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Quality of Life Concerns and Depression among Hematopoietic Stem Cell Transplant Survivors

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Abstract

Purpose—This study examined quality of life, transplant-related concerns, and depressive symptoms and their demographic and medical correlates at 1 to 3 years following hematopoietic stem cell transplantation (HSCT).

Methods—HSCT survivors ($N = 406$) completed telephone-administered questionnaires that assessed demographic variables, functional status, quality of life, transplant-related concerns, and depressive symptoms.

Results—The most prevalent concerns among HSCT survivors included physical symptoms (e.g., fatigue, pain), maintaining current health status and employment, changes in appearance, and lack of sexual interest and satisfaction. In addition, almost one-third (32%) of survivors age 40 years and younger reported concern about their ability to have children. Unemployed survivors and those with lower incomes and worse functional status were more likely to experience poorer quality of life in multiple domains. Fifteen percent of the sample reported moderate to severe depressive symptoms, and these symptoms were higher among allogeneic transplant recipients and those with lower functional status.

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Conflict of Interest

The authors indicate no potential conflicts of interest.

The authors had access to the primary data and agree to allow the journal to review their data upon request.

Conclusions—Results suggest that interventions are needed to address physical symptoms, coping with an uncertain future, infertility, and sexual issues during the early phase of HSCT survivorship.

Keywords

hematopoietic stem cell transplantation; quality of life; cancer survivorship; psychological; depression; sexual health

Introduction

The population of hematopoietic stem cell transplant (HSCT) survivors continues to increase, as more than 45,000 people receive HSCT annually throughout the world [13]. The term HSCT includes bone marrow transplants, stem cell transplants from peripheral blood or umbilical cord blood, and mini/light procedures (with lower toxicity) that are primarily used to treat hematologic and lymphoid cancers [13]. HSCT patients usually receive high doses of chemotherapy with or without total body irradiation followed by infusions of stem cells to restore hematopoietic function. Autologous HSCT uses the patient's own stem cells, whereas allogeneic HSCT uses donor stem cells, which may result in graft-versus-host disease (GVHD) and other severe complications. HSCT involves a lengthy recovery process, with many survivors resuming social and work roles at 1 to 3 years post-transplant [26, 36]. The present research focuses on quality of life concerns and psychological adjustment during this critical early phase of HSCT survivorship.

Although most studies indicate that average levels of distress are within the normal range by 3 years post-transplant [20, 24, 33, 36], averaging across survivors obscures the fact that a significant minority experience clinical or subclinical levels of psychological distress. For example, studies have shown that approximately one-fourth (26%–28%) of allogeneic HSCT recipients report significant depressive symptoms at 1 year post-transplant [10, 22]. In a 5-year prospective study of allogeneic and autologous HSCT recipients, 7% to 11% of survivors were found to report moderate to severe depression at each assessment point [36]. Greater post-transplant distress has been associated with worse pre-transplant psychological functioning [28], worse post-transplant physical and sexual functioning [21], and greater fatigue [15]. Demographic (e.g., age, gender, marital status) and medical variables (e.g., type of transplant, disease relapse) have shown mixed associations with psychological distress [27–28, 33, 36]. Clarification of the predictors of enduring distress is important for identifying at-risk patients who may benefit from early psychosocial intervention.

In addition to transplant-related psychological distress, toxicity and immunosuppression associated with HSCT can cause physical symptoms and functional impairment that lead to poor quality of life among survivors [12, 24, 36–37]. Fatigue has been found to be a particularly prevalent symptom. One longitudinal study found that 30% to 42% of HSCT survivors were bothered by fatigue at 6, 12, and 24 months post-transplant; the prevalence of other physical symptoms (e.g., pain, mouth sores, skin changes) was generally less than 20% [26]. Another study found that both autologous and allogeneic HSCT recipients reported greater fatigue than the general population at 3 to 5 years post-transplant [20]. Physical symptoms such as fatigue contribute to the functional limitations (e.g., impaired mobility or ability to perform routine activities) that have been identified in 18% to 34% of survivors who are 18 months to 5 years post-transplant [12, 36]. In turn, these functional limitations contribute to poor quality of life outcomes. Although physical symptoms and accompanying functional limitations have been shown to predict worse subjective assessments of physical, emotional, and functional well-being (i.e., quality of life), medical variables (e.g., GVHD,

transplant type) have not been consistently correlated with post-transplant quality of life [1, 27–28, 36].

Other physical side effects of HSCT include sexual dysfunction and almost certain infertility (> 98%) [16, 35, 39]. Both men and women who are long-term HSCT survivors report greater sexual difficulties than nontransplant controls [7, 37], and women endorse more sexual problems than men [21, 38]. A prospective study of HSCT survivors found that sexual activity generally decreased over time, and that depression and female gender predicted sexual problems at 1 and 3-year follow-ups [21]. Although nearly all HSCT survivors become infertile after transplant, little is known about the prevalence of infertility concern and factors that might predict it. One study of 10-year HSCT survivors found that the majority (54%) of HSCT survivors under the age of 40 reported elevated infertility concern [17]. Having no children prior to the transplant and an annual income less than \$100,000 predicted greater infertility concern, whereas gender did not.

Although global assessments of physical, psychosocial, and sexual domains are often included in studies of HSCT survivors, little research has examined the extent to which survivors endorse specific quality of life issues. One study of HSCT survivors who were 3 to 62 months post-transplant documented a range of highly prevalent problems, including fear of disease recurrence, low energy level, feelings of anxiety and depression, and sexual dysfunction [2]. Younger age, female gender, and poorer functional status were associated with a greater number of problems following HSCT.

Overview of the Present Study

Investigations of HSCT survivorship have mostly focused on the first year post-transplant [33], whereas far fewer investigations have examined the physical, psychological, and sexual well-being of survivors who are 1 to 3 years post-transplant—the period of time that is our focus. This transition period often involves efforts to restore a sense of “normalcy” following a lengthy transplant recovery process [3]. Distress, poor quality of life, and transplant-related problems that endure during this period are likely to hinder survivors as they attempt to resume social and work roles. Understanding the prevalence and severity of these problems among HSCT survivors at 1 to 3 years post-transplant would inform the development of interventions which target these specific issues. Understanding medical and sociodemographic predictors of these problems would help identify patients at high risk for enduring problems after HSCT.

This study extends prior work by documenting specific problems in a large sample of HSCT survivors at 1 to 3 years post-transplant. The primary objectives were to examine quality of life, transplant-related concerns, and depressive symptoms and determine the most common problems. Based on the literature [2–3], we hypothesized that the most prevalent problems would include fear of potential disease recurrence and job loss, fatigue, and changes in appearance and sexuality. We also hypothesized that a minority of survivors would report moderate to severe depressive symptoms. A second objective was to identify demographic and medical correlates of study outcomes. These analyses were exploratory because research to date has not shown consistent associations between quality of life variables and demographic and medical characteristics [33]. Finally, given the paucity of research on infertility concern among HSCT survivors [17], the prevalence of this problem and its demographic and medical correlates were separately examined.

Methods

Participants and Procedure

HSCT survivors were recruited from Hackensack University Medical Center, Memorial Sloan-Kettering Cancer Center, and the Mount Sinai Medical Center. Respondents completed study measures during a telephone screening for a cognitive-behavioral therapy trial designed to reduce distress. Eligibility criteria for screening were as follows: (1) 18 years of age or older, (2) HSCT performed 12–36 months prior to study enrollment, (3) fluency in English, (4) working phone service, and (5) not currently awaiting another transplant or receiving treatment for disease relapse. All of the measures described below were administered prior to the intervention. The sample includes all screened survivors, not just those who met distress-related criteria for entry into the trial.

Following institutional review board approval, potential participants were mailed a consent form, letter, and brochure describing the study. Trained research assistants then called potential participants to determine their interest in participating and eligibility for the screening assessment. Screening questionnaires assessed demographics and psychological, social, physical, and functional well-being. Twenty dollar gift certificates were issued to participants as compensation for their time. We report data from survivors who completed the measures of quality of life, depression, and functional status described below.

Measures

Quality of life and transplant-related concerns—The Functional Assessment of Cancer Therapy-Bone Marrow Transplant (FACT-BMT) version 3 [9, 32] includes the general version of the FACT (FACT-G) and a 12-item subscale that assesses transplant-related concerns. The FACT-G includes four 7-item subscales (physical, social, and functional well-being) and a 6-item subscale assessing emotional well-being. Higher scores indicate better quality of life over the past 7 days. The FACT-G total score and the subscale that assesses transplant-related concerns were used in this study.

Depressive symptoms—The Beck Depression Inventory (BDI) [5] is a 21-item measure that assesses depressive symptoms during the past week. This measure has adequate reliability and validity [4].

Functional status—The Karnofsky Self-Reported Performance Rating Scale (KPS-SR) [23, 40] is a self-report measure that is used to assess functional status or impairment caused by physical symptoms. The scale ranges from 40 (disabled, requiring special care and help) to 100 (normal). This measure has been correlated with survival [30] and clinically significant illness [40].

Medical factors—Information regarding the survivors' medical diagnosis and transplantation were obtained from medical charts.

Statistical Analyses

Data were analyzed with SPSS statistical software (version 15.0; SPSS, Chicago, IL, USA). First, descriptive statistics were used to characterize the demographic, medical, and psychosocial characteristics and concerns of the study sample. For negatively phrased FACT-BMT items (e.g., “I get tired easily”), a response of 2 (*somewhat*) or higher on a 0–4 scale indicated endorsement of the concern. For positively phrased FACT-BMT items (e.g., “I have a good appetite”), a response of 0 (*not at all*) or 1 (*a little bit*) on a 0–4 scale was classified as a concern. Second, correlations between study outcomes (depressive symptoms, transplant-related concerns, and quality of life) and demographic and medical variables were

computed. Variables that were significantly correlated with each outcome were entered into the multiple regression model predicting that outcome. Simultaneous predictor entry was used.

Results

Sample Characteristics

Of the 1,434 survivors who were approached regarding the study, 751 (52%) completed a pre-screen assessment to determine their eligibility for participating in the screening assessment, 156 declined, 385 could not be reached, and 142 had outdated contact information. Of the 498 survivors who were eligible for screening, 29 declined to continue in the study and 17 were lost to follow-up. That is, 452 survivors (91% of 498) consented to participate and 408 of these individuals completed the screening assessment to determine their eligibility for the intervention trial. Common reasons for failure to complete screening were inability to reach the participant ($n=25$) and participant refusal ($n=6$). Ten participants were not screened because the study ended before they could be scheduled. Using logistic regression, we found that none of the variables with sufficient nonmissing responses (i.e., age, ethnicity, sex, time since treatment) predicted completion of the screening assessment.

The final sample included 406 survivors (47.8% female) who completed study outcome measures. Demographic characteristics of the sample appear in Table 1. Participants were primarily Caucasian (83.7%) and married or partnered (72.9%) and their average age was 49 years ($SD = 13$). The majority of survivors were not employed (51.7%) and had a college degree (61.6%); 51% reported annual household incomes greater than \$80,000 per year. About 60% of survivors had undergone autologous transplantation and an average of 21 months had elapsed since the transplant ($SD = 6$).

Descriptive Statistics

Table 2 shows descriptive statistics and Cronbach's coefficient alphas for study variables. Mean quality of life scores were comparable to those reported for HSCT survivors in prior research [25]. Sixty-one participants (15%) met the criteria for moderate to severe depressive symptoms, which is higher than that reported in a study that used the BDI to assess depressive symptoms among HSCT survivors who were 90 days to 5 years post-transplant (range = 7% to 11%) [36]. Karnofsky scores suggested that participants were, on average, not highly functionally impaired. Most were able to carry out their daily activities and experienced minor physical symptoms.

Table 3 displays the proportion of HSCT survivors who endorsed each transplant-related problem. The most common problems included fatigue (56%), worry that their condition will worsen (36%), lack of sexual interest and satisfaction (31% and 28%, respectively), and changes in appearance (30%). A significant minority of survivors also endorsed pain (27%), concerns about keeping their job, including work in the home (27%), and worry that the transplant would not be successful (25%). One-fourth of survivors indicated that they were bothered by the side effects of treatment. Problems endorsed by less than 15% of the sample included poor family communication about their illness, inadequate support from their family and friends, nausea, poor appetite, inability to accept the illness, and lack of confidence in their doctors and nurses.

Demographic and Medical Correlates of Study Outcomes

Significant correlates of study outcomes (quality of life, transplant-related concerns, and depressive symptoms) appear in Table 4. Survivors with less functional impairment, those who were employed, and those who had higher incomes endorsed better quality of life,

fewer transplant-related problems, and fewer depressive symptoms. In addition, greater education and autologous transplantation were correlated with fewer depressive symptoms and transplant-related problems. Finally, although no gender differences were found with regard to quality of life and depressive symptoms, women reported more transplant-related problems than men.

In regression analyses (see Table 5), functional impairment emerged as the only significant unique predictor of quality of life, with better performance status predicting better quality of life. Allogeneic transplantation and greater functional impairment were unique predictors of higher transplant-specific problems and depressive symptoms.

Finally, demographic and medical correlates of infertility concern were examined for those 40 years of age and younger. Almost one-third (32%) of survivors in this age group reported infertility concern, whereas few survivors above this age (4%) endorsed this issue. Being childless ($r = -.45, p < .001$) and unmarried ($r = -.30, p < .01$), having greater education ($r = .23, p < .05$), and undergoing allogeneic transplantation ($r = -.31, p < .01$) were associated with greater infertility concern. In a regression analysis, these variables together predicted 27% of the variance in infertility concern, $F(4, 79) = 7.38, p < .001$, with childlessness ($\beta = -.32, p < .01$) and allogeneic transplantation ($\beta = -.21, p < .05$) being the only significant unique predictors of this issue.

Discussion

The present study examined quality of life, transplant-related problems, and psychological adjustment among HSCT survivors who were 1 to 3 years post-transplant. During this critical period of transition, many survivors attempt to gain a sense of “normalcy” as they resume work and social roles [3]. However, resumption of pre-transplant activities may be challenging as survivors experience fear of potential complications and disease relapse as well as late side effects of treatment (e.g., pain, fatigue) [8, 26, 36]. As hypothesized, common problems among these survivors included fatigue, worry that their condition will worsen, lack of sexual interest and satisfaction, and changes in appearance. One quarter of survivors indicated that they were at least “somewhat” bothered by the side effects of treatment. A significant proportion of survivors (25–27%) also reported pain, fear of losing their job, and worry that the transplant would not be a success. Previous cross-sectional studies have reported global quality of life outcomes for HSCT recipients at various phases of survivorship [6, 19], whereas this study examined specific problems during the transition from acute recovery to survivorship. Although fatigue, pain, and sexual problems are well known side effects of HSCT [21, 26, 33, 37], this study identified additional concerns that have not been extensively documented, including changes in appearance and fear of job loss. Taken together, results suggest that interventions need to address the impact of HSCT on daily activities, physical stamina, sexual health, and self-image during the early phase of survivorship.

Intervention efforts may target unemployed survivors and those with lower incomes and worse functional status, as these individuals were more likely to experience poorer quality of life in multiple domains. Previous cross-sectional studies with HSCT recipients at various phases of survivorship have obtained similar findings [2, 6, 18]. It is unclear whether survivors return to work due to adequate quality of life or whether quality of life improves through enhanced social status and income associated with professional activity. Survivors with higher incomes may have more resources to assist them in managing daily tasks and access to specialists who may aid their recovery process. Other demographic variables (e.g., gender, age, education) did not show consistent associations with quality of life outcomes in this study and previous studies of HSCT survivors [6, 26, 33, 36]. Mixed associations also

were found between medical factors and study outcomes. Specifically, autologous transplantation was associated with fewer depressive symptoms and transplant-related problems, whereas time since transplant, disease status, and a history of acute and chronic graft-versus-host disease were unrelated to study outcomes. Overall, results suggest that social and economic resources and perceptions of functional status may be more predictive of quality of life than actual disease status and complications.

Fifteen percent of the sample reported moderate to severe depressive symptoms, which is higher than that reported for the general population (9%) [34]. This result is congruent with evidence from a national survey that having cancer places individuals at risk for depression [14]. Higher levels of depressive symptoms and transplant-specific problems were associated with poorer functional status and the receipt of allogeneic transplantation. The replicated association between physical limitations and depressive symptoms among HSCT survivors indicates that long-term complications may impede emotional recovery [8, 36]. Although allogeneic transplant patients tend to have a more complicated recovery process than autologous transplant patients [13], transplant type has shown mixed associations with psychological outcomes [20, 26, 36]. Interestingly, gender was not associated with depressive symptoms in this cross-sectional analysis; however, a 5-year prospective study indicated that female HSCT survivors were more likely to develop depression than their male counterparts [36].

In addition to examining psychological and physical well-being, correlates of infertility concern were explored among survivors age 40 years and younger, as 32% endorsed this issue. Childlessness and the receipt of allogeneic transplantation were most strongly associated with infertility concern. A study of 10-year HSCT survivors also found childlessness to be a risk factor for infertility concern; however, their sample included an insufficient number of autologous HSCT survivors to examine this issue by transplant type [17]. Perhaps the slower recovery process and complications associated with allogeneic transplantation heighten worries regarding one's future, including the possibility of parenting. In addition, allogeneic HSCT with total body irradiation may be more damaging to the reproductive axis compared to autologous HSCT [11], and this knowledge may account for greater infertility concern among allogeneic HSCT survivors. Research is needed to further characterize survivors with elevated distress related to infertility and the degree to which this issue affects their life satisfaction and relationships.

Although a number of transplant-related problems were identified, results also point to the strengths of this population. Over 98% of the sample indicated that they had accepted their illness and 96% received some emotional support from their family. Only 14% reported poor family communication about their illness. Most survivors (95%–99%) had confidence in their nurses and doctors and received support from friends and neighbors (88%). Regarding physical symptoms, few survivors (5%–6%) reported significant nausea and appetite loss, as found in prior research [2]. Finally, about 95% indicated that they were able to enjoy life and few survivors (3%) regretted having the transplant.

Limitations of this study include the self-selected nature of the sample, as screening assessments were linked to accrual efforts for a psychological intervention trial. Although this sample was demographically similar to the larger population of HSCT survivors [29] and certain demographic variables (age, sex, ethnicity, time since treatment) did not predict screening completion, the relationships between psychosocial characteristics and screening completion could not be analyzed. However, only a minority of the sample (21.8% of 408) were eligible for the intervention based on their level of distress, and average quality of life scores were comparable to those reported for HSCT survivors in prior research [25]. Other limitations of this study include the cross-sectional design, which precludes inferences

regarding causality and the temporal ordering of variables, and the restricted range of outcomes. Longitudinal research that incorporates other psychiatric conditions (e.g., anxiety disorders) and medical comorbidities (e.g., infections) would further our understanding of HSCT survivors' adjustment.

The present findings have important implications for future research and clinical practice. First, results suggest that HSCT recipients often experience multiple problems, including physical symptoms (e.g., fatigue, pain), body image and sexual changes, and fear of worsening health and job loss during the early phase of survivorship. Randomized clinical trials of interventions should target multiple domains of functioning in this population. These interventions should be cost-effective and portable (e.g., Internet or phone-based), as survivors with fewer socioeconomic resources and physical limitations are most affected by the transplant. Given the high prevalence of concerns among HSCT survivors, researchers also should assess whether routine screening followed by a referral to supportive services results in better management of these issues than other strategies (e.g., preventative interventions offered to all HSCT recipients) [31]. Educational approaches, such as presenting options for managing infertility, may help reduce transplant-related distress. Given the global impact of this aggressive therapy on quality of life, a multidisciplinary, empirically-based effort is warranted to address the psychosocial and health maintenance needs of HSCT survivors.

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Table 1

Sample Characteristics

Characteristic	Descriptive Statistic ^a
<i>Gender</i>	
Male	51.5%
Female	47.8%
Missing	0.7%
<i>Ethnicity</i>	
Caucasian	83.7%
African American	5.7%
Hispanic	3.9%
West Indian	1.5%
Other	4.4%
Missing	0.7%
<i>Age, years</i>	
Mean ± Standard Deviation	49.25 ± 12.82
<i>Education</i>	
12 years	17.5%
Some college	20.9%
College or graduate degree	61.6%
<i>Annual Household Income</i>	
Below \$30,000	10.6%
\$30,000–\$79,000	33.5%
Above \$80,000	51.0%
Missing	4.9%
<i>Employment Status</i>	
Employed	46.6%
Not employed	51.7%
Missing	1.7%
<i>Marital Status</i>	
Married or marriage equivalent	72.9%
Not married	27.1%
<i>Children</i>	
Yes	80.8%
No	17.7%
Missing	1.5%
<i>Disease Type</i>	
Non-Hodgkin's lymphoma	22.4%
Hodgkin's lymphoma	6.2%
Acute and chronic myeloid leukemia	11.6%
Acute and chronic lymphoid leukemia	3.4%
Myelodysplastic syndrome or myeloproliferative disease	8.4%

Characteristic	Descriptive Statistic ^a
Multiple myeloma or amyloidosis	33.7%
Other	1.5%
Missing	12.8%
<i>Current Disease Status</i>	
Free of disease	56.4%
Alive with disease	27.6%
Data unavailable	16.0%
<i>Transplantation Type</i>	
Allogeneic	29.1%
Autologous	60.3%
Missing	10.6%
<i>Months since HSCT^b</i>	
Mean ± Standard Deviation	21.23 ± 6.22
<i>History of Acute GVHD (n = 118 Allogeneic Transplant Survivors)^c</i>	
Yes	32.2%
No	59.3%
Missing	8.5%
<i>Chronic GVHD (n = 118 Allogeneic Transplant Survivors)^c</i>	
Yes	25.4%
No	61.0%
Missing	13.6%

^aAll values are percentages of participants (N = 406) unless otherwise specified.

^bHSCT = hematopoietic stem cell transplantation

^cGVHD = graft-versus-host disease

Table 2

Descriptive Statistics for Study Variables

Variable	<i>M</i>	<i>SD</i>	α
FACT-G total ^a	87.43	15.36	.92
Bone Marrow Transplant Subscale	29.85	6.07	.68
Beck Depression Inventory	8.07	6.97	.88
Karnofsky Performance Status	87.52	10.74	

^aFACT-G = general version of the Functional Assessment of Cancer Therapy

Table 3

Proportion of HSCT Survivors Endorsing Quality of Life Concerns

Quality of Life Concern ^a	%	n ^b
I get tired easily	56.4	406
I have a lack of energy	42.1	406
I worry that my condition will get worse	36.0	405
I am interested in having sex(R)	31.0	400
I like the appearance of my body(R)	30.2	404
The effects of treatment are worse than I had imagined	29.6	406
I am satisfied with my sex life (R) ^c	28.0	237
I have pain	26.8	406
I am concerned about keeping my job (include work in home)	26.8	406
I worry that the transplant will not work	25.6	402
I am bothered by side-effects of treatment	25.4	405
I feel sad	23.9	406
I feel nervous	23.7	406
I worry about dying	22.2	406
I feel distant from other people	20.9	406
I am sleeping well(R)	20.0	406
Because of my physical condition, I have trouble meeting the needs of my family	16.7	406
I feel distant from my friends	16.0	406
I am content with the quality of my life right now (R)	16.3	406
My work (include work in home) is fulfilling (R)	14.8	405
I am enjoying the things I usually do for fun(R)	13.5	405
Family communication about my illness is poor	13.5	406
I get support from my friends and neighbors(R)	11.8	406
I have concerns about my ability to have children	11.3	388
I feel sick	11.1	405
I am forced to spend time in bed	10.1	406
I am able to work (include work in home) (R)	8.1	405
I am losing hope in the fight against my illness	6.2	406
I have a good appetite(R)	5.9	406
I am proud of how I'm coping with my illness(R)	5.9	406
I am able to enjoy life(R)	5.4	406
I have nausea	5.4	406
I feel close to my partner (or the person who is my main support) (R)	5.4	401
I have confidence in my nurse(s) (R)	4.8	397
I get emotional support from my family (R)	4.0	405
I regret having the bone marrow transplant	3.2	406
My doctor is available to answer my questions(R)	2.2	405
I have accepted my illness (R)	1.7	406
My family has accepted my illness(R)	1.7	403

Quality of Life Concern ^a	%	n ^b
I am able to get around my myself(R)	1.5	406
I have confidence in my doctor(s) (R)	0.2	406

^aPositively phrased items were reverse coded (R) so that a response of 0 (*not at all*) or 1 (*a little bit*) on a 0–4 scale indicated concern regarding the issue. For all other items, a response of 2 (*somewhat*) or higher on a 0–4 scale indicated endorsement of the concern. Copyright 1987 by David Cella, Ph.D.

^bNumber of valid responses of total sample of 406.

^cOnly participants who had been sexually active during the past year responded to this item.

Table 4Correlations between Participant Characteristics and Study Outcomes (*N* = 406)

Participant Characteristic ^a	FACT-G ^b total	Bone Marrow Transplant Subscale	Beck Depression Inventory
Gender	.02	-.10 [*]	.08
Education	.07	.11 [*]	-.12 [*]
Annual income	.18 ^{***}	.17 ^{**}	-.12 [*]
Employment status	.21 ^{***}	.25 ^{***}	-.14 ^{**}
Karnofsky performance status	.57 ^{***}	.50 ^{***}	-.48 ^{***}
Transplant type	.08	.13 [*]	-.12 [*]

^a Gender coded (1 = male, 2 = female). Employment status coded (0 = not currently working, 1 = currently working). Transplant type coded (1 = allogeneic, 2 = autologous). Other variables yielding nonsignificant correlations with dependent variables were age, race, marital status, children, time since transplant, disease status, and history of acute and chronic graft-versus-host disease.

^b FACT-G = general version of the Functional Assessment of Cancer Therapy.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 5

Multiple Regression Analyses Predicting Quality of Life and Depressive Symptoms

Outcome ^a	Predictors ^c	β	<i>t</i>	Partial <i>r</i>
FACT-G ^b	Annual income	-.03	-.50	-.03
	Employment status	.00	.04	.00
	Karnofsky performance status	.58	11.81 ***	.57
Bone Marrow Transplant Subscale	Gender	-.10	-1.88	-.12
	Education	.03	.51	.03
	Annual income	-.01	-.26	-.02
	Employment status	.03	.58	.04
	Transplant type	.18	3.57 ***	.21
	Karnofsky performance status	.52	9.73 ***	.51
Beck Depression Inventory	Education	-.09	-1.70	-.10
	Annual income	.07	1.16	.07
	Employment status	.08	1.39	.08
	Transplant type	-.19	-3.59 ***	-.21
	Karnofsky performance status	-.50	-9.24 ***	-.49

^aFor FACT-G, $R^2 = .34$, $F(3, 295) = 49.95$, $p < .001$; for Bone Marrow Transplant Subscale, $R^2 = .34$, $F(6, 265) = 22.82$, $p < .001$; for depressive symptoms, $R^2 = .30$, $F(5, 267) = 22.73$, $p < .001$.

^bFACT-G = general version of the Functional Assessment of Cancer Therapy.

^cGender coded (1 = male, 2 = female). Transplant type coded (1 = allogeneic, 2 = autologous). Employment status coded (0 = not currently working, 1 = currently working).

 $p < .001$.