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QUALITY OF LIFE IN LONG-TERM SURVIVORS OF OVARIAN GERM CELL TUMORS: A GYNECOLOGIC ONCOLOGY GROUP STUDY

Victoria Champion, DNSFAAN^{1,3}, Stephen D. Williams, MD^{2,3}, Anna Miller, DNSRN³, Kristina M. Reuille, MSNRN¹, Kim Wagler-Ziner, PhDcRN¹, Patrick O. Monahan, PhD^{2,3}, Qianqian Zhao, MS², David Gershenson, MD⁴, and David Cella, PhD⁵

¹Indiana University School of Nursing, Indianapolis, IN

²Indiana University School of Medicine, Indianapolis, IN

³Indiana University Cancer Center, Indianapolis, IN

⁴MD Anderson Cancer Center, Houston, TX

⁵Evanston Northwestern Healthcare and Northwestern University, Evanston, IL

Abstract

Purpose—This report describes the strength and significance of the association between antecedent and mediating variables across four categories of quality of life (QOL) outcomes in 132 disease free women with ovarian germ cell tumors.

Methods—Survivors (n=132) participated in a mailed questionnaire and computer-assisted telephone survey. Participants in four prospective GOG protocols were contacted their treating physician for verbal consent to be approached by investigators at the Indiana University Cancer Center about a quality of life study. Similar patients treated at the MD Anderson Cancer Center were also included. If women verbally consented after being contacted by investigators at Indiana University, an informed consent and questionnaire packet was sent via mail. After return of the written informed consent and background questionnaire, a trained research assistant scheduled a computer-assisted interview to complete data collection.

Results—Median follow-up from diagnosis was 10.2 years. Mediating variables of self efficacy and social support played a significant role (p=.001) in all four QOL categories: physical functioning, psychological functioning, sexual functioning, and spiritual functioning. Being a younger age at diagnosis and married were positively related to sexual functioning (p=.05). Menstrual and gynecological symptoms were inversely related.

Implications—Results indicate that clinicians may want to be especially sensitive to identifying a survivor's social support and confidence (self efficacy) in handling issues evolving from treatment since these skills may be related to overall quality of life outcomes.

Corresponding author: Victoria Champion, DNS, FAAN, Associate Dean for Research, Mary Margaret Walther Distinguished Professor of Nursing, Indiana University School of Nursing, 1111 Middle Drive, Indianapolis, IN 46202, Phone: 317-274-4187; Fax: 317-278-2021, Email: vchampion@iupui.edu For Reprint Information: Ms. Denise Mackey, Gynecologic Oncology Group, Administrative Office, Four Penn Center, 1600 JKF Blvd., Suite 1020, Philadelphia, PA 19102, Phone: 215-854-0770

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Keywords

Ovarian Germ Cell Tumors; Cancer Survivorship; Quality of Life

INTRODUCTION

Quality of Life in Long-Term Survivors of Ovarian Germ Cell Tumors

In the last two decades, the therapeutic outcomes of ovarian germ cell tumor patients have dramatically improved. Patients with ovarian germ cell tumors who are well staged and whose tumors were initially completely resected and received adjuvant chemotherapy are very often cured.¹⁻³ Additionally, ovarian germ cell tumor survivors usually are young and potentially have many years of productive life, if successfully treated. Thus, quality of life issues of long-term survivorship are of great importance.

Ovarian germ cell tumor survivors are a small and unique population of cancer survivors. Although ovarian germ cell tumors occur in older children and younger women, the greatest frequency for diagnosis is in the teens and twenties.⁴ Unlike the majority of cancers, germ cell tumors strike during transition from adolescence to adulthood, a time of unique challenges. Research addressing quality of life issues in ovarian germ cell survivors is limited. Hale⁵ addressed some late treatment effects of germ cell tumors in a study of 47 survivors. Survivors reported delayed puberty and irregular menses, and over 50% used estrogen replacement therapy because of ovarian failure.⁵ Additionally, among those who received pelvic radiation therapy (RT), uterine hypoplasia was common.⁵ The purpose of this study was to determine what variables are most closely associated with quality of life outcomes in long-term survivors of ovarian germ cell cancer with the ultimate purpose of informing interventions that can ameliorate long-term survivorship problems.

A theoretical framework addressing four domains of quality of life was used. The domains included: 1) physical functioning, 2) psychological functioning, 3) social functioning, and 4) spiritual functioning.⁶ Mediating variable included self-efficacy and social support. The mediating variables were selected for two reasons. First, quality of life research has supported the mediating roles of perceived self-efficacy and social support and their relationship to quality of life. Secondly, self-efficacy and social support can be directly influenced through psychosocial interventions. Self-efficacy, (perceived confidence in carrying out a behavior)⁷ may affect the survivor's ability to adapt to the negative effects of disease and treatment.⁸ Cunningham⁹ found that perceived self-efficacy was strongly related to adaptation in cancer patients. In addition to mediating variables, antecedent variables such as personal and demographic characteristics as well as time since diagnosis were selected. The following research questions directed analysis and were derived from Ferrel's theoretical framework that is illustrated in Figure 1. Although the data are cross-sectional, the linear sequence of the regression models is based on prior development of the stated antecedent and mediating variables predicting the 4 quality of life domains which is theoretically driven.

Research Questions:

1. Antecedent and mediating variables are related to physical health as measured by SF-36 and FACT/GOG-NTX?
2. Antecedent and mediating variables are related to psychological health as measured by CESD, Positive and Negative Affect Scale (PANAS), and the Integrative Cancer Experience Scales (ICES)?

3. Antecedent and mediating variables are related to Social Functioning as measured by the Dyadic Adjustment Scale (DAS), the Sexual Activity Questionnaire (SAQ), and Sexual Self Schema scales?
4. Antecedent and mediating variables are related to Spiritual Functioning as measured by the FACIT-Spirituality (FACIT-Sp) and Post Traumatic Growth Inventory (PTGI) scales?

MATERIALS AND METHODS

This multi-site behavioral study of ovarian germ cell cancer survivors was conducted through the GOG, a National Cancer Institute (NCI) cooperative clinical trials group, and the University of Texas, M.D. Anderson Cancer Center in Houston. GOG patients were enrolled on one of four trials (Protocols 45, 78, 90, or 116).^{2, 3, 10} All of these prospective trials including those at the University of Texas, M.D. Anderson Cancer Center used similar platinum-based chemotherapy regimens and surgery. Patients treated on protocol 116 received carboplatin and etoposide without bleomycin.¹⁰ All other patients were treated with cisplatin and bleomycin with either vinblastine or etoposide. The therapeutic results from GOG protocols 45³, 78², and 116¹⁹ have been previously published, but the results from Protocol 90 have not been reported. Interviews, database management, and analyses were conducted at the Indiana University Cancer Center in Indianapolis. Eligible patients were identified by the GOG Statistical Office. Initial consent for participation was obtained by the treatment site through mail or telephone contact. Those survivors who agreed to participate were mailed an informed consent and background questionnaire. Subsequently, a research assistant trained in structured interviewing techniques scheduled and conducted a computer-assisted telephone interview designed to take approximately 60 minutes with a range from 45 to 90 minutes.

Sample

The sample included 132 patients who had been treated for ovarian germ cell tumors on GOG or M.D. Anderson protocols and were continuously disease-free for a minimum of two years after initiation of treatment. All patients provided written informed consent consistent with all federal, state and local institution requirements prior to receiving protocol therapy.

All patients were treated with surgery followed by platinum-based chemotherapy. Participants were excluded if they had received radiotherapy. Women were 18 years of age or older and able to speak English and complete the background questionnaire. Of the 238 eligible women from both active and inactive GOG sites, 171 women from active sites were identified; 142 were available for contact and 117 (82%) completed the study. Of the remaining 25 women, 10 completed only one part of the study, 10 were lost to follow-up, four changed their minds about participation, and 1 did not speak or read English. MD Anderson Cancer Center identified 31 eligible women; 17 were located and enrolled and 15 (88%) completed the study, with two lost to follow-up.

Data Collection Measures—To decrease telephone interview time, study participants returned and completed a background questionnaire prior to the interview. Missing or contradictory data were validated during the telephone interview.

Antecedent Variables—Personal characteristics such as age, education, religion, current marital status, marital status at time of diagnosis, income and occupation at time of diagnosis, and time since diagnosis were identified through the background questionnaire. Additional questions were added to measure work and insurance difficulties.

Menstrual and reproductive history was assessed using an 11-item Gynecologic Symptoms Scale that included specific questions about symptoms of concern to women, such as vaginal bleeding or dryness and sexual intercourse problems.¹¹

A 14-item Reproductive Concerns Scale measured reproductive desire, sexual activity, childbearing, and illness-related sequelae, all of which may be of concern to young cancer survivors who may experience early menopause and loss of fertility. This scale was specifically developed to assess ovarian and breast cancer survivor reproductive problems or worries and used in a quality of life study of female cancer survivors diagnosed during childbearing years.¹² Internal consistency for this scale was reported as .85. For this study, the Cronbach's alpha coefficient was also .85.

Mediating Variables—Self-efficacy was assessed during the telephone interview, using a 15-item Confidence Adjusting to Illness Scale (CAIS)¹³ adapted from Telch and Telch¹⁴, which assesses patients' perceived confidence in being able to cope in various situations or perform specific activities that have been found to be difficult for cancer patients. Preliminary analyses of the CAIS indicated an internal consistency of .93. For this study, the Cronbach's alpha coefficient was .93.

Social support was assessed with the self-report 8-item Duke-UNC Functional Social Support questionnaire (DUFSS). This scale measures perceived social support through the dimensions of affective and confidant relationship support. Average item-total correlations were reported from .62 to .64.¹⁵ The alpha coefficient for this study was .87. Although general social support was the main social-support mediating variable in the theoretical model (Figure 1), we also measured participants on the 5-item *Family APGAR* scale which measures family functioning with respect to communication, support, responding to emotions, and sharing time together.¹⁶ The Cronbach alpha for the total score for this study was .87.

Quality of Life Dimensions

Physical Functioning—Assessment of physical functioning included Health Status and Symptom Distress. The MOS 36-item Short-Form Health Survey was included in the background questionnaire.¹⁷ The SF-36 has been used extensively in medical outcome studies. Analysis for this article includes four of the eight health dimensions measured by this scale: limitations in usual role activities because of physical health problems, bodily pain, vitality, and general health perceptions.¹⁸ For this study, the alpha coefficients were .79 for general health; .85 for role, physical; .92 for bodily pain; and .85 for vitality.

Symptoms associated with peripheral neuropathy were assessed during the telephone interview, using the 14-item FACT/GOG-NTX scale. This is part of the Functional Assessment of Chronic Illness Therapy (FACIT) Measurement System.¹⁹ The 14-item scale measures symptoms and problems associated with chemotherapy-induced peripheral neuropathy. The alpha coefficient for this study was .84.

Psychological Functioning—Assessment of psychological functioning included the Depressed Mood Scale (CES-D), PANAS (Positive and Negative Affect Scale), and the Integrative Cancer Experience Scale (ICES), using the telephone interview format.

The CES-D is a summated 20-item scale that measures symptoms of depression in both clinical and general populations. The CES-D has had extensive testing in general populations and has demonstrated concurrent validity, known groups' validity, and construct validity. Internal consistency alphas have ranged from .85 to .90 and test-retest reliabilities have ranged from .51 to .67.²⁰ The alpha coefficient for this study was .90.

The PANAS-Short Form was used to assess mood and emotional well-being.²¹ The PANAS positive affect subscale is composed of 10 adjectives that load on a single factor and are independent from the 10 adjectives on the PANAS negative affect scale. Respondents rank on a 5-point scale how much of the stated affect they generally experience, ranging from “very slightly or not at all” to “extremely.” The internal consistency of the positive affect subscale ranges from .86 to .90 and of the negative affect subscale from .84 to .87. Correlations with other established scales have supported its validity. The alpha coefficients for this study were .89 for PANAS-positive and .87 for PANAS-negative.

Integrative Cancer Experience—This scale assesses life satisfaction, life appreciation, emotional resilience, and growth in cancer survivors.²² This scale has been used in several studies focused on female cancer survivors. Scale development revealed the Cronbach’s alpha across all items was .75. For this study, the alpha coefficients were .66.

Social Functioning—For this study, Social Functioning was defined through dyadic relationships and included scales to measure sexual functioning, sexual self schema, and dyadic adjustment.

The Sexual Self Schema scale developed by Anderson is a 26-item scale designed to measure a cognitive self-view of both positive and negative aspects of sexuality.²³ Construct validity was supported when the scale predicted sexual outcomes following cancer. Internal consistency reliabilities during development ranged from .66 to .81, and test-retest reliability was .89 at two weeks. For this study, the alpha coefficient was .72.

The SAQ assesses marital and family relations, sexual satisfaction, and overall sexual functioning, including pleasure and discomfort. This scale originally was developed to investigate the impact of long-term preventive therapy for women at high risk for breast cancer.²⁴ For this study, the alpha coefficient for the pleasure and discomfort scales were .90 and .63, respectively.

The Dyadic Adjustment Scale was used to assess the quality of marital or other dyadic relationships. The overall scale reliability was reported as .96 in 1976 and .91 in 1982, using Cronbach’s alpha coefficient.^{25, 26} For this study, the overall alpha coefficient was .95.

Spiritual Well-being—Assessment of Spiritual Well-Being was explored during the telephone interview, using the FACIT-Sp and the Spiritual Change Factor from the Post Traumatic Growth Inventory (PTGI).

FACIT-Sp—Like the FACT/GOG-NTX, this scale is part of the Functional Assessment of Chronic Illness Therapy (FACIT) Measurement System. This scale assesses the spiritual dimensions of quality of life.²⁷ The Alpha coefficient for this study was .88.

The 21-item Post Traumatic Growth Inventory assesses positive outcomes reported by persons who have experienced traumatic events, which for this study was defined as having had cancer. Factor 4 of the PTGI scale measures Spiritual Change, asking the respondents whether they have a better understanding of spiritual matters and a stronger faith as a result of having had a specific traumatic event.²⁸ Alpha reliabilities were reported as .94 for the PTGI total scale and .85 for the Spiritual Change Factor 4. In this study, the alpha coefficients were .93 for the PTGI total score and .85 for PTGI-Factor 4, Spiritual Change.

Statistical Methods

We built a separate model for each outcome based on the theoretical model in Figure 1. That is, we first took an explanatory model-building approach by forcing years since diagnosis, and

the two hypothesized mediating variables (self efficacy and social support) into all models. Antecedent variables that significantly predicted the outcome at a liberal p -value $< .20$ were then included. Backward deletion was used until only variables that were significant at alpha .05 remained in the model (except years since diagnosis, self efficacy, and social support which remained in all models). Finally, we identified the normed values for Quality of Life outcomes reported in other populations and compared these values to those of our sample.

For each predictor, the semi-partial correlation coefficient (r) was reported, which provides the correlation between the QOL outcome and the predictor after adjusting for other predictors in the model. The multiple coefficient of determination (R^2) was reported, which indicates the percentage variance explained in the QOL outcome by the linear combination of predictors. The adjusted R^2 was also provided for comparing QOL models with different numbers of predictors.

Although many statistical tests were performed, significance was reported at several alpha levels (.05, .01, and .001). In our view, for this exploratory study, Type II errors (not uncovering a true relationship) are more serious than Type I errors (flagging a false relationship), because insights for future interventions could be gained. Therefore, predictors with $p < .05$ were retained in models.

RESULTS

Women ranged in age from 19 to 64 with a mean age of 35.9 and SD of 9.1 (Table 1). The mean age at diagnosis was 25.7 years and the time since diagnosis ranged from 2.7 to 21.3 years, with a mean of 10.2 years. Educational level was high, with 47% having a college degree or some graduate school, 29% having some college, and 21% being a high school graduate. Only 3 % had less than a high school education. The majority were Caucasian (80%), with 11% being African American. The household income level was \$25,000 or less for 23% of the sample and \$65,000 or more for 30% of the sample. At the time of the study, 43% were not married or in a committed relationship, which included 29% single and 13% separated or divorced women. The relatively high percentage of unmarried survivors may be related to survivor age, since more than 10% were less than 25 years old. Marital status could also reflect the lower intimacy motivation Cella and Tross²⁹ reported in Hodgkin's disease survivors, which may be related to lower marriage rates and higher divorce rates.

Demographics are reported in Table 1 and addressed in the sample section. The final model for each outcome is reported in Tables 2 through 5. Each column in these tables represents the regression model for that QOL outcome (column label = QOL outcome which is the dependent variable). All significant predictors ($p < .05$) added at least 2% explained variance. Collinearity was not a significant concern since the condition index was less than 30 for all final models.³⁰ None of the estimated standard errors were large compared to coefficients, indicating stable estimation.

Physical Functioning QOL

The subscales of the SF36 were independently analyzed. The model was used to predict role-physical ($n = 128$) and explained 18% of the variance in role-physical through the linear combination of years since diagnosis, menstrual/gynecological symptoms score, self-efficacy, and social support (i.e., DUFSS) (Table 2). The menstrual/gynecological symptoms score was significant, with fewer menstrual/gynecological symptoms being associated with better functioning in work and regular daily activities as a result of physical health (-.23) after controlling for years since diagnosis, self-efficacy, and social support (Table 2).

Social support (DUFSS) was positively correlated ($r = .20$) with bodily pain after adjusting for education and the other two variables forced in the model (Table 2) indicating that higher education and greater social support were associated with better scores on bodily pain.

A total of 29% of the variance was explained for general health after adjusting for covariates. Specifically, lower menstrual/gynecological symptoms ($-.28$), higher social support ($.16$), and greater age (at interview) were independently associated with better general health after adjusting for years since diagnosis and self efficacy.

A decrease in menstrual/gynecological symptoms and an increase in family functioning (APGAR) were associated with an increase in vitality, with 32% of total variance explained (Table 2). Additionally, an increase in general social support (DUFSS) was marginally associated with greater vitality ($p = .055$).

The most highly predictable of the physical QOL outcomes was self-reported neurotoxicity due to cancer treatment (FACT/GOG-NTX); 37% of variance in FACT/GOG-NTX was explained by the linear combination of six predictors: years since diagnosis, education, menstrual/gynecological symptoms, self efficacy, social support, and type of chemotherapy treatment. Specifically, lower education, more menstrual/gynecological symptoms, and presence of cisplatin and bleomycin in the chemotherapy regimen were significantly associated with greater (worse) neurotoxicity (Table 2). Cisplatin/bleomycin predicted the greatest variance in neurotoxicity.

Psychological Functioning QOL

Psychological functioning was measured by using the CESD and a scale to measure positive and negative affect (PANAS). A total of 54% of the variance in depression was explained by years since diagnosis, education, self efficacy, social support, and family functioning (APGAR). Specifically, lower education, lower self efficacy, lower social support, and lower family functioning were associated with more depressive symptoms (Table 3). Self efficacy ($-.32$) and social support ($-.25$) were both strong and independent predictors of depressive symptomatology. Negative affect ($-.30$) and positive affect ($.25$) were predicted most significantly by self efficacy (Table 3). Less negative affect was also independently associated with greater years since diagnosis ($-.17$) and higher family functioning ($-.24$). Greater positive affect (PANAS) was also independently associated with higher social support ($.16$), and presence of cisplatin and bleomycin ($.18$). Higher (better) integrative cancer experience was independently associated with fewer reproductive concerns ($-.17$), and greater self efficacy ($.33$).

Sexual Functioning QOL

Sexual functioning was measured by the Sexual Self Schema scale, which measured psychological attributes of sexuality, and by a sexual function scale measuring the physical components of sexual functioning. Self efficacy was the strongest predictor of Sexual Self Schema ($r = .31$, Table 4). Higher scores on Sexual Self Schema were also independently associated with not being married ($-.17$) and presence of cisplatin and bleomycin ($.18$).

For sexual functioning, higher (better) scores on total dyadic adjustment (composite of cohesion and affection) were predicted by greater social support ($.24$) and better family functioning ($.23$) (Table 4). Better scores on sexual pleasure were predicted by fewer menstrual/gynecological symptoms ($-.24$). More sexual discomfort, on the other hand, was predicted primarily and very strongly by greater menstrual/gynecological symptoms ($.54$) but also by more reproductive concerns ($.17$).

Spiritual Functioning QOL

Measurement of spiritual well-being included the Fact-SP as well as a more global measurement of quality of life - the post traumatic growth inventory. Spiritual well-being was significantly associated with several variables. A total of 40% of the variance in the FACIT-SP was predicted (Table 5) by a combination of older current age, greater self efficacy, and more social support. Self efficacy displayed the strongest correlation (.32 after adjusting for years since diagnosis, age and social support). Results for the FACIT-SP were very similar but not quite as strong when age at diagnosis was used instead of current age. Higher post traumatic growth (PTGI total score) was experienced by those whose chemotherapy regimen included bleomycin. However, only 7% of total variance in PTGI total score was explained. For the spiritual subscale of the PTGI, 9% of the variance was explained and this was primarily due to age and menstrual/gynecological symptoms. The higher the age and the greater the menstrual/gynecological symptoms the higher scores on spiritual post traumatic growth inventory.

In addition to predicting the four QOL domains as described above, Table 6 illustrates the means and SD for QOL outcome variables reported in the literature with different populations.

DISCUSSION

We found support for both antecedent and mediating variables in explaining a significant amount of variance of the four quality of life domains in ovarian germ cell tumor survivors. First, dimensions of health were related to antecedent and mediating variables. Fewer gynecological symptoms and younger age at diagnosis were associated with better physical functioning. Cella³¹ found late effects on general health and physical functioning for Hodgkin's survivors. A theoretically identified mediator - social support - also predicted general health. Ovarian germ cell cancer survivors who reported more social support reported better general health. Vitality as measured by the SF36 is also an indicator of physical functioning. Fewer gynecological symptoms and greater family functioning were associated with higher scores on vitality. Finally, the inclusion of cisplatin in the treatment regimen is associated with long-standing neurotoxicity.^{32, 33}

Ovarian germ cell tumor patients are usually treated successfully and little attention has been directed toward psychological distress that may result from the cancer experience. Thorne (2005) addressed the prevalence of psychosocial distress in cancer patients and its resulting impact on both the patient's QOL and the health care system which included increased use of health care at all levels.³⁴ The present results support the influence of both social support and self efficacy on psychological QOL outcomes in ovarian germ cell tumor survivors. Both general social support and family functioning contributed to prediction of QOL variables indicating that it is important to measure both general social support and family functioning.

Several questions on the self-efficacy scale used in this research included a woman's perceived confidence in communicating with health care providers. The more confidence a survivor has in her ability to communicate the better long-term QOL outcomes. Additionally, for most cancer patients, health care provider support is an important component of general support. A body of evidence is emerging that describes the impact of healthcare provider and patient communication on psychosocial distress in cancer survivors. As a result, several studies have directed interventions to increase communication and addressed both the provider and patient.^{35, 36} Results from this study may support interventions that increase a patient's self efficacy regarding communication with health care providers as part of an attempt to improve long term psychological distress in cancer patients.

Social support and family functioning were positively related to dyadic adjustment scores. In addition, sexual pleasure also was higher for women who had fewer gynecological symptoms and were married. Sexual discomfort was highest in those with more menstrual/gynecological symptoms and more reproductive concerns. In contrast, previous literature has found that younger breast cancer survivors reported more pain with intercourse. Avis.³⁷ Cimprich found a greater impact on sexuality for younger as compared to older breast cancer survivors.³⁸ The older sample of ovarian germ cell tumor survivors in this report was probably closer in age to the younger breast cancer survivors. However, it is obvious that factors such as menstrual/gynecological symptoms and reproductive concerns were associated with sexual functioning. Menstrual and gynecological symptoms were also strong predictors of QOL, including general health and sexual functioning. It would be important for health care providers to be aware of the impact that these symptoms have on QOL.

We used Spiritual well-being and the Post Traumatic Growth Inventory as global measures of spiritual well-being. Although Spiritual well-being using the FACIT-SP was associated with current age, self efficacy and social support, the PTGI total and PTGI Spirituality was more difficult to predict. Higher scores on spirituality were associated with greater self-efficacy and greater social support as well as by being older at interview. Post-traumatic growth inventory total scores were better for those whose chemotherapy regimen included cisplatin and bleomycin which seems counterintuitive. Possible, women with lingering side effects such as neurotoxicity try to cognitively reframe as a coping mechanism. For spiritual post traumatic growth, the data suggest that getting older, and perhaps wiser, is one of the few predictors of turning a bad experience into a positive outlook. Because a positive growth experience is one of the few potential benefits of the cancer experience, it behooves us to better understand its predictors.

Finally, means and standard deviations of QOL outcome variables were compared with published data. Scores for this sample were very similar to reports from other populations (Table 6). Although our data suggest avenues for interventions on several variables, it is evident that overall, the ovarian germ cell population was similar to other populations reported in the literature.

Strengths of this study include the fact that all participants were prospectively identified by the fact that they were initially enrolled on prospective clinical trials. Further, duration of follow-up since chemotherapy is quite long for the majority of patients. However, results of this study must be considered within the context of several limitations. First, this was a cross-sectional survey, and as such, it is difficult to determine if the antecedent and mediating variables did indeed come before the outcomes. That is, the direction of causality may be reversed or even bi-directional. Our analyses were based on a theoretical model that specified direction, however, only a prospective study could determine if these findings are supported. Secondly, although all patients in the described GOG trials were eligible, some could not be contacted. Even though the study team made vigorous efforts to contact all potentially eligible patients, the sample represented here may not be representative of the population in general. Third, although measures were chosen that had demonstrated validity and reliability, limitations of self-report biases must be considered. Finally, it is possible that some associations mentioned in this study may have occurred by chance and are not reproducible. It is possible that unknown variables may have confounded results.

These results have a number of implications for those providing care for patients with ovarian germ cell tumors. First, the general psychological health and quality of life seems to be quite good for survivors of ovarian germ cell tumor survivors and tends to improve over time. The importance of fertility preservation is again emphasized and vigorous efforts to maintain reproductive potential during the initial surgical procedure continued to be warranted. Further,

this study has emphasized the importance of menstrual and gynecologic symptoms in many aspects of survivor quality of life. Health care professionals should seek and aggressively manage these symptoms, with the knowledge that symptom control can have substantial implications for quality of life. Survivor self-efficacy and social support have profound implications for many aspects of quality of life. Attempts to maximize these characteristics should begin and the time of diagnosis and continue throughout the treatment and follow-up phases, with the clear understanding that improvement in these qualities can have substantial benefits for survivors. Finally, there are suggestions that improved patient-provider communication can positively alter self-efficacy making health care communication an important concern during diagnosis and treatment.

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Figure 1.
Theoretical Framework

Table 1

Demographic Characteristics (N = 132)

	Survivors
Current Age (at Interview) in years, Mean (SD)	35.9 (9.1)
Age at diagnosis in years, Mean (SD)	25.7 (8.7)
Race	N (%)
Caucasian	106 (80.3)
African American	15 (11.4)
Other	11 (8.3)
Education	
HS Graduate or Less	32 (24.2)
College	38 (28.8)
College Graduate	40 (30.3)
Graduate School	22 (16.7)
Income	
<\$25,000	30 (22.7)
\$25,000-\$44,999	39 (29.5)
\$45,000-\$64,999	20 (15.2)
≥\$65,000	39 (29.5)
Missing	4 (3)
Marital Status	
Single	38 (28.8)
Married	66 (50.0)
Living in a long-term committed relationship	9 (6.8)
Separated/Divorced	17 (12.9)
Widowed	2 (1.5)

Table 2

Physical Functioning

Independent Variables	Role Physical	Body Pain	General Health	Vitality	FACT Neurotoxicity
Years since diagnosis ^a	.08	.04	-.05	-.04	-.05
Current age			.19*		
Education		.18*			-.23**
Men/GYN	-.23**		-.28***	-.23**	.17*
Self Efficacy ^a	.08	.07	.09	.07	-.13
Social Support ^a	.12	.20*	.16*	.14	-.07
Family Functioning				.19*	
Cisplatin/Bleomycin					.31***
N	128	131	128	128	128
R square	.18	.13	.29	.32	.37
Adjusted R Square	.16	.10	.26	.29	.34

* p < .05,
** p < .01,
*** p < .001, df = 1 for all predictors.

Values for each predictor are the semi-partial correlation coefficients. Education = four ordinal categories, 'HS graduate or less' (1) to 'at least some graduate school' (4). Men/Gyn = menstrual/gynecological symptoms score.

^aYears since diagnosis, self efficacy, and social support were forced into all models even when not significant bivariate.

Table 3

Psychological Functioning

Independent Variables	CES-D	PANAS Negative Affect Scale	PANAS Positive Affect Scale	Integrative Cancer Experience Scale
Years since diagnosis ^a	-.05	-.17 [*]	-.07	-.05
Education	-.18 ^{**}			
Men/GYN			-.14 [*]	
Reproductive Concerns				-.17 [*]
Self Efficacy ^a	-.32 ^{***}	-.30 ^{***}	.25 ^{***}	.33 ^{***}
Social Support ^a	-.25 ^{***}	-.05	.16 [*]	.02
Family Functioning	-.12 [*]	-.24 ^{***}		
Cisplatin/Bleomycin			.18 [*]	
N	131	131	128	128
R square	.54	.32	.37	.31
Adjusted R Square	.52	.30	.34	.29

*
p < .05,

**
p < .01,

p < .001, df = 1 for all predictors.

Values for each predictor are the semi-partial correlation coefficients. Education = four ordinal categories, 'HS graduate or less' (1) to 'at least some graduate school' (4).

^aYears since diagnosis, self efficacy, and social support were forced into all models.

Table 4

Sexual Functioning

Independent Variables	DAS	SAQ-pl	SAQ-di	SCHEMA
Years since diagnosis ^a	-.02	.14	.04	.01
Current age				
Marital Status		.18 *		-.17 *
Men/Gyn		-.24 **	.54 ***	
Reproductive Concerns			.17 *	
Self Efficacy ^a	.14	.08	.03	.31 ***
Social Support ^a	.24 *	.03	-.01	.02
Family Functioning	.23 *			
Cisplatin/Bleomycin				.18 *
N	81	112	106	131
R square	.30	.22	.50	.21
Adjusted R Square	.26	.18	.48	.17

*
p < .05,

**
p < .01,

p < .001, df = 1 for all predictors.

Values for each predictor are the semi-partial correlation coefficients. SCHEMA = Sexual Self-Schema total score. DAS = Dyadic Adjustment Scale total score. SAQ-pl and SAQ-di = Sexual Activity Questionnaire, pleasure and discomfort scores. Men/Gyn = menstrual/gynecological symptoms score. Marital status = married (or living in a long-term committed relationship) versus others.

^aYears since diagnosis, self efficacy, and social support were forced into all models.

Table 5

Spiritual Functioning

Independent Variables	FACIT/ Spirituality	Post Traumatic Growth Inventory Total	Post Traumatic Growth Inventory Spirituality
Years since diagnosis ^a	-.01	.05	.03
Current age	.20 **		.19 *
Men/Gyn			.18 *
Self Efficacy ^a	.32 ***	.14	.10
Social Support ^a	.24 ***	.05	.03
Cisplatin/Bleomycin		.17 *	
N	130	131	127
R square	.40	.07	.09
Adjusted R Square	.38	.04	.06

*
p < .05,

**
p < .01,

p < .001, df = 1 for all predictors.

Values for each predictor are the semi-partial correlation coefficients.

^aYears since diagnosis, self efficacy, and social support were forced into all models.

Table 6

Comparison of psychological, social and spiritual domains in ovarian germ cell patients

Scale	Referenced		Survivor	
	Mean	SD	Mean	SD
SF36 Role Physical ³⁹	83.65 age 35-44	32.21	78.47	35.77
SF36 Body Pain ³⁹	74.85	22.74	79.08	25.01
SF36 General Health ³⁹	74.25	19.44	72.45	21.43
SF36 Vitality ³⁹	59.43	19.72	57.01	22.49
CES-D ²⁰	9.25	8.58	11.37	10.20
PANAS ²¹ Negative	18.1	5.9	18.79	7.10
PANAS Positive	35.0	6.4	35.85	7.37
DAS ²⁵	101.5	28.3	114.91	16.30
SAQ-pl ²⁴	Median 14		10.50	6.10
SAQ-di	Median 0		1.33	1.66
Schema ⁴⁰	59.54	13.46	55.13	13.40
FACT ²⁷ Spirituality	38.5	8.1	36.88	8.28
PTGI ²⁸ Total	Women 81.60	21.09	91.40	20.83