-related thoughts, follow-up procedures, bodily sensations, and appropriate discussions of recurrence while strengthening tolerance of uncertainty and balanced cognitive interpretation. Clinicians can encourage realistic optimism rather than providing unrealistic reassurance, helping survivors recognize both the genuine uncertainty associated with survivorship and their capacity to cope effectively with future difficulties. Therapeutic programs may also strengthen positive reappraisal, personal agency, emotional openness, and flexible consideration of alternative interpretations of ambiguous health information. Although perceived social support did not independently predict or mediate FCR in the structural model, practitioners should continue to assess interpersonal functioning, particularly whether survivors feel able to communicate recurrence concerns and whether family, peer, and professional responses are genuinely supportive. Integrating these elements into survivorship programs may enable more individualized psychological care and reduce persistent recurrence-related distress.

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Authors' Contributions

All authors equally contributed to this study.

Declaration of Interest

The authors of this article declared no conflict of interest.

Ethical Considerations

The study protocol adhered to the principles outlined in the Helsinki Declaration, which provides guidelines for ethical research involving human participants.

Transparency of Data

In accordance with the principles of transparency and open research, we declare that all data and materials used in this study are available upon request.

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