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ORIGINAL ARTICLE

Direct and Buffering Effects of Social Support Among Gynecologic Cancer Survivors

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Abstract

Background There are few studies of QoL among long-term gynecologic cancer survivors; available data suggest significant sequelae of disease and treatment. Research clarifying circumstances that improve difficult survivorship trajectories is lacking.

Purpose The present study examines whether social support moderates the relationship between physical functioning and psychological outcomes by testing the stress-buffering hypothesis.

Methods Participants (N=260) were gynecologic cancer survivors (cervical, n=47; endometrial, n=133; ovarian, n=69; vulvar, n=11). Compromised physical health was conceptualized as multidimensional. Social support (SNI, PSS-Fa, PSS-Fr, ISEL) was tested as a buffer of adverse psychological outcomes (IES-R, CES-D).

Results Results for traumatic stress provided evidence for buffering; whereas social support was of general benefit for depressive symptoms. Effects varied by source and type of support.

Conclusions These results suggest that circumstances for gynecologic cancer survivors burdened with physical symptoms may be worse for those with fewer support resources, providing needed insight into a common target of psychosocial interventions for cancer survivors.

Keywords Gynecologic cancer · Cancer survivorship · Social support · Traumatic stress · Depressive symptoms

Introduction

Research on cancer survivorship aims to identify and examine adverse outcomes associated with cancer diagnosis and treatment, including long-term side effects and late sequelae of treatment(s). Considering all prior quality-of-life studies in cancer survivorship, the majority have focused on women with breast cancer [1]. However, gynecologic cancer cases account for 11% of all new cancers in women in the USA [2] and 18% worldwide [3]. Prior research has confirmed that significant psychological and sexual morbidity commonly occurs in the early post-treatment period (see [4] for a review) however there are few studies of long-term outcomes. The data that are available suggest three scenarios. First, long-term treatment sequelae are common and poor health or, at the very least, nagging physical symptoms, is stressful [5–11]. Second, there is significant sexual morbidity for many [8, 11, 12] and significant psychological distress for some [6–10, 13]. Third, physical and psychological outcomes covary [5, 6].

Research clarifying the circumstances that may change a difficult survivorship trajectory to one that is less distressing is lacking. One important factor may be social support. While there are several interesting studies of possible immune benefits of social support in newly

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diagnosed gynecologic cancer patients (e.g., [14–16]), there is still very little data on the role of social support in long-term survivorship. One study suggests that women with little social support have the poorest quality of life outcomes [17]. Studies of survivors of other cancers suggest important benefits of social support. For instance, Michael et al. [18], following breast cancer survivors drawn from the Nurses' Health Study ($N=708$), found that socially integrated women (i.e., women who had more friends, family members, or other social contacts) prior to their diagnosis seemed to be less adversely impacted by cancer. They were more able to maintain their role functioning, they had more energy, and their health was better than that of the socially isolated. In another study, Parker et al. [19] interviewed cancer survivors (various disease sites, $N=351$) and found that those reporting having little social support reported depressive and anxious symptoms, unlike those reporting adequate support. Similar results have been obtained when traumatic stress is the predicted outcome [20, 21]. Finally, improved survival for more socially integrated survivors has also been reported [22].

How does this come about? Cohen and Wills [23] have articulated a process through which social support has its beneficial effect on psychological outcomes, suggesting that social support may serve as a “buffer” for those under great stress. The term buffering is used because it is believed that social support lessens pathogenic effects *in the presence of* a stressor. Put simply, when stress is high, those with more support, in contrast to those with little or no support, have better outcomes. The ready availability of companionship or help with everyday chores, for example, may reduce stress. But under normal circumstances (when everyday stress is relatively low), differences in absolute level of social support may matter less, if at all.

The lack of basic data on the relationship between social support and psychological outcomes in the population of long-term gynecologic cancer survivors limits the ability of researchers and clinicians to effectively explore social support as an intervention target. Several examples of manualized interventions that target or include modules on social support can be found in the breast cancer literature, all of which take different approaches to enhancing support. Some focus on familial [24] or partner support [25, 26], others emphasize psychoeducation on the benefits of social support and aim to reduce social isolation [27, 28], still others aim to enhance support through the group therapy format itself [29]. These interventions underscore known benefits of social support, but there is still little agreement on the type of support that might be most valuable, for whom, and under what circumstances.

We use the stress buffering hypothesis as a framework to examine the association between physical symptomatology and psychological outcomes for gynecologic cancer survivors. We expected that survivors' physical health would covary with mental health, as has been found previously. We viewed their physical functioning (health) as a source of stress and were interested in testing whether survivors' social support served a protective, “buffering” role. That is, might the psychological burden of poor physical functioning be lessened for those with more positive social support circumstances? To quantify “physical functioning,” a multidimensional assessment was used, which included a nurse assessment of the patient's health, as well as patient's own reports of symptoms. Data included common treatment morbidities, gynecologic (vaginal) changes, and disruption in one's life due to physical symptomatology (e.g., fatigue). For social support, two complementary aspects were assessed: structural support (a quantification of the *number and types* of social relationships) and functional support (an individual’s *perception* of available support). Use of multiple social support measures was conceptually important, as it allowed us to examine several different aspects of social support (e.g., support from family vs. friends; tangible assistance vs. companionship).

In the present study, the predicted outcomes are cancer-specific traumatic stress and depressive symptoms. We examine multiple psychological outcomes for several reasons. First, we expect that survivors could experience either or both types of symptoms. For instance, troubling physical symptoms might act as a continual reminder of the cancer experience that could contribute to greater traumatic stress symptoms or to feelings of hopelessness associated with depression [30]. Second, prior studies in cancer samples have demonstrated that traumatic stress and depressive symptoms differ not only with regard to predictors and correlates [31], but also in their response to psychosocial intervention [32]. Third, and most importantly, depressive symptoms and cancer-specific traumatic stress symptoms differ conceptually. While we would expect social support to be associated with better outcomes in both cases, the mechanisms through which social support has its effect likely differ. For instance, a supportive interaction with a friend or family member might directly elevate mood/reduce depressive symptoms [33]. Alternatively, adequate access to a broad, supportive network would not seem to directly impact intrusive thoughts or avoidant behaviors, but it would provide multiple opportunities to discuss disease-related stress and gain control over negative emotions, thereby reducing traumatic stress symptoms [34].

Method

Participants and Procedures

A cross-sectional design was used. Patients returning for follow up exams to the Division of Gynecologic Oncology at an NCI-designated Comprehensive Cancer Center were recruited for this study. "Survivor" was operationalized as a patient diagnosed 2–10 years previously who was *at least 6 months* post-treatment. We reasoned that, by 2 years, the acute stress of diagnosis had ended and most patients would have returned to their pre-cancer routines [35, 36]. By excluding patients diagnosed >10 years previously, we hoped to decrease the likelihood of additional comorbid conditions associated with aging [37]. Other exclusion criteria included age <20 and >85, current pregnancy, prior refusal of cancer treatment, and/or significant sensory deficit, major/untreated mental illness, deficient ability to speak/read English. Age, pregnancy, and treatment-related exclusion criteria (all determined a priori) were selected based on the known rarity of such cases in this clinic and our resulting inability to adequately address any systematic differences in such patients' psychosocial needs. The latter exclusion criteria were related to patients' ability to provide informed consent and complete the assessment. Clinic rosters were screened and, 2 weeks prior to scheduled appointments, potentially eligible patients received a letter from their physician describing the study. Over 12 months, 294 eligible patients were identified and 260 (88%) were accrued. Informed consent was completed in person at the clinic appointment (IRB protocol 2004BO342). Data were obtained through structured, in-person interviews with trained female assessors and brief evaluations with a research nurse (both of which took place in the clinic on the same day, prior to the patient's scheduled follow-up appointment), and subsequent medical chart review. Participants were offered $25. See Table 1 for descriptive data.

Table 1 Sample description

Variable	*N*=260
Age	56.4 (12.3)
Race (% Caucasian)	95%
Married (% yes)	63%
Living with partner (% yes)	68%
Years with partner	26.1 (15.9)
Years of education	14.1 (2.8)
Employed (% yes)	47%
Hours worked per week	36.5 (13.5)
Median household income, $000s	45.0 (320.5)
Site (%):	
Cervix	18%
Endometrium	51%
Ovary/peritoneum	26%
Vulva/vagina	5%
Stage (%):	
I	60%
II	9%
III	24%
IV	4%
N/A	3%
Grade (%):	
I	40%
II	26%
III	25%
N/A	9%
Months since diagnosis	51.3(25.0)
Treatment (%):	
Hysterectomy	79%
Chemotherapy	44%
Radiation	22%

Unless otherwise indicated, values represent mean (*SD*). Site, stage, and grade are at time of diagnosis. Stage and histological grade were not available (N/A) for the small percentage of patients who did not undergo complete surgical staging

Measures

Descriptive statistics and intercorrelations for the predictors and outcomes can be found in Table 2. Coefficient α's provided below are for the present sample.

Physical Health Stressor

To broadly define the physical health stressor, five measures assessed different dimensions of health. *I) Disease-specific quality of life*. The Functional Assessment of Cancer Therapy, FACT [38] subscales for cervical (Cx), endometrial (En), ovarian (O), and vulvar (V) cancers were used. Higher scores reflect better quality of life. Internal consistencies for the full subscales were Cx: α=0.65, En: α=.76, O: α=58, and V: α=0.76. For the purpose of calculating the physical health composite, items on these scales that assessed emotional distress were removed to reduce overlap with the measures of depressive symptom and traumatic stress outcomes. The following numbers of items were retained from the respective versions: 9 of 15 (Cx, α=0.44), 14 of 16 (En, α=.76), 8 of 12 (O, α=0.46), and 11 of 15 (V, α=0.71). *II) Quality of life disruption from symptoms*. The Physical Component Summary (PCS) score from the Medical Outcomes Study-Short Form-12 (SF-12) was used [39]. Raw scores were transformed, using a mean of 50 (SD=10); scores range from 0 to 100. Higher scores reflect less quality of life disruption. α=0.91. *III) Signs/symptoms and treatment toxicities*. A research nurse provided ratings of current symptoms, signs, and treatment toxicities used for clinical trials by the Southwest Oncology Collaborative Group (SWOG), 1994 version [40]. Four systems were rated: renal/bladder, gastrointestinal, endocrine, and mucosal. Each scale contained unique symptoms rated on five-point scales. For example, hemorrhagic cystitis (renal/bladder) includes 0=none; 1=microscopic blood; 2=frank blood; no treatment; 3=bladder irrigation required; and 4=requires cystectomy/transfusion. To obtain summary ratings for each of the four systems, items within categories were averaged. Averages for the four categories were summed for an aggregate toxicity score, ranging from 0 (no symptoms across categories) to 16 (life-threatening symptoms/signs). α=0.68. *IV) Vaginal changes*. At the time of study design there were no standardized measures of vaginal health. Thus, a symptom list of changes following gynecologic cancer treatment was generated from the literature and physician sources. Six common sequelae (shortening, tightness, dryness, pain/irritation, numbness, and discharge) were rated by the patient as currently absent (0) or present (1). Items were summed for a total score. α=0.71. *V) Fatigue*. Because fatigue persists for many cancer survivors treated with adjuvant therapy [41] and symptoms of fatigue are not explicitly captured by the above measures, the Total Disruption Index (TDI) from the Fatigue Symptom Inventory-Revised [42] was used to assess the degree to which fatigue interfered with activities of daily living. Scores range from 0 to 70, with higher scores indicating greater interference with daily activities. α=0.93.

A physical health composite index was calculated from these measures. Intercorrelations among the five measures ranged from 0.09 to 0.47 (see Table 2). The composite score was calculated in three steps. First, total scores for each measure were determined and standardized with a mean of 0 and standard deviation of 1. Next, standard scores for the FACT subscales and SF-12 were reversed so that higher scores indicated poorer physical health. Finally, standard scores of the five measures were averaged. Composite scores ranged from −1.2 to 3.2 (SD=0.67).

Social Support Moderators

Functional (perceived) support Three measures of functional support were chosen to tap different aspects of functional support—support from family (PSS-Fa), support from friends (PSS-Fr), and perceived availability of different types of social resources (Interpersonal Support Evaluations List (ISEL) subscales). The use of multiple measures allowed us to explore whether better perceived support was generally beneficial or if the effects of perceived support varied by source and/or type of support. I) The Perceived Social Support from Family (PSS-Fa) and Friends (PSS-Fr) scales [43] assess perceived support, with particular attention to the source of support: family (e.g., “I have a deep, sharing relationship with a number of members of my family”) versus friends (“My friends give me the moral support I need”). For each scale, scores range from 0 to 20, with higher scores reflecting higher perceived support. PSS-Fa α=0.89; PSS-Fr α=0.92. II) The ISEL [44] assessed patients' perceptions of support from any interpersonal source. In addition to using a total score, subscale scores can be calculated to assess different types of perceived support: Appraisal, i.e., availability of someone with whom problems can be discussed; Belonging, i.e., availability of companionship; Self-Esteem, i.e., evaluating one's self as positive in comparison to others; and Tangible, i.e., availability of material aids. Total scores range from 40 to 80, with higher scores indicating better perceived support. α=0.88; subscale α range 0.67–0.79.

Structural support The Social Network Index, SNI, [45] uses 16 items to assess the number of social ties (e.g., household size, number of relatives, social group membership) and frequency of social contacts. Total scores range from 1 to 12, with higher scores representing greater social involvement. α=0.48, which we would expect given heterogeneity of item content [46]. The SNI was added to the protocol four months into accrual; therefore data were available for 181 (70%) of the 260 participants.[1]

Psychological Outcomes

Cancer-specific Traumatic Stress The Impact of Events Scale-Revised, IES-R [47] assessed current intrusive thoughts (“Pictures about it popped into my mind”), avoidant behaviors (“I stayed away from reminders about it”), and hyperarousal (“I had trouble staying asleep”) reactions to cancer diagnosis and treatment. Subscale scores for intrusion, avoidance, and hyperarousal can be obtained. Total scores can range from 0 to 88, with higher scores reflecting greater cancer-specific traumatic stress. A cut-off score of 33 identifies patients with symptoms in the clinical range [48] α=0.93.

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[1] Because participants were consecutive clinic patients, these data could be considered missing completely at random, i.e., bias was not an issue. As a precaution, we replicated the regression analyses for the other social support measures (ISEL, PSS-Fa, PSS-Fr) restricting the sample to the subset of participants who completed the SNI. The pattern of results was identical; thus, we elected to include all available data in the primary analyses.

Table 2 Descriptive data and intercorrelations among predictor and outcome variables

	M (SD)	Observed range	Correlation coefficient										
			1	2	3	4	5	6	7	8	9	10	11
Physical health stressor													
FACT-Cx	46.9 (6.7)	30–59											
FACT-En	57.2 (6.4)	27–64											
FACT-O	34.9 (5.1)	22–44											
FACT-V	44.2 (8.9)	31–56											
1 FACT (aggregated)	–	–	–										
2 SF-12 PCS	44.3 (12.9)	12–62	.39**	–									
3 FSI TDI	15.4 (15.8)	0–63	−.47**	−.52**	–								
4 Signs/Sxs toxicity	2.1 (0.8)	0–6	−.33**	−.24**	.34**	–							
5 Vaginal changes	1.8 (1.6)	0–6	−.24**	−.09	.21**	.36**	–						
6 Composite score	–	–	−.72**	−.66**	.75**	.67**	.56**	–					
Social support moderator													
7 SNI	6.2 (3.4)	1–12	.19**	.09	−.19**	−.11	.07	−.15*	–				
8 PSS-Fa	17.7 (4.1)	0–20	.11	.15*	−.21**	−.09	−.08	−.19**	.25**	–			
9 PSS-Fr	17.7 (4.0)	0–20	.12	.07	−.10	−.06	−.03	−.11	.24**	.43**	–		
10 ISEL	75.4 (5.1)	44–80	.28**	.26**	−.29**	−.11	−.06	−.30**	.30**	.58**	.69**	–	
Psychological outcomes													
11 IES-R	11.6 (13.6)	0–59	−.25**	−.07	.27**	.19**	.23**	.30**	−.16*	−.07	−.03	−.12	–
12 CES-D	4.3 (3.9)	0–22	−.44**	−.33**	.63**	.24**	.17**	.54**	−.25**	−.30**	−.18**	−.39**	.39**

Descriptive statistics for the full (unadjusted) FACT subscales are provided as a reference so that scores in this sample may be more easily compared against those reported in other studies. The aggregated FACT score, which was included in the composite and therefore excludes the psychosocial items, is reported here to illustrate the pattern of correlation with other measures included in the regression analyses

*$p<0.05$; **$p<0.01$ (2-tailed)

Depressive Symptoms The 11-item Iowa short-form of the Center for Epidemiological Studies Depression Scale, CES-D [49] was used. Total scores range from 0 to 22; higher scores reflect greater depressive symptoms. A cut-off score of 8 identifies clinically significant symptomatology. α=0.82.

Analytic Strategy

Preliminary analyses first tested whether disease-site groups significantly differed on the predictor, moderator, or outcome variables using analysis of variance (ANOVA). Next, descriptive statistics and intercorrelations among the health stressor, social support moderator, and psychological outcome variables were examined. Correlations with sociodemographic (age, partner status, years with partner, years of education, employment status, hours worked/week, personal and household income) and disease/treatment variables (months since diagnosis, receipt of hysterectomy, radiation, and/or chemotherapy, stage, and grade) with the psychological outcomes were calculated to assess the need for use as controls.

Hierarchical multiple linear regression (HMLR) models were used. A priori variable entry was as follows: (1) control variables; (2) physical health composite; (3) social support; and (4) the interaction term, health composite X social support. Predictor and outcome variables were standardized prior to conducting the regression analyses to insure that all regression coefficients were centered and therefore interpretable. When predictor variables are standardized in this way, the unstandardized regression beta coefficients (shown in Table 3) can be interpreted as unit changes from the sample mean of a particular variable, as opposed to an arbitrary value of zero [50]. Analyses were performed for each social support variable (PSS-Fa, PSS-FR, ISEL, and SNI) and for each outcome (IES-R, CES-D) to determine if effects of source and type of support varied across outcomes. For significant health X support interactions, simple slopes analysis was used for interpretation [51].

Results

Clinical Description of the Sample

Descriptive data (see Table 2) showed that health-related quality-of-life (PCS) scores for the sample corresponded to norms for patients with minor medical illness [39] and chronic pain [52]. FACT scores, however, were comparable to those of samples assessed shortly after cancer treatment [53–55], whereas this sample was assessed, on average, 4 years from diagnosis and treatment. Fatigue was a problem, with mean TDI scores comparable to those of bone marrow transplant patients [56] and much higher than those of non-cancer counterparts [57]. As a group, survivors did not report exceptional levels of psychological maladjustment; scores on both the IES-R and CES-D were comparable to norms for healthy adult women [58, 59]. This is consistent with prior data [6, 9, 10]. Still, nearly 9% of patients met or exceeded the clinical cutoff scores for significant traumatic stress symptoms (IES-R) and 15% had clinically significant depressive symptoms (CES-D). Heightened physical symptomatology was consistently associated with poorer psychological outcomes (r range=.30–.54), consistent with the data from breast cancer [18, 31], head and neck cancer [60], and leukemia [61] samples.

Preliminary Analyses

One-way ANOVAs indicated that patients differing in site of disease did not significantly differ on physical health composite, social support, or psychological outcome variables (all p>.06), and thus, analyses collapsed across disease site. Table 2 provides descriptive statistics and intercorrelations among primary variables. Control variables used were similar across outcomes. Control variables by outcome were as follows: IES-R: age (r=−0.26, p<0.001), years with partner (r=−0.19, p=0.01), receipt of hysterectomy (yes vs. no; r=−0.14, p=0.02), and months since diagnosis (r=−0.14, p=0.02); CES-D: age (r=−0.24, p<0.001), years with partner (r=−0.18, p=0.02), years of education (r=−0.21, p=0.001), and months since diagnosis (r=−0.13, p=0.03). As age and years with partner were strongly correlated (r=0.71, p< 0.001) and years with partner would restrict the sample, only age was used as a control.

Cancer-Specific Traumatic Stress

The four HMLR models were significant, accounting for 18–23% of the variance in patients' reports of cancer-specific traumatic stress (see Table 3, top). As hypothesized, the physical health stressor was important, accounting for 7–8% of the variance in IES-R scores, indicating that patients with heightened physical symptomatology experienced greater stress. None of the four social support variables were significant predictors alone. The buffering effect was demonstrated with both functional (ISEL, PSS-Fr) and structural (SNI) social support measures. No interaction was found for the PSS-Fa scale (family support). The plot of the interaction between physical symptomatology and ISEL is provided for illustration (see Fig. 1); interactions for the PSS-Fr and SNI were of the same form. As shown, the buffering phenomenon was observed. That is, symptomatic patients with better perceived social support reported fewer cancer-specific traumatic stress symptoms than symptom-

Table 3 Results of HMLR analyses

	SNI			PSS-Fa			PSS-Fr			ISEL-Total		
Step and predictors	ΔR^2	Unstand β	p value	ΔR^2	Unstand β	p value	ΔR^2	Unstand β	p value	ΔR^2	Unstand β	p value
Cancer-specific traumatic stress (IES-R)												
Age	.076	−.016	.004**	.067	−.019	<.001***	.070	−.019	<.001***	.067	−.019	<.001***
Hysterectomy	.030	−.396	.021*	.016	−.222	.121	.017	−.245	.084	.016	−.234	.097
Months since diagnosis	.006	−.003	.343	.016	−.004	.112	.016	−.004	.095	.016	−.004	.086
Physical composite	.081	.260	<.001***	.071	.273	<.001***	.079	.291	<.001***	.071	.257	<.001***
Social support	.008	−.108	.124	<.001	.023	.709	<.001	.030	.620	.001	.041	.529
Composite X support	.033	−.194	.006**	.008	−.091	.128	.024	−.170	.006**	.023	−.154	.008**
	$F(6,180)=9.128$, $p<0.001$			$F(6,253)=9.131$, $p<0.001$			$F(6,251)=10.863$, $p<0.001$			$F(6,253)=10.136$, $p<0.001$		
	Total $R^2=0.233$			Total $R^2=0.178$			Total $R^2=0.206$			Total $R^2=0.194$		
Depressive symptoms (CES-D)												
Age	.145	−.018	<.001***	.108	−.018	<.001***	.111	−.019	<.001***	.108	−.018	<.001***
Education (years)		−.058	.014*		−.055	.002**		−.059	.001**		−.056	.002**
Months since diagnosis	.019	−.004	.087	.017	−.004	.061	.018	−.004	.062	.017	−.004	.057
Physical composite	.223	.481	<.001***	.239	.461	<.001***	.251	.500	<.001***	.239	.421	<.001***
Social support	.011	−.116	.065	.039	−.180	.001**	.019	−.127	.016*	.060	−.253	<.001***
Composite X support	.001	−.035	.570	.005	−.072	.158	.002	−.046	.396	<.001	−.010	.846
	$F(6,180)=19.971$, $p<0.001$			$F(6,252)=28.980$, $p<0.001$			$F(6,250)=27.773$, $p<0.001$			$F(6,252)=31.063$, $p<0.001$		
	Total $R^2=0.400$			Total $R^2=0.408$			Total $R^2=0.400$			Total $R^2=0.425$		

Unstandardized β and p values represent final model statistics. All tests are two-sided

*$p<.05$; **$p<.01$; ***$p<.001$

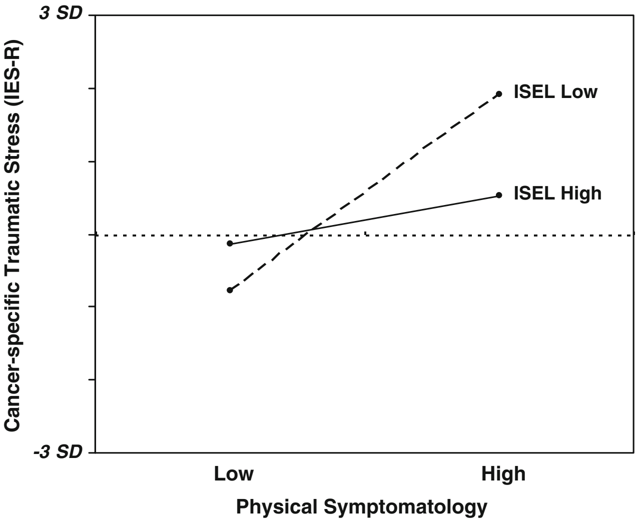

Fig. 1 Predicting traumatic stress using low vs. high ISEL scores

atic patients with poorer perceived support. In contrast, those with few symptoms (better health) reported significantly fewer traumatic stress symptoms, and traumatic stress did not vary for patients with wider or smaller social networks. This pattern of results was observed for both the intrusion and avoidance subscales of the IES-R.

As findings with the ISEL were significant, *post hoc* analyses were conducted to clarify which of the subscales showed a buffering effect. HMLR interaction results for the Appraisal (access to confidants; $p=0.03$) and Belonging (companionship; $p<0.001$) scales were significant and of the same form as those for the total ISEL score. Interactions for the Self-Esteem ($p=0.05$) and Tangible ($p=0.41$) subscales were not significant. In combination with the results using the total scores, the pattern of results suggest that support from a broad network of friends, confidants, and companions might be more important than family support in buffering cancer-specific traumatic stress symptoms.

Depressive Symptoms

All HMLR models were significant, accounting for 40–43% of the variance in patients' reports of depressive symptoms (see Table 3, bottom). Similar to the traumatic stress findings, the physical health stressor was important, accounting for 22–25% of the variance, indicating that patients with heightened physical symptomatology reported more depressive symptoms. Unlike the traumatic stress findings, however, social support played a direct role and did not interact with extent of physical symptoms. That is, those with higher levels of functional (perceived) support (ISEL, PSS-Fa, PSS-Fr) reported fewer depressive symptoms and those with less support reported more depressive symptoms (see Fig. 2). Neither direct nor interaction effects were observed for structural support (SNI).

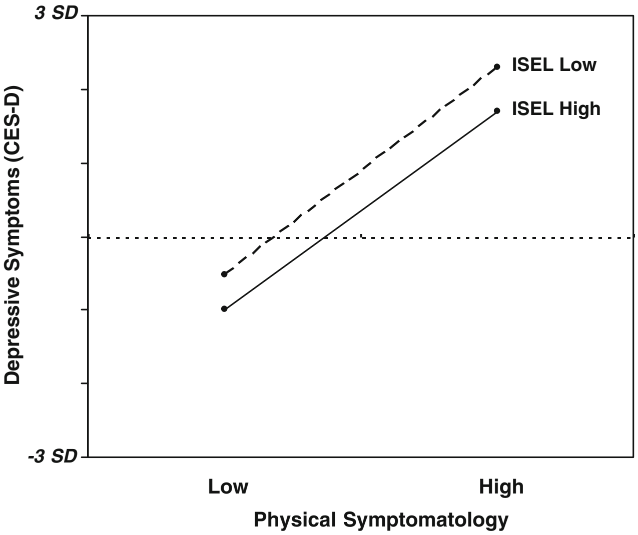

Fig. 2 Predicting depressive symptoms using low vs. high ISEL scores

The models tested here accounted for more variance in CES-D scores than in IES-R scores (approximately 40% vs. 20%). As a *post hoc* test, we explored whether this was due to overlap of CES-D somatic symptom items (e.g., I did not feel like eating; My sleep was restless) with the physical health items, repeating the analyses after removing four somatic CES-D items. A notable difference remains in variance explained (18–23% for the IES-R; 27–30% for the revised CES-D), suggesting that the difference is not due entirely to item overlap and that poor health may confer risk for depressive symptoms of both a somatic and psychological nature.

Discussion

The present study tested the stress-buffering hypothesis in a sample of gynecologic cancer survivors, examining the association between cancer-related physical symptomatology—the stressor—and psychological adjustment—cancer-specific traumatic stress and depressive symptoms. Patients evidenced compromised health status compared to available norms. As hypothesized, relatively greater physical symptomatology was associated with poorer psychological adjustment, providing support for the notion that the physical sequelae associated with gynecologic cancer treatments are a source of considerable psychological stress for patients. For traumatic stress, both functional and structural support interacted with physical symptomatology, providing evidence for buffering. No interactions were found for depressive symptoms outcomes. Instead, fewer physical symptoms and better support were directly associated with fewer depressive symptoms.

The combination of greater physical symptomatology and relatively limited social resources was associated with higher traumatic stress for patients (see Fig. 1). This may arise because those with less or poorer support lack an important outlet for coping with a continual reminder—persistent physical symptoms—of their cancer status. Horowitz [62] has argued that individuals have a need to integrate traumatic events, such as a cancer diagnosis, into cognitive models of the self and the world. While the processing of trauma-related information is believed to be adaptive, it is also distressing, which leads some to respond with avoidant coping behaviors (e.g., thought suppression). According to Horowitz, intrusive thoughts occur when avoidance impedes the basic cognitive processes of assimilation and accommodation that would facilitate integration of the cancer experience, creating a prolonged cycle in which avoidance prevents habituation to trauma-related stimuli [63, 64]. Lepore [34] has outlined a social-cognitive process through which social support can perpetuate or break this cycle. For instance, a supportive environment facilitates discussion of the traumatic event, promoting integration of the experience [65] and reducing the need for further cognitive processing [66]. In contrast, those with inadequate support resources (low structural support) and those who receive unhelpful responses (poor functional support) are more likely to restrict disclosure of their reactions and engage in other avoidant coping behaviors, ultimately impeding development of skills that could enhance adjustment, e.g., generation of alternative interpretations [67].

Post hoc tests illustrated that availability of confidants (ISEL-Appraisal) and companionship (ISEL-Belonging), rather than availability of material aids (ISEL-Tangible), buffered the traumatic stress response. Notably, these relationships were observed for friend support (PSS-Fr), not family support (PSS-Fa). Although family members are often the most readily available support resource, they are known to experience adverse psychological reactions that can be severe and long lasting [68], often at rates comparable to patients'. Manne, DuHamel, and Redd [69] have demonstrated that a sense of comfort expressing cancer-related thoughts and feelings play a key role in mothers' adjustment to their children's cancer. Moreover, their data suggest that that the responses of family and friends considered “less important” others might play a more crucial role in reducing traumatic symptoms than those of the “closest” family and friends. They postulated that mothers might rely on friends and extended family members because they are more insulated from the cancer stressor than members of the nuclear family. In the context of the present study, the social network outside the family may provide a more private outlet for disclosure of thoughts and feelings that might be too difficult to discuss with close family members, such as sexual difficulties or fears of recurrence. Manne et al. [70] and Rini et al. [71] have also provided evidence that perceived support from friends and extended family can offset the negative psychological impact of negative/inadequate partner support in the cancer context.

The direct benefit of social support for depressive symptoms is consistent with previous studies. Like other survivor groups [18, 19, 72], the gynecologic cancer survivor appears to have benefited from a supportive network regardless of the level of physical symptomatology. As discussed above, we postulated that social support can be an important resource for coping with cancer-specific stress, whereas a subset of depressive symptoms—e.g., loneliness, social isolation, views of the self as unlikable or unworthy—are likely aligned with one's perceptions of social support. These results highlight the methodological and conceptual importance of separately examining traumatic stress and distress outcomes in survivorship research, as discussed above.

The research on social support buffering is equivocal. It has been suggested (though not often shown) that structural support is directly related to psychological outcomes, whereas functional support acts as a buffer [23, 73]. Our data do not support this assertion; nor do data from other studies examining the buffering effect in cancer and other medically ill samples [74, 75]. For instance, Koopman et al. [76] demonstrated that both lower levels of aversive support (functional support) and a larger social network (structural support) protected metastatic breast cancer patients with high life stress (stressor) from mood disturbance. The absence of a buffering effect for depressive symptoms in the presents study was inconsistent with Koopman et al.'s, but the identified stressors were vastly different (physical health status vs. incidence of stressful life events such as muggings, loss of family member or friend, etc.) and might thus require availability of different coping resources. Taken together, these data imply several directions for the social support buffering literature: (1) consideration of variations in the buffering effect based on the stress outcome (e.g., traumatic stress vs. depressive symptoms, as reported here); (2) consideration of variation based on the nature of the stressor (e.g., compromised physical health status vs. number of stressful life events); (3) closer examination of the complexity of social support beyond structural vs. functional support (e.g., variations based on type/source of support); or some combination thereof.

The present study adds to our understanding of gynecologic cancer survivorship by testing a theoretical model that delineates the relationship between physical symptomatology, social support, and psychological adjustment. The cross-sectional design allowed for efficient recruitment of a large, representative cohort. Physical symptomatology was assessed as a multidimensional health stressor and the multiple measures of social support provided examination of both perceived and actual (network size) social support. However, weaknesses of design and method should be noted. A cross-sectional assessment does not allow for causal or directional inferences. The data are analyzed with physical symptoms as a stressor affecting psychological outcomes; however, it might also be the case that adjustment difficulty results in increased experiencing or reporting of physical symptoms. For instance, several authors have demonstrated that negative affect significantly alters reporting of somatic symptoms [77, 78], though the converse may also occur. A longitudinal design is needed to establish the direction of the relationship between physical health and psychological outcomes; however, these results provide additional information on a pathway (i.e., social support) through which outcomes could be improved and a well-designed intervention trial would inform the question of causality (see [79], for a discussion).

In addition, patients who, thus far, remained disease free and able to return for follow up were studied. Those who died from any cause prior to or following the 2–10-year eligibility window or who did not return for their regular follow-up within the accrual year were not included. Thus, patients with fewer economic or social resources may not have been adequately sampled [80]. Ethnic minority participation was low (5%), even for the state of Ohio (15%). The available research on African-American cancer patients suggests that they might have higher rates of distress and greater unmet needs than cancer patients from other ethnic backgrounds [81] and thus might exhibit a different pattern of results.

In conclusion, much is yet to be learned about the psychological adjustment of gynecologic cancer survivors. This study underscores health status as an important correlate of patients' stress and distress, making obvious the need for symptom control for suffering survivors. The circumstances for patients burdened with physical symptoms may be emotionally worse for those with fewer social support resources. These results suggest that women with compromised physical health experiencing traumatic stress symptoms might derive particular benefit from a interventions that aim to broaden the social network, enhance support from individuals outside the immediate family[82], or provide peer support through a group format [83]; whereas women presenting with depressive symptomatology might benefit more from strategies aimed at enhancing perceptions of support [27], without a strong emphasis on increasing the size of the network. Over 80,000 women in the USA were diagnosed with gynecologic tumors in 2009 [2], with many of them expected to survive for many years. Identifying patients at particularly high risk for psychological adjustment difficulties represents an important step toward designing interventions tailored for the difficulties and circumstances of differing groups.

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