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Who Fears More, Who Recovers Faster? Demographic Factors Influencing Fear of Cancer Recurrence and Resilience among Cancer Survivors

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Abstract

Background

Fear of cancer recurrence (FCR) is a prevalent and distressing concern among cancer survivors, often persisting long after the completion of treatment and negatively impacting psychological well-being. Resilience, as a key protective factor, may buffer against FCR; however, the moderating role of demographic factors in this relationship remains poorly understood.

Objective

This study aimed to investigate the association between psychological resilience and FCR among survivors of the most common cancers in Golestan Province, Iran, and to explore the moderating effects of demographic variables age, gender, and marital status.

Methods

This study employed a cross-sectional design, recruiting 105 adult cancer survivors from outpatient oncology clinics. Participants completed the Connor-Davidson Resilience Scale (CD-RISC) and the Fear of Cancer Recurrence Inventory (FCRI). Data were analyzed using Pearson correlation, regression analyses, and ANCOVA to assess moderation effects.

Results

Resilience was inversely correlated with FCR ($r = -0.51$, $p < 0.01$). Among resilience components, Positive Acceptance of Change and Secure Relationships emerged as the strongest predictor of lower FCR ($\beta = -0.50$, $p < 0.001$). Age, gender, and marital status significantly moderated the relationship between resilience and FCR. Notably, younger survivors (< 30 years) and unmarried individuals exhibited higher FCR and lower resilience. Gender differences revealed paradoxical trends, with males reporting both higher resilience and FCR than females.

Conclusion

These findings underscore the protective role of resilience in reducing FCR and highlight the importance of tailoring psychosocial interventions to demographic profiles. Targeted enhancement of specific resilience dimensions—particularly those related to emotional adaptability and social support—may mitigate FCR, especially in younger, single, and high-risk subgroups.

Introduction

Cancer survivorship (CS) is a complex phenomenon [1]. In 2022, there were approximately 20 million new cancer cases, including non-melanoma skin cancers (NMSC), and 9.7 million cancer-related deaths, including NMSC [2]. In the United States, more than 1 in 3 people will be diagnosed with cancer in their lifetime [3]. In this population, known as cancer survivors [4], CS is defined as the time between cancer diagnosis and the end of life that encompasses the totality of medical and psychosocial care, side effects from treatments, development of secondary cancers, remission and, ultimately, death [1].

Although long-term survivors (defined as > 5 years post-diagnosis) are no longer burdened by active treatment and routine follow-up appointments, they continue to face uncertainty regarding potential cancer recurrence [5]. Fear of Cancer Recurrence (FCR), conceptualized as 'fear, worry, or concern that cancer will come back or progress' [6], remains a persistent health-related concern for most cancer survivors, irrespective of cancer type or disease trajectory [7]. Consequently, addressing FCR is widely recognized as a critical unmet supportive care need within cancer care [8]. Moreover, a review of survivors across various cancer types [9] found no significant variation in FCR levels based on time since diagnosis. This finding suggests that, without targeted clinical intervention, FCR tends to persist chronically, negatively impacting Quality of Life (QoL) [5].

FCR is a frequent experience. The review indicating approximately 73% of cancer survivors have some degree of FCR, and 49% report moderate to high FCR [9]. FCR can become highly distressing, chronic, and disabling, which is associated with adverse health outcomes, including depression, anxiety, and generalized anxiety disorder [10]. Multiple reviews identify FCR management as one of the most frequently reported unmet needs among cancer survivors [11]. Furthermore, FCR has been found to predict several significant health-related behaviors, including increased utilization of psychotropic medications [12], elevated healthcare service use [13], greater use of complementary medicine, and reduced adherence to mammography screening [14].

Resilience, a cornerstone construct in positive psychology, is defined as the capacity to adapt effectively in the face of trauma, adversity, and significant life stressors [15]. It mitigates the deleterious consequences of psychological stress, attenuates symptoms of anxiety and depression, and reduces FCR while correlating positively with enhanced well-being and mental health outcomes. Empirical evidence indicates that resilience among post-operative carcinoma patients is inversely associated with FCR severity [16]. In breast cancer cohorts, elevated resilience levels predict diminished FCR and superior emotional adjustment [17]. Furthermore, individuals with robust psychosocial resources exhibit a weakened association between stress exposure and depressive symptomatology [18].

Despite these advances, the moderating influence of demographic variables on the resilience-FCR relationship remains underexplored in oncological populations. This study addresses this critical gap by investigating resilience as a buffer against FCR and elucidating the contingent role of demographic factors. Our dual objectives are (1) to quantify the association between resilience and FCR in cancer patients and (2) to empirically validate the moderating effect of demographic variables on this relationship.

Methods

Study Design and Participants

This cross-sectional study comprised all adult survivors of the five most prevalent cancers in Golestan Province who attended outpatient oncology clinics in Gorgan, Iran, in 2022. The target cancers—breast cancer (female only), lung cancer, gastric cancer, colorectal cancer, and leukemia—were identified based on incidence data from the Golestan Population-Based Cancer Registry (GPCR) for the year 2020. Given the unknown survival population, sample size estimation followed the Tabachnick & Fidell [19] ($N \geq 8M + 50$), where M represents the number of predictor variables intended for simultaneous entry into regression models (initially SOC-Total and subscales). Considering four predictor variables, a sample of 82 was required. To enhance statistical power, account for potential non-response or incomplete data, and ensure robustness, 105 participants were recruited via convenience sampling.

Data Collection

A board-certified hematologist-oncologist performed diagnostic confirmation, disease status, and remission verification for all participants. Following the provision of written informed consent, participants voluntarily completed standardized questionnaires. Demographic and clinical data were collected using validated instruments: the Connor-Davidson Resilience Scale (CD-RISC) [19] and the Fear of Cancer Recurrence Inventory (FCRI) developed by Simard and Savard [20].

Data Analysis

Data were analyzed using IBM SPSS Statistics (Version 20). Quantitative variables are presented as mean ± standard deviation (SD), while categorical variables are summarized using frequency distributions and percentages. Statistical analyses employed both descriptive and inferential methods. After confirming data normality, parametric and non-parametric tests were applied as appropriate. These included stepwise linear regression analysis, Spearman's and Pearson's correlation coefficients, one-way analysis of variance (ANOVA), and independent samples t-tests. Statistical significance was set at $p < 0.05$.

Results

As presented in Table 1, the lowest levels of psychological resilience were observed in laryngeal cancer survivors (M = 48.00, SD = 4.95) and tongue cancer survivors (M = 47.00, SD = 0.00). Concurrently, the highest fear of cancer recurrence (FCR) was identified in these same cancer types (laryngeal: M = 93.50, SD = 24.75; tongue: M = 82.00, SD = 0.00).

The highest resilience score was observed in the 30–40 age group (M = 72.80, SD = 12.29), while the lowest was in participants under 30 years (M = 69.57, SD = 13.51). Conversely, the highest fear of recurrence was in those under 30 (M = 83.00, SD = 16.70), with the lowest fear observed in participants over 50 (M = 70.75, SD = 21.89).

Males exhibited the highest resilience scores (M = 71.61, SD = 13.90), while females showed the lowest resilience (M = 71.41, SD = 13.24). Males also reported a higher fear of recurrence (M = 73.02, SD = 21.42) compared to females (M = 70.77, SD = 17.32).

Married participants demonstrated the highest resilience (M = 72.10, SD = 13.48), whereas singles scored the lowest (M = 68.00, SD = 13.58). Fear of recurrence was highest among singles (M = 79.87, SD = 13.87) and lowest among married participants (M = 70.56, SD = 19.92).

Kolmogorov-Smirnov test results indicated normal distribution for all variables ($p \geq 0.05$). Consequently, the study employed parametric tests, including Pearson’s correlation for bivariate associations and stepwise regression for determining variable contributions.

Table 1
Mean and Standard deviation of resilience and FCR in cancer type

Cancer Type	M, SD	FCR	Resilience	Spiritual influences	Control	Positive acceptance of change and secure relationships	Trust instincts	Personal competence
Breast	M	66.69	69.82	6.65	8.48	15.13	16.91	22.65
	SD	18.59	11.38	1.61	2.43	2.95	4.13	4.32
Leukemia	M	68.33	76.76	7.71	9.38	15.71	18.85	25.09
	SD	14.89	11.89	0.56	1.91	2.53	4.49	4.66
Colorectal	M	78.36	69.64	7.45	8.64	14.18	16.09	23.27
	SD	24.74	19.26	1.03	2.20	4.02	7.61	6.72
Stomach	M	74.85	72.43	7.14	8.57	15.43	16.85	24.43
	SD	19.51	13.68	1.57	2.43	1.27	4.56	5.62
Liver	M	60.67	75.33	7.33	10.33	17.67	14.66	25.33
	SD	14.05	4.04	0.58	0.58	1.52	1.15	2.08
Ovarian	M	69.75	78	7.50	9	16.75	19.50	25.25
	SD	14.52	10.09	0.58	1.41	1.89	5.19	5.56
Endometrial	M	78	66.11	6.44	8.89	13.11	15.78	21.89
	SD	18.72	13.17	1.59	2.62	2.47	4.05	5.30
Pancreatic	M	75	69	6	9	15	17.67	21.33
	SD	19.67	11.53	1.73	1	3.60	4.72	3.05
laryngeal	M	93.50	48.50	5	5	10	14.50	14
	SD	24.75	4.95	1.41	1.41	1.41	0.70	2.82
Testicular	M	49	78.50	7	9.50	17.50	19.50	25
	SD	9.90	3.53	1.41	0.70	0.71	3.53	1.41
Kidney	M	61.33	69	8	7.67	14	17	22.33
	SD	38.37	23.26	0	3.51	5.29	8.54	6.03
Lung	M	84.50	72.75	7.50	9.25	12.50	20.50	23
	SD	23.46	9.10	0.58	2.75	2.64	3	3.36
Prostate	M	73.17	70.83	6.83	9.17	14.33	16.17	24.33
	SD	17.69	18.08	1.83	3.06	4.03	4.71	6.56
Tongue	M	82	47	6	6	2	16	17
	SD	0	0	0	0	0	0	0
Sarcoma	M	67	75	7	8	17	17	26

Cancer Type	M, SD	FCR	Resilience	Spiritual influences	Control	Positive acceptance of change and secure relationships	Trust instincts	Personal competence
	SD	0	0	0	0	0	0	0
Esophageal	M	108	70	5	9	11	20	25
	SD	0	0	0	0	0	0	0
Lymphoma	M	76	74	7	8.67	14.33	18	26
	SD	17.35	6.24	1.73	2.08	2.08	1.73	5.56
Adenocarcinoma	M	74	87	8	11	18	22	28
	SD	0	0	0	0	0	0	0
Total	M	71.88	71.51	7.06	8.81	14.75	17.37	23.52
	SD	19.40	13.51	1.34	2.24	3.29	4.69	5.05

Primary Hypothesis Testing

Table 2 reveals a significant inverse correlation between psychological resilience and FCR among survivors of prevalent cancers ($r = -0.51$, $p < 0.01$), confirming the study's primary hypothesis

Table 2
Pearson correlation of Resilience and FCR

Variables		FCR
Resilience	Personal competence	0.43-
	Trust instincts	0.42-
	Positive acceptance of change secure relationships	0.50-
	Control	0.42-
	Spiritual influences	0.15-
	Total	0.51-
Predictive Analyses		

As shown in Table 3 the resilience components Positive Acceptance of Change and Secure Relationships significantly predicted FCR ($\beta = -0.50$, $p < 0.001$). The negative β coefficient indicates an inverse relationship in that higher levels of these resilience components predicted lower FCR.

Table 3
ANOVA in Multiple Regression for Positive Acceptance of Change and Secure Relationships

Model	Sum of Squares	df	Mean Square	F	Sig
Regression	9703.974	1	9703.974	33.955	0.000
Residual	29436.655	103	285.793		
Total	39140.629	104			

The results in Table 2 demonstrate that the predictive pathways of treatment adherence, derived from the components of sense of coherence, were statistically significant at 0.01 level based on the analysis of variance (ANOVA). This result indicates a robust association between the sense of coherence dimensions and adherence

Table 4
Model Summary

Model	R	R Square	Adjusted R Square	Std	Df 1	Df 2	Sig	Durbin Watson
Positive Acceptance of Change and Secure Relationship	0.50	0.25	0.24	16.90	1	103	0.000	1.70

Moderation Effects

Age: ANCOVA demonstrated a significant moderating effect of age on the resilience-FCR relationship ($\beta = -0.39$, $p < 0.0005$). This relationship varied significantly across age groups among survivors.

Gender: The resilience-FCR pathway was significantly moderated by gender ($\beta = -0.27$, $p < 0.0005$), indicating distinct patterns between males and females

Marital Status: Marital status significantly moderated the association ($\beta = -0.48$, $p < 0.0005$), revealing differential effects based on marital status

Ethnicity (F-statistic non-significant) and cancer Type (F-statistic non-significant) did not significantly moderate the resilience-FCR relationship.

Discussion

This study explored the interplay between psychological resilience and fear of cancer recurrence (FCR) among survivors of the five most prevalent cancers in Golestan Province, with a specific focus on the moderating roles of demographic variables. Our findings contribute to a growing body of literature emphasizing the persistent psychological challenges faced by cancer survivors, even years after treatment completion.

The findings align with and extend contemporary literature while highlighting culturally nuanced patterns. Key points for discussion include a strong inverse correlation between resilience and FCR reinforcing resilience as a critical buffer, consistent with global studies [21, 22]. The "Positive Acceptance of Change and Secure Relationships" subscale emerged as the most potent resilience component predicting lower FCR. This result underscores the social-ecological dimension of resilience [23]—emotional support and adaptability to life disruptions are central to mitigating FCR. Recent meta-analyses [24] similarly identify social factors that were related to resilient responses. Also, this finding aligns with prior research suggesting that adaptive coping strategies and emotionally supportive interpersonal

networks facilitate psychological adjustment and reduce health-related anxieties in cancer survivors [17][18]. The results underscore the multidimensionality of resilience. While components such as personal competence, trust in one's instincts, and control showed moderate negative correlations with FCR, spiritual influences demonstrated a weaker association, indicating that not all resilience dimensions contribute equally. These nuances suggest that intervention programs should prioritize enhancing specific sub-domains of resilience rather than adopting a one-size-fits-all approach.

A notable contribution of this study is the identification of significant demographic moderators—namely, age, gender, and marital status—in the relationship between resilience and FCR. Age exhibited the highest moderation effect, suggesting that younger survivors (< 30) are more vulnerable to FCR despite their relatively shorter survivorship duration. This result may be attributable to heightened concerns about fertility, career disruption, body image, and long-term mortality. Conversely, older survivors (> 50) exhibited higher resilience and lower FCR, possibly reflecting a more accepting and integrated approach to health-related uncertainty.

Gender also significantly moderated the resilience-FCR relationship, although contrary to expectations, males reported higher FCR and resilience than females. This paradoxical pattern may reflect gendered differences in emotional expression or help-seeking behaviors rather than actual psychological burdens. Prior literature often reports higher FCR in women, especially those with breast cancer [9][10], but cultural and sociocultural factors in this Iranian sample may have influenced reporting trends. Marital status emerged as a third significant moderator in married individuals displaying both higher resilience and lower FCR. This finding resonates with the Downward et al. [25] study, which posits that secure relational contexts attenuate perceived threats and enhance adaptive responses to stress. Interestingly, neither cancer type nor ethnicity significantly moderated the association between resilience and FCR. This finding suggests that the psychological mechanisms linking resilience and FCR may operate consistently across tumor types and ethnic backgrounds, highlighting the transdiagnostic relevance of resilience-building interventions.

These findings have important implications for psycho-oncology and survivorship care planning. First, routine psychosocial screening for FCR and resilience should be integrated into follow-up protocols, particularly for young, single, and female survivors. Second, psychological interventions—such as resilience training, salutogenesis interventions, and Compassion-focused therapy —may help target the modifiable components of resilience shown to influence FCR. Third, supportive care models should adopt a personalized, demographic-sensitive approach to optimize outcomes. Additionally, healthcare professionals should be aware that survivors of cancers with more visible, debilitating, or stigmatized symptoms (e.g., laryngeal and tongue cancer) exhibited both the lowest resilience and highest FCR. Tailored interventions that address communication impairments, identity loss, and social reintegration could mitigate distress in these vulnerable subgroups.

Several limitations warrant consideration. First, the cross-sectional design limits causal inference; longitudinal research is needed to assess changes in FCR and resilience over time. Second, the relatively small and regionally specific sample may restrict generalizability, and the presence of zero standard deviation in some subgroups suggests caution in interpreting those data points. Third, we could not control the potential confounders such as treatment type, disease severity, comorbidities, and personality traits. Future studies should employ longitudinal designs, incorporate qualitative data to capture survivors' lived experiences, and explore biological correlates of psychological resilience (e.g., neuroendocrine or inflammatory markers). Moreover, developing culturally tailored resilience interventions in Middle Eastern populations would be a valuable next step.

Conclusion

This study provides empirical evidence that psychological resilience significantly mitigates the fear of cancer recurrence among survivors of prevalent cancers and that this protective effect is modulated by age, gender, and marital status. These findings emphasize the necessity of incorporating psychosocial variables into survivorship care, particularly for at-risk groups such as young, unmarried individuals and those diagnosed with disfiguring or function-impairing cancers.

Given the chronic nature of FCR and its deleterious impact on quality of life and healthcare behaviors, targeted interventions to enhance resilience—especially the domains of positive acceptance and secure relationships—should be prioritized in cancer care. Integrating psychological support with demographic sensitivity will not only address a critical unmet need but also promote holistic recovery and long-term well-being among cancer survivors.

Declarations

Ethics approval and Consent to publication

Ethical approval for this study was obtained from the Ethics Committee of Golestan University of Medical Sciences (Approval Code: IR.GOUMS.REC.1402.006). All procedures involving human participants were conducted in strict accordance with the ethical principles outlined in the World Medical Association (WMA) Declaration of Helsinki.

Clinical Trial

Not Applicable

Availability of data and material

The datasets generated and analyzed during this study are not publicly available due to confidentiality agreements and ethical restrictions protecting participant privacy. However, the data may be made available upon reasonable request, subject to institutional approval. Interested researchers should direct inquiries to the corresponding author at [badeleh@gmail.com] for access.

Competing interests

The authors declared no potential competing of interest concerning research, authorship, and/or publication.

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Authors contributions

MP performed the measurements. MTBS and AHP was involved in planning and supervising the work. MTBS and JR processed the experimental data, performed the analysis, and drafted the manuscript. MTBS worked on the final manuscript. All authors commented on the manuscript.

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