Submitted: 13 October, 2025 Accepted: 02 December, 2025 Published: 15 January, 2026 DOI:10.22514/ejgo.2026.005

ORIGINAL RESEARCH

European Journal of Gynaecological Oncology

Influence of fatigue, psychological distress, social support, and uncertainty appraisal on quality of life in post-treatment patients with gynecological cancer

Ju-Hee Nho[1], Eun Suk Hwang[2], Won Ku Choi[3], Bo Ram Yu[4], Dong Hyu Cho[3,*]

[1]College of Nursing, Research Institute of Nursing Science, Jeonbuk National University, 54896 Jeonju, Republic of Korea
[2]College of Nursing, Jeonbuk National University, 54896 Jeonju, Republic of Korea
[3]Department of Obstetrics and Gynecology, Jeonbuk National University Medical School, Research Institute of Clinical Medicine of Jeonbuk National University, Biomedical Research Institute of Jeonbuk National University Hospital, 54907 Jeonju, Republic of Korea
[4]Department of Obstetrics and Gynecology, Jeonbuk National University Hospital, 54907 Jeonju, Republic of Korea

***Correspondence**
obgyn2001@jbnu.ac.kr
(Dong Hyu Cho)

Abstract

Background: This study aimed to examine the levels of fatigue, psychological distress, social support, uncertainty appraisal, and quality of life (QoL) in post-treatment patients with gynecological cancer and to evaluate how these factors influence their QoL. **Methods**: A cross-sectional correlation study was conducted with 150 women with gynecological cancer recruited through convenience sampling from the outpatient gynecology clinic of a tertiary hospital in Jeonju, South Korea. Data were collected using a structured questionnaire between 20 November 2024, and 10 January 2025. Statistical analyses included an independent *t*-test, analysis of variance, Pearson's correlation, and multiple regression analysis. **Results**: The majority of participants were diagnosed with endometrial or ovarian cancer (74.0%). The mean QoL score was moderate to high (78.11 $\pm$ 14.20). QoL was positively correlated with higher fatigue scores (lower levels of fatigue) (r = 0.68, $p < 0.001$), greater social support (r = 0.58, $p < 0.001$), and higher opportunity appraisal (r = 0.34, $p < 0.001$), and negatively correlated with psychological distress ($r = -0.59, p < 0.001$) and danger appraisal ($r = -0.28, p < 0.001$). Multiple regression analysis identified fatigue (β = 0.45, $p < 0.001$) and social support (β = 0.36, $p < 0.001$) as significant predictors of QoL, accounting for 60.0% of the variance. **Conclusions**: These findings highlight the critical role of fatigue reduction and enhanced social support in improving the QoL of post-treatment patients with gynecological cancer. Targeted interventions addressing both physical and psychosocial factors are recommended for comprehensive survivorship care.

Keywords

Fatigue; Psychological distress; Quality of life; Social support; Uncertainty

1. Introduction

Gynecological cancers are malignant tumors that occur in the female reproductive organs and account for 9.2% of all cancers among women in South Korea [1]. According to the 2022 national report, the 5-year age-standardized prevalence rates were 52.5 for cervical cancer, 61.3 for endometrial cancer, 45.5 for ovarian cancer, 2.7 for vulvar cancer, and 1.0 for vaginal cancer. The 5-year relative survival rates from 2018 to 2022 were 79.9% for cervical cancer, 89.0% for endometrial cancer, and 65.8% for ovarian cancer, indicating that many patients with gynecological cancer are surviving more than five years after diagnosis. In particular, the survival rates were higher when the cancer was confined to the primary site; 96.5% for endometrial cancer and 93.8% for ovarian cancer [2].

As cancer survival rates have increased significantly, the importance of quality of life (QoL) after treatment has become increasingly recognized alongside clinical outcomes. Patients with gynecological cancer experience a range of symptoms, not only due to the disease itself, but also as a result of treatments such as surgery, chemotherapy, and radiation therapy, all of which can significantly impact their QoL [3].

Cancer-related fatigue is one of the most common and burdensome symptoms among patients with gynecological cancer. Because fatigue is directly associated with decreased activity, limited role functioning, and a decline in overall QoL, timely screening and appropriate intervention are essential [4].

After being diagnosed with cancer, patients often experience a variety of negative emotions, such as hopelessness, irritability, worthlessness, anxiety, depression, and despair. These feelings can result in an overall sense of emotional discomfort. While such responses may be a natural reaction to illness, many patients experience distress, a severe emotional condition that may interfere with treatment adherence and outcomes [5]. Distress is defined as a multifaceted and unpleasant psychological, social, spiritual, and physical experience associated with cancer that impairs an individual's ability to cope effectively [6].

A study of women survivors of cancer in the United States [7] found that they were significantly more likely to experience

depression than the general population. Gynecological cancer and its treatment can adversely affect QoL, interfere with daily functioning, and have long-term consequences on physical, emotional, and mental well-being. In addition, many patients experience profound changes in their sense of self, body image, and sexual identity [8]. Therefore, there is a critical need to address health issues arising from these changes and to develop strategies aimed at improving QoL.

Social support is a vital resource provided by others. It includes all interpersonal relationships and social networks that enable individuals to manage their health and function optimally in their current situation [9]. Support from family and significant others has been shown to reduce perceived stress, increase positive emotions, and decrease anxiety and depression [10]. Emotional support from family and friends, in particular, has been reported to positively influence patients' QoL [11].

Patients with cancer frequently experience a high level of uncertainty regarding their disease, particularly in relation to the effectiveness of treatment. As uncertainty increases, patients' resilience may decline, and fear may outweigh the will to pursue treatment [12, 13]. Therefore, how patients appraise uncertainty can be a key factor that negatively impacts their recovery and overall QoL.

Ferrell *et al*. [14] suggested that physical well-being, psychological well-being, social well-being, and spiritual well-being all contribute to the QoL of cancer survivors. Based on this model, the present study aims to identify the relationships between fatigue (physical well-being), psychological distress (psychological well-being), social support (social well-being), and uncertainty appraisal (spiritual well-being), and their influence on the QoL of gynecological cancer survivors (Fig. 1). This study seeks to provide foundational data for the development of effective interventions to enhance QoL in this population.

This study examined fatigue, psychological distress, social support, uncertainty appraisal, and QoL in post-treatment patients with gynecological cancer using Ferrell's QoL model, with the aim of identifying factors that influence QoL. The specific objectives of this study were as follows:

(i) To assess fatigue, psychological distress, social support, uncertainty appraisal, and QoL in post-treatment patients with gynecological cancer.

(ii) To analyze differences in QoL according to participants' general characteristics.

(iii) To examine the correlations among fatigue, psychological distress, social support, uncertainty appraisal, and QoL.

(iv) To identify the factors that significantly influence QoL.

2. Materials and methods

2.1 Research questions

Based on the study objectives, the following research questions were addressed:

(i) What are the levels of fatigue, psychological distress, social support, uncertainty appraisal, and QoL among post-treatment patients with gynecological cancer?

(ii) Are there significant differences in QoL based on participants' general characteristics?

(iii) What are the relationships among fatigue, psychological distress, social support, uncertainty appraisal, and QoL in post-treatment patients with gynecological cancer?

(iv) Which factors significantly influence QoL in this population?

2.2 Study design and participants

This study employed a descriptive correlational, cross-sectional design and was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. A convenience sample was recruited from the outpatient gynecological clinic of a tertiary medical center located in Jeonju, South Korea. Data were collected between 20 November 2024 and 10 January 2025, using a structured questionnaire.

The inclusion criteria were as follows: (i) women diagnosed with gynecological cancer who received treatment such as surgery, chemotherapy, radiation therapy, or hormone therapy, (ii) aged 19 years or older, and (iii) provided voluntary consent to participate in the study. The exclusion criteria included: (i) currently undergoing active treatment, (ii) diagnosed with and receiving treatment for severe mental illness, and (iii)

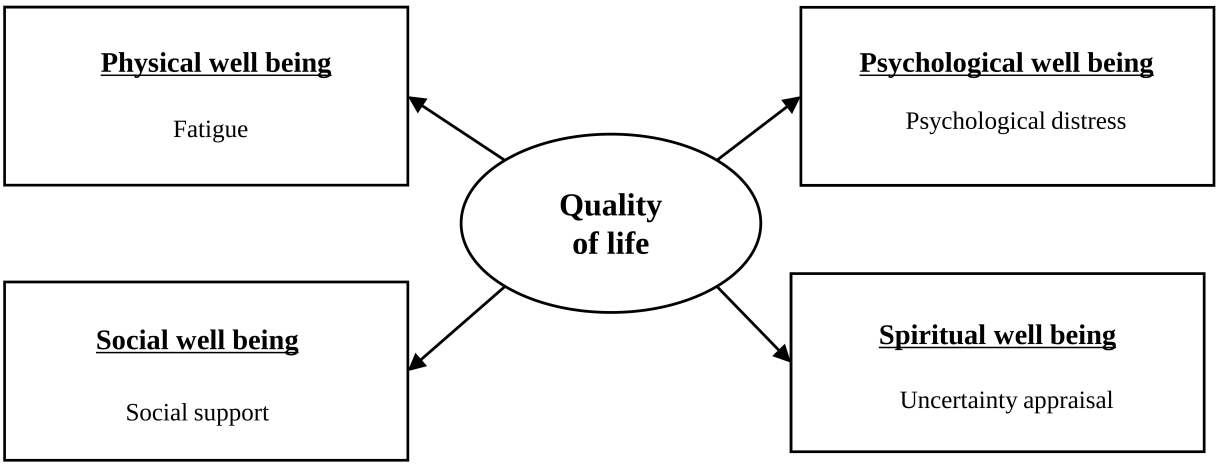

FIGURE 1. Conceptual framework of this study: quality of life cancer survivor model.

diagnosed with other acute or chronic conditions (*e.g.*, cardiovascular disease, respiratory disease, hypertension, diabetes with complications, or chronic kidney disease).

The required sample size was calculated using G*Power 3.1 (Heinrich Heine University Düsseldorf, Düsseldorf, NRW, Germany), with a significance level of 0.05, power of 0.80, and effect size of 0.15 [15]. Based on 14 predictor variables (10 general characteristics and four clinical variables: fatigue, psychological distress, social support, and uncertainty appraisal), the minimum sample size was determined to be 135. Among the 154 participants initially recruited, four were excluded because they had incomplete responses (over 50% of items unanswered). As a result, a total of 150 patients (97.4%) were included in the final analysis.

Data were collected using structured questionnaires administered by a research nurse who screened and identified eligible patients based on the inclusion criteria. The data collection process involved providing participants with a clear explanation of the study's purpose and significance, as well as their rights as participants, and assurances of confidentiality. Individuals who voluntarily agreed to participate were given an informed consent form and a self-administered questionnaire. Completion of the questionnaire required approximately 15–20 minutes. Participants who completed the survey received a small gift as a token of appreciation. This study was approved by the Institutional Review Board of Jeonbuk National University Hospital (IRB no. CUH 2024-09-034-002), and written informed consent was obtained from all participants. The study was conducted in accordance with the ethical standards of the Institutional Committee on Human Experimentation and the Declaration of Helsinki (1975).

2.3 Measurements

2.3.1 Quality of life

The Korean version of the Functional Assessment of Cancer Therapy-General (FACT-G), Version 4, developed by Cella *et al*. [16], was used to assess QoL. This instrument comprises a total of 27 items across four domains: physical well-being (7 items), social/family well-being (7 items), emotional well-being (6 items), and functional well-being (7 items). Each item is rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (very much). Negatively worded items in the physical well-being (7 items) and emotional well-being (5 items) domains were reverse-coded according to the scoring guidelines. Total scores ranged from 0 to 108, with higher scores indicating better QoL. The reliability of the instrument at the time of its development was demonstrated with a Cronbach's α of 0.89 [16], while the Cronbach's α in the current study was 0.85.

2.3.2 Fatigue

Fatigue was measured using the Korean version of the Functional Assessment of Chronic Illness Therapy-Fatigue Scale (FACIT-F) [17]. This instrument consists of 13 items, each rated on a 5-point Likert scale ranging from 0 (not at all) to 4 (very much). Eleven of these items were reverse-coded in accordance with the scoring guidelines. Total scores range from 0 to 52, with higher scores reflecting lower levels of fatigue. A score of 34 is used as the cutoff: scores of $\leq$34 indicate the presence of fatigue, whereas scores of $\geq$35 indicate its absence [18]. The FACIT-F demonstrated excellent reliability, with a Cronbach's α of 0.95 at the time of development and 0.89 in this study.

2.3.3 Psychological distress

Psychological distress was assessed using the Korean version of the Depression Anxiety Stress Scale (DASS-21) [19], a shortened version of the original 42-item DASS. This instrument includes three subscales: depression, anxiety, and stress, each consisting of 7 items rated on a 4-point Likert scale (0–3), with higher scores indicating greater levels of psychological distress. At the time of development, the DASS-21 demonstrated a Cronbach's α of 0.93 [19]. In this study, the Cronbach's α was also 0.93.

2.3.4 Social support

Social support was measured using the Korean version of the Multidimensional Scale of Perceived Social Support [20]. This scale comprises 12 items covering three domains: support from family, friends, and significant others. Each item is rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), with higher scores indicating greater perceived social support. The original instrument had a Cronbach's α of 0.91 [20], and in this study, the Cronbach's α was 0.97.

2.3.5 Uncertainty appraisal

Uncertainty appraisal was assessed using the Appraisal of Uncertainty Scale developed by Mishel and Sorenson [21]. This instrument includes two subdomains: danger appraisal (8 items) and opportunity appraisal (7 items), each rated on a 6-point Likert scale. The total score range for danger appraisal is 0–40, with higher scores indicating a greater perception of threat. The opportunity subscale ranges from 0 to 35, with higher scores reflecting a more positive or opportunity-oriented perception of uncertainty. The original instrument reported Cronbach's α values of 0.87 for danger appraisal and 0.82 for opportunity appraisal [21]. In the present study, the Cronbach's α was 0.90 for danger appraisal and 0.90 for opportunity appraisal.

2.3.6 General characteristics of participants

The general characteristics of the participants included their age, educational level, employment status, religion, monthly income, type of cancer, cancer stage, recurrence, type of treatment received, and time since treatment completion.

2.4 Data analysis

Data were analyzed using IBM SPSS Statistics version 27.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize participants' general characteristics, as well as levels of fatigue, psychological distress, social support, uncertainty, and QoL. Inferential statistical analyses were conducted as follows: independent *t*-tests and one-way analysis of variance (ANOVA) were performed to examine differences in QoL according to general characteristics. Scheffé's *post-*

hoc test was used when ANOVA results were statistically significant. Pearson's correlation coefficients were calculated to assess the relationships among fatigue, psychological distress, social support, uncertainty appraisal, and QoL. Multiple regression analysis was conducted to identify factors influencing QoL. Prior to regression analysis, the normality of the data distribution was assessed using the Kolmogorov-Smirnov test, as well as skewness and kurtosis values. Multicollinearity was evaluated by checking tolerance values and variance inflation factors. Statistical significance was set at $p < 0.05$ for all analyses.

3. Results

3.1 General characteristics of participants, fatigue, psychological distress, social support, uncertainty appraisal, and QoL

The mean age of participants was 56.35 years, the most common diagnosis was endometrial cancer (n = 57, 38.0%), and the most frequent cancer stage at diagnosis was stage 1 (n = 95, 63.3%) (Table 1). The mean QoL score was 78.11 ± 14.20, and the mean fatigue score was 39.16 ± 8.17, with 109 participants (72.7%) reporting no symptom of fatigue. The average scores for psychological distress were 11.05 ± 10.42, for social support were 47.43 ± 8.81, for danger appraisal of uncertainty were 14.37 ± 8.48, and for opportunity appraisal of uncertainty were 16.59 ± 7.41 (Table 2).

3.2 QoL according to participants' general characteristics

Participants aged 59 years or younger reported significantly higher QoL scores compared with those aged 70 years or older ($F = 4.48$, $p = 0.005$). Those with a university degree or higher had significantly higher QoL scores than participants with an education level below high school ($F = 5.89$, $p = 0.006$). Employed participants demonstrated significantly higher QoL scores compared with their unemployed counterparts ($t = -3.09$, $p = 0.002$). Similarly, participants with a monthly income of ≥3 million KRW reported higher QoL scores than those with an income of <1 million KRW ($F = 5.23$, $p = 0.006$). Lastly, participants without a history of cancer recurrence had significantly higher QoL scores than those who experienced recurrence ($t = 2.26$, $p = 0.026$) (Table 3).

3.3 Correlations between fatigue, psychological distress, social support, uncertainty appraisal, and QoL

QoL scores were positively correlated with fatigue scores, indicating that lower levels of fatigue (*i.e.*, higher FACIT-F score) were associated with higher QoL scores ($r = 0.68$, $p < 0.001$). Additionally, lower psychological distress and greater social support were associated with higher QoL ($r = -0.59$, $p < 0.001$; $r = 0.58$, $p < 0.001$). Lower danger appraisal and higher opportunity appraisal of uncertainty were both associated with better QoL ($r = -0.28$, $p < 0.001$; $r = 0.34$, $p < 0.001$) (Table 4).

TABLE 1. General characteristics of study participants (N = 150).

Variable	Categories	n (%) or M ± SD
Age (yr)		
		56.35 ± 12.46
	≤49	38 (25.3)
	50–59	42 (28.0)
	60–69	50 (33.3)
	≥70	20 (13.3)
Educational level		
	<High school	42 (28.0)
	High school	69 (46.0)
	≥University graduate	39 (26.0)
Employment status		
	Yes	52 (34.7)
	No	98 (65.3)
Religion		
	Yes	78 (52.0)
	No	72 (48.0)
Monthly income (×10,000, KRW)		
	<100	68 (45.3)
	100∼<300	56 (37.3)
	≥300	26 (17.3)
Type of cancer		
	Ovarian cancer	54 (36.0)
	Cervical cancer	39 (26.0)
	Endometrial cancer	57 (38.0)
Cancer stage		
	1	95 (63.3)
	2	23 (15.3)
	3	22 (14.7)
	4	10 (6.7)
Recurrence		
	Yes	18 (12.0)
	No	132 (88.0)
Type of treatment received		
	OP	75 (50.0)
	OP + Chemo	41 (27.3)
	Other	34 (22.7)
Time since treatment completion	0∼378	47.43 ± 53.76

Chemo: Chemotherapy; KRW: Korean won (one million Korean won is approximately 600 euros); OP: Operation; M: Mean; SD: Standard deviation.

TABLE 2. The levels of key study variables (N = 150).

Variable	Categories	n (%) or M ± SD	Min–Max	Range
Quality of life				
	Total	78.11 ± 14.20	32–108	0–108
	Physical	24.43 ± 4.37	7–28	0–28
	Social/family	17.92 ± 6.11	0–28	0–28
	Emotional	17.97 ± 3.82	2–24	0–24
	Functional	17.79 ± 5.75	0–28	0–28
Fatigue				
	Total	39.16 ± 8.17	14–52	0–52
	Fatigue (≤34)	41 (27.3)		
	Non fatigue (>34)	109 (72.7)		
Psychological distress				
	Total	11.05 ± 10.42	0–54	0–63
	Depression	3.49 ± 3.93	0–21	0–21
	Anxiety	3.10 ± 3.31	0–16	0–21
	Stress	4.45 ± 3.89	0–21	0–21
Social Support				
	Total	47.43 ± 8.81	16–60	12–60
	Family Support	16.21 ± 3.01	4–20	4–20
	Friends Support	15.21 ± 3.35	4–20	4–20
	Special Support	16.01 ± 3.08	4–20	4–20
Uncertainty appraisal				
	Danger appraisal	14.37 ± 8.48	0–40	0–40
	Opportunity appraisal	16.59 ± 7.41	0–35	0–35

M: Mean; SD: Standard deviation; Min: Minimum; Max: Maximum.

TABLE 3. Quality of life according to participants' characteristics (N = 150).

Variable	Categories	Quality of life	
		Mean ± SD	*t*, *F*, *r* (*p*)
Age (yr)			
	≤49[a]	80.93 ± 13.41	4.48 (0.005)
	50–59[b]	82.04 ± 13.23	a, b > d[†]
	60–69[c]	75.58 ± 13.90	
	≥70[d]	70.83 ± 15.23	
Educational level			
	High school[a]	73.79 ± 14.21	5.89 (0.006)
	High school[b]	77.58 ± 13.07	c > a[†]
	≥University graduates[c]	83.71 ± 14.60	
Employment status			
	Yes	82.89 ± 12.67	−3.09 (0.002)
	No	75.58 ± 14.37	
Religion			
	Yes	76.90 ± 14.63	1.09 (0.278)
	No	79.43 ± 13.69	

TABLE 3. Continued.

Variable	Categories	Quality of life	
		Mean ± SD	t, F, r (p)
Monthly income (×10,000, KRW)			
	<100[a]	74.21 ± 13.97	5.23 (0.006)
	100∼<300[b]	80.59 ± 14.64	c > a[†]
	≥300[c]	82.97 ± 11.26	
Type of cancer			
	Ovarian cancer	74.71 ± 15.46	2.60 (0.078)
	Cervical cancer	80.90 ± 13.61	
	Endometrial cancer	79.42 ± 12.88	
Cancer stage			
	1[a]	80.00 ± 12.51	2.04 (0.111)
	2[b]	77.03 ± 15.93	
	3[c]	74.42 ± 16.54	
	4[d]	70.75 ± 17.54	
Recurrence			
	Yes	71.13 ± 14.52	2.26 (0.026)
	No	79.06 ± 13.94	
Type of treatment received			
	OP	80.37 ± 11.92	2.01 (0.138)
	OP + Chemo	75.25 ± 15.00	
	Other	76.58 ± 17.17	
Time since treatment completion			−0.060 (0.463)

Chemo: Chemotherapy; KRW: Korean won (One million Korean won is approximately 600 Euros); OP: Operation; SD: Standard deviation. [†]Scheffe' test. Different letters are intended to indicate which group differences emerged in the post-hoc analysis.

TABLE 4. Correlations between fatigue, psychological distress, social support, uncertainty appraisal, and QoL (N = 150).

Variable	QoL	Fatigue	Psychological distress	Social Support	Uncertainty appraisal	
					DA	OA
			r (p)			
Fatigue	0.68 (<0.001)	-				
Psychological distress	−0.59 (<0.001)	−0.66 (<0.001)	-			
Social Support	0.58 (<0.001)	0.33 (<0.001)	−0.39 (<0.001)	-		
Uncertainty appraisal						
DA	−0.28 (<0.001)	−0.34 (<0.001)	0.51 (<0.001)	−0.11 (0.169)	-	
OA	0.34 (<0.001)	0.34 (<0.001)	−0.35 (<0.001)	0.41 (<0.001)	−0.14 (0.081)	-

DA: Danger appraisal; OA: Opportunity appraisal; QoL: quality of life.

3.4 Factors influencing QoL

A multiple regression analysis was conducted to identify factors that significantly influence QoL. Independent variables included clinical variables (fatigue, psychological distress, social support, and uncertainty appraisal) and general characteristics (age, education level, employment status, monthly income, and recurrence). The Durbin-Watson statistic was 1.83, indicating no autocorrelation among residuals. Multicollinearity diagnostics revealed tolerance values ranging from 0.37 to 0.90 and variance inflation factors ranging from 1.38 to 2.74, indicating no multicollinearity among the independent variables.

Multiple regression results revealed that fatigue (β = 0.45, $p < 0.001$) and social support (β = 0.36, $p < 0.001$) were significant predictors of QoL. These variables explained 60.0% of the variance in QoL (F = 16.68, $p < 0.001$) (Table 5).

TABLE 5. Influencing factors on quality of life (N = 150).

Variable	B	SE	β	t	p
(Constant)	23.77	8.23		2.89	0.005
Age (yr) (≤49)*					
50–59	2.63	2.14	0.08	1.23	0.222
60–69	1.11	2.35	0.04	0.47	0.636
≥70	−2.15	3.06	−0.05	−0.70	0.483
Educational level (≥University graduate)*					
<High school	0.09	2.55	0.00	0.03	0.973
High school	−1.99	1.94	−0.07	−1.03	0.305
Employ status (Yes)*	1.37	1.91	0.05	0.71	0.477
Monthly income (≥300)* (×10,000, KRW)					
<100	−2.17	2.45	−0.08	−0.88	0.378
100∼<300	−1.88	2.20	−0.06	−0.85	0.394
Recurrence (No)*	1.62	2.39	0.04	0.68	0.499
Fatigue	0.78	0.13	0.45	6.09	<0.001
Psychological distress	−0.18	0.11	−0.14	−1.68	0.095
Social Support	0.57	0.10	0.36	5.69	<0.001
Uncertainty appraisal					
DA	−0.03	0.10	−0.02	−0.29	0.776
OA	−0.06	0.12	−0.03	−0.50	0.615
	Adj.R^2 = 0.60	F = 16.68	$p < 0.001$		

**Dummy variable of reference group. DA: Danger appraisal; OA: Opportunity appraisal; B: Unstandardized coefficient; SE: Standard error; KRW: Korean won; Adj.R^2: Adjusted R^2.*

4. Discussion

This study aimed to examine the QoL of post-treatment patients with gynecological cancer by exploring the impact of physical (fatigue), psychological (psychological distress), social (social support), and spiritual (uncertainty appraisal) dimensions of health. The results demonstrated that QoL among post-treatment patients with gynecological cancer improved with decreased fatigue and increased social support.

In this study, the mean QoL score for post-treatment patients with gynecological cancer was 78.11 ± 14.20 out of a possible 108 points. This finding indicates that the QoL in this population exceeds that of women with cancer who are currently undergoing treatment [22]; nevertheless, it remains lower than that observed in the general adult women [23]. Specifically, higher QoL scores were observed among younger participants, those with higher education levels and monthly incomes, and individuals without a history of recurrence. These results align with prior research [24–26]. Educational attainment and monthly income are indicators of an individual's socioeconomic status. Financial stability enables greater participation in social and leisure activities, alleviates financial burdens, such as medical and living expenses, and ultimately contributes to enhanced QoL [25]. Additionally, older patients and those with recurrent disease tend to report lower QoL, which may be attributed to decreased physical functioning and overall decline in general health status [22, 26]. Therefore, to enhance QoL in participants with lower education attainment, lower income, older age, or recurrence, ongoing assessments and the development of tailored interventions are necessary.

This study found that fatigue was significantly associated with QoL, confirming that it is the most critical factor influencing QoL. Fatigue is one of the most common and persistent symptoms experienced by patients with cancer. It is known to exacerbate psychological distress, negatively impacting both QoL and treatment outcomes [4, 5]. The level of fatigue in this population was lower than that reported among women with gynecological cancer undergoing treatment [27]; however, the prevalence of fatigue (27.6%) was higher than that observed among middle-aged women without cancer (6%) [28]. The findings of this study are consistent with existing literature, reinforcing that higher levels of fatigue are strongly associated with lower QoL [27, 29]. Lifestyle interventions that incorporate physical activity and nutritional education have been shown to be effective in reducing fatigue among patients with gynecological cancer [30]. Taken together, these findings suggest that managing fatigue is essential for improving QoL in this population. Therefore, fatigue-focused interventions should be actively implemented, and personalized fatigue management strategies tailored to the demographic, clinical, and socioeconomic characteristics of each individual are necessary to enhance the QoL of post-treatment patients with gynecolog-

ical cancer.

Second, social support emerged as a significant factor influencing QoL, with family support identified as the most impactful. This finding is consistent with studies involving patients with lung cancer [31] and patients with cancer in general [32], which also reported that family constituted the strongest source of social support. This may reflect the strong role of family-centered emotional support, suggesting that the family functions as a primary support system during cancer treatment and recovery. Moreover, social support serves as a crucial resource for coping with illness, in particular, in respiratory malignancies; higher perceived support has been associated with improved QoL [33]. Longitudinal studies further suggest that, even if the impact of social support on QoL is modest at baseline, its influence increases over time, becoming a key determinant of QoL during follow-up [9]. Collectively, these findings indicate that social support contributes not only to immediate emotional relief but also to long-term psychological stability and sustained improvements in QoL [9, 31–33]. However, most current medical institutions primarily focus on physical treatment, with limited efforts directed at systematically enhancing social support. It is, therefore, essential to develop and promote interventions that aim to strengthen social support at both institutional and community levels. Given that family and friends are most directly involved in the patient's daily lives, targeted programs are needed to help them provide effective support to patients with cancer. Such interventions can improve the quality of support offered by families, thereby enhancing the QoL of post-treatment patients with gynecological cancer. Future research should focus on developing and implementing more specific social support programs.

Although lower psychological distress was associated with improved QoL in this study, it was not found to significantly influence QoL. Among gynecological cancer survivors, higher levels of psychological distress have been linked to lower QoL [5, 34], identifying psychological distress as a key variable affecting QoL in women with gynecological cancer [34]. Prior studies have shown that psychological distress significantly impairs both mental and physical health in patients with cancer. However, most participants in this study were early-stage cancer survivors who had completed treatment, and approximately 80% had high cure and survival rates. This contrasts with previous studies and may explain why psychological distress had a relatively limited impact on the QoL in this study population. Nevertheless, the significant correlation observed suggests that emotional issues still warrant ongoing management even after treatment. These findings underscore that while psychological distress may not directly affect QoL in early-stage survivors, it remains an important factor in their overall health and well-being. According to previous studies [35, 36], factors such as resilience and coping style serve as mediators between psychological distress and QoL in patients with cancer. Future research should investigate the potential mediating or moderating variables that may explain why psychological distress exerts only a limited effect on QoL among early-stage survivors. Furthermore, research focusing on individuals who experience high levels of psychological distress, as well as the development and evaluation of interventions aimed at reducing such distress in this population, is warranted. In this regard, it is essential that interventions targeting psychological distress be implemented and sustained continuously from the point of diagnosis through post-treatment care [37].

In assessing uncertainty, this study found that lower levels of danger appraisal and higher levels of opportunity appraisal were associated with better QoL outcomes. These results are consistent with previous theoretical frameworks [38, 39], which propose that uncertainty can be viewed positively as an opportunity or negatively as a threat. When perceived as a threat and prolonged, uncertainty can result in severe emotional distress, including anxiety, depression, distress, cognitive impairment, and avoidant behaviors. A recent study involving 165 patients with gynecological cancer found that higher levels of illness-related uncertainty were associated with lower QoL [40], emphasizing the importance of assessing uncertainty in this population. Understanding patients' uncertainty responses enables the development of personalized interventions that support recovery and overall well-being. Therefore, healthcare professionals should give greater attention to assessing and managing uncertainty. Since most participants in this study were early-stage survivors with favorable prognoses, a nuanced interpretation is required. These findings have meaningful implications for clinical practice and survivorship care. Healthcare providers play a pivotal role in shaping patients' cognitive and emotional responses to uncertainty. Thus, developing psychosocial support and educational interventions that promote positive coping and reframe uncertainty as an opportunity may improve emotional well-being and overall QoL. Furthermore, for early-stage survivors with high cure rates, tailored support strategies should focus on reinforcing optimism, resilience, and future-oriented perspectives.

This study has limitations in terms of generalizability, as most participants were early-stage post-treatment patients with gynecological cancer. Future research should investigate QoL determinants in patients with advanced gynecological cancers and replicate these findings across diverse clinical settings. Moreover, this study utilized a convenience sampling method, which may have introduced potential selection bias. To strengthen external validity, future research should employ more rigorous sampling strategies, such as stratified random sampling or systematic sampling, when recruiting participants from multiple outpatient clinics or institutions. Nevertheless, this study is significant in that it comprehensively analyzed the effects of fatigue, psychological distress, social support, and uncertainty appraisal reflecting physical, psychological, social, and spiritual domains on the QoL of post-treatment patients with gynecological cancer. These findings provide a valuable foundation for developing interventions and policies aimed at improving QoL in this population.

5. Conclusions

This study aimed to identify the factors influencing the QoL of post-treatment patients with gynecological cancer in order to enhance understanding of their lived experiences and provide a foundation for developing targeted interventions. The findings indicated that higher QoL was associated with lower levels of fatigue and greater perceived social support. These results

underscore the critical importance of addressing both physical and psychosocial domains in survivorship care. Accordingly, it is recommended that interventions be systematically developed and empirically validated to reduce fatigue, strengthen social support networks, and ultimately enhance the QoL of post-treatment patients with gynecological cancer. In particular, interventions that promote energy conservation, foster emotional resilience, and enhance social connectedness may serve as effective strategies for improving long-term well-being in this population.

AVAILABILITY OF DATA AND MATERIALS

All datasets analyzed for this study are mentioned in the article. Further information is available from the corresponding author upon reasonable request.

AUTHOR CONTRIBUTIONS

JHN and DHC—designed the research study. JHN, ESH, WKC, BRY and DHC—performed the research. JHN—provided help and advice on data interpretation and manuscript structure. JHN and ESH—analyzed the data. JHN, ESH and DHC—wrote the manuscript. All authors contributed to editorial changes in the manuscript. All authors read and approved the final manuscript.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. The present study was approved by the Institutional Review Board (IRB) of Jeonbuk National University Hospital in Korea (CUH 2024-09-034-002). We obtained written informed consent from all subjects, and subjects were given the option to voluntarily withdraw their consent at any point during the study.

ACKNOWLEDGMENT

Not applicable.

FUNDING

This paper was supported by research funds of Jeonbuk National University in 2024. This paper was supported by the Fund of Biomedical Research Institute, Jeonbuk National University Hospital.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

[1] Korea Central Cancer Registry, National Cancer Center. Annual report of cancer statistics in Korea in 2022. 2025. Available at: https://ncc.re.kr/cancerStatsView.ncc?bbsnum=720&searchKey=total&searchValue=&pageNum= (Accessed: 12 July 2025).

[2] National Cancer Information Center (Korea). Cancer incidence. 2025. Available at: https://www.cancer.go.kr/lay1/S1T639C649/contents.do (Accessed: 26 September 2025).

[3] Gil-Ibanez B, Davies-Oliveira J, Lopez G, Díaz-Feijoo B, Tejerizo-Garcia A, Sehouli J. Impact of gynecological cancers on health-related quality of life: historical context, measurement instruments, and current knowledge. International Journal of Gynecological Cancer. 2023; 33: 1800–1806.

[4] Zhao J, Zhan L, Pang Y, Shen S, Huang J, Zhang W, *et al*. Prevalence and risk factors for cancer-related fatigue in women with malignant gynecological tumors: a meta-analysis and systematic review. BMC Cancer. 2025; 25: 827.

[5] Betea R, Dima M, Chiriac VD. Quality of life and stress-related psychological distress among patients with cervical cancer: a cross-sectional analysis. Diseases. 2025; 13: 70.

[6] National Comprehensive Cancer Network (NCCN). NCCN Clinical Practice Guidelines in Oncology (NCCN Guidelines®): distress management. Version 2. 2024. Available at: https://www.nccn.org/guidelines/guidelines-detail?category=3&id=1431 (Accessed: 30 September 2025).

[7] Vernon MM, Datta B, Coughlin SS. Depressive disorder among gynecologic cancer survivors in the US: evidence from the 2020 behavioral risk factor surveillance survey. Cancer Epidemiology. 2025; 96: 102795.

[8] Roussin M, Lowe JB, Hamilton AL, Martin LA. Sexual quality of life in young gynaecological cancer survivors: a qualitative study. Quality of Life Research. 2023; 32: 2107–2115.

[9] Mandato VD, Paterlini M, Torricelli F, Rabitti E, Mastrofilippo V, Aguzzoli L. Perceived social support and quality of life in endometrial cancer patients: a longitudinal study. Frontiers in Oncology. 2024; 14: 1447644.

[10] Acoba EF. Social support and mental health: the mediating role of perceived stress. Frontiers in Psychology. 2024; 15: 1330720.

[11] Widodo D, Djuwadi G, Budianto B, Halis F. Physical conditions, psychosocial, and social support affects the quality of life in breast cancer survivors. Indonesian Journal Cancer. 2025; 19: 27–33.

[12] Shen Z, Zhang L, Shi S, Ruan C, Dan L, Li C. The relationship between uncertainty and fear of disease progression among newly diagnosed cancer patients: the mediating role of intolerance of uncertainty. BMC Psychiatry. 2024; 24: 756.

[13] Yang Y, Liu S. Uncertainty affects cancer-related fatigue among breast cancer women undergoing peripherally inserted central catheter chemotherapy: the chain mediating role of psychological resilience and self-care. BMC Women's Health. 2024; 24: 344.

[14] Ferrell BR, Dow KH, Leigh S, Ly J, Gulasekaram P. Quality of life in long term cancer survivors. Oncology Nursing Forum. 1995; 22: 915–922.

[15] Mun S, Park H. The impact of peripheral neuropathy symptoms, self-care ability, and disturbances to daily life on quality of life among gynecological cancer patients undergoing chemotherapy. Korean Journal of Women Health Nursing. 2022; 28: 296–306.

[16] Cella DF, Tulsky DS, Gray G, Sarafian B, Linn E, Bonomi A, *et al*. The functional assessment of cancer therapy scale: development and validation of the general measure. Journal of Clinical Oncology. 1993; 11: 570–579.

[17] FACIT.org. Functional assessment of chronic illness therapy—fatigue scale (FACIT-fatigue). 1997. Available at: https://www.facit.org/measures/facit-fatigue (Accessed: 02 June 2024).

[18] Van Belle S, Paridaens R, Evers G, Kerger J, Bron D, Foubert J, *et al*. Comparison of proposed diagnostic criteria with FACT-F and VAS for cancer-related fatigue: proposal for use as a screening tool. Support Care in Cancer. 2005; 13: 246–254.

[19] Henry JD, Crawford JR. The short-form version of the depression anxiety stress scales (DASS-21): construct validity and normative data in a large non-clinical sample. British Journal of Clinical Psychology. 2005; 44: 227–239.

[20] Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. Journal of Personality Assessment. 1988; 52: 30–41.
[21] Mishel MH, Sorenson DS. Uncertainty in gynecological cancer: a test of the mediating functions of mastery and coping. Nursing Research. 1991; 40: 167–171.
[22] Jung HJ, Hong YJ, Hong SY, Nho JH. Influencing factors on quality of life in women undergoing cancer treatment: a cross-sectional study. Women's Health Nursing. 2025; 31: 192–202.
[23] An M, Jeong SG, Nho JH. Influencing factors of quality of life among Korean women in one-person and multiperson households: analysis of the 8th Korean National Health and Nutrition Examination Survey. Journal of Korean Maternal and Child Health. 2025; 29: 228–241.
[24] Akgor U, Kurtay S, Ustun Y. Quality of life and mental health among gynaecological cancer patients towards the end of COVID-19 pandemic. European Journal of Gynaecological Oncology. 2024; 45: 132–139.
[25] Ogamba CF, Joseph A, Adefemi AK, Ezegwui CO, Major A, Jimoh RO, *et al*. Factors associated with health-related quality of life and financial toxicity among gynecological cancer patients in Southern Nigeria. Scientific Reports. 2025; 15: 28041.
[26] Jónsdóttir B, Wikman A, Sundström Poromaa I, Stålberg K. Advanced gynecological cancer: quality of life one year after diagnosis. PLOS ONE. 2023; 18: e0287562.
[27] Kirca N, Adibelli D, Toptas T, Yilmaz S. Perceived social support, fatigue, and sleep quality in women treated for gynecological cancer: a cross-sectional study. Supportive Care in Cancer. 2025; 33: 636.
[28] Stone P, Richards M, A'Hern R, Hardy J. A study to investigate the prevalence, severity and correlates of fatigue among patients with cancer in comparison with a control group of volunteers without cancer. Annals of Oncology. 2000; 11: 561–567.
[29] Li CC, Chang TC, Chang CW, Huang CH, Tasi YF, Huang CL, *et al*. Quality of life and climacteric symptoms in women with endometrial cancer: examining the impact of lower limb lymphedema. Journal of Patient-Reported Outcomes. 2025; 9: 66.
[30] An H, Nho JH, Yoo S, Kim H, Nho M, Yoo H. Effects of lifestyle intervention on fatigue, nutritional status and quality of life in patients with gynecologic cancer. Journal of Korean Academy of Nursing. 2015; 45: 812–822. (In Korean)
[31] Lim HW, Son HM, Han GM, Kim TH. Stigma and quality of life in lung cancer patients: the mediating effect of distress and the moderated mediating effect of social support. Asian-Pacific Journal of Oncology Nursing. 2024; 11: 100483.
[32] Chama Z, Jabir M, Jaafar HK, Saleh HM, Hulail HM, Prasad KDV. The relationship between social support and quality of life in cancer patients. International Journal of Surgery Open. 2025; 63: 201–214.
[33] Ding Y, Wang X, Zhang F, Yan H, Liu Y, Zhang L. The relationship between perceived social support, coping styles and quality of life and psychological state of lung cancer patients. BMC Psychology. 2024; 12: 439.
[34] Kim GH, Kim MJ. Impacts of psychological distress, gender role attitude, and housekeeping sharing on quality of life of gynecologic cancer survivors. Korean Journal of Women Health Nursing. 2018; 24: 287–296.
[35] Saeed W. The relationship of depression and quality of life with mediating role of death anxiety, silver lining and religious coping among women cancer patients in Pakistan. Frontiers in Oncology. 2025; 15: 1489169.
[36] Caldiroli CL, Sarandacchi S, Tomasuolo M, Diso D, Castiglioni M, Procaccia R. Resilience as a mediator of quality of life in cancer patients in healthcare services. Scientific Reports. 2025; 15: 8599.
[37] Soria-Reyes LM, Alarcón R, Cerezo MV, Blanca MJ. Psychometric properties of the depression anxiety stress scales (DASS-21) in women with breast cancer. Scientific Reports. 2024; 14: 20473.
[38] Mishel MH. Uncertainty in illness. Image—The Journal of Nursing Scholarship. 1988; 20: 225–232.
[39] Kang YH. A critical review of literature: mid-range nursing theory of uncertainty in illness. Korean Journal of Adult Nursing. 2003; 15: 146–153.
[40] Ko E, Lee Y. The effects of coping strategies between uncertainty and quality of life of Korean women with gynecological cancer: evaluation of uncertainty in illness theory and stress and coping theory. Advances in Nursing Science. 2024; 47: E84–E95.

How to cite this article: Ju-Hee Nho, Eun Suk Hwang, Won Ku Choi, Bo Ram Yu, Dong Hyu Cho. Influence of fatigue, psychological distress, social support, and uncertainty appraisal on quality of life in post-treatment patients with gynecological cancer. European Journal of Gynaecological Oncology. 2026; 47(1): 40-49. doi: 10.22514/ejgo.2026.005.