Depressive Symptoms in Cancer Patients Compared with People from the General Population: The Role of Sociodemographic and Medical Factors

Maya J. Schroevers, PhD
Adelita V. Ranchor, PhD
Robbert Sanderman, PhD

ABSTRACT. This study examined depressive symptoms in 475 patients with cancer and in a reference group of 255 individuals without cancer from the general population and the associations of those symptoms with sociodemographic and medical factors. Depressive symptoms were measured at 3 months (Time 1) and 15 months (Time 2) after diagnosis. Patients reported more depressive symptoms than the reference group did at Times 1 and 2. Younger age, especially, was related to the onset of depressive symptoms after a cancer diagnosis. Better-educated patients and those with a lower stage of disease reported a greater decrease in depressive symptoms over time. The authors conclude that cer-

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tain sociodemographic factors may primarily reflect general dysfunction or vulnerability rather than risk factors for developing depressive symptoms after a diagnosis of cancer. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress.com>* © *2003 by The Haworth Press, Inc. All rights reserved.]*

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A diagnosis of cancer, its prolonged treatment, and physical side effects can have a profound impact on patients' lives. The sudden confrontation with such a life-threatening disease may disrupt their emotional balance and induce feelings of uncertainty, a diminished self-image, and changes in relationships with family and friends (Moos & Schaefer, 1984). Not surprisingly, depressive symptoms are the most frequently encountered psychological problem among the medically ill, including cancer patients (Grassi et al., 2000; Katon & Sullivan, 1990).

REVIEW OF THE LITERATURE

The recognition and treatment of depressive symptoms in cancer patients is of crucial importance because these symptoms may adversely affect their quality of life, compliance with treatment, length of hospitalization, ability to care for themselves, and perhaps even progression of the disease (McDaniel et al., 1995). However, the recognition of depressive symptoms in cancer patients is often hampered for several reasons (Kathol et al., 1990a, 1990b). First, depressive symptoms are often an appropriate and normal reaction to a life-threatening event, such as a cancer diagnosis. In addition, somatic symptoms of depression, such as fatigue, weight loss, and sleep problems, may resemble symptoms of cancer or the side effects of treatment. Patients also may have difficulty disclosing emotional problems to their physician or nurses, and physicians and nurses may be reluctant and lack the time and communication skills to probe into patients' psychological problems (Maguire et al., 1980).

Information about the risk factors related to an increased vulnerability to depressive symptoms may facilitate early recognition, monitoring, and treatment of high-risk patients (Sheard & Maguire, 1999).

Important predictors of depressive symptoms in patients include socio-demographic factors (e.g., gender, age, education, and marital status) and medical factors (e.g., cancer site, stage, and type of treatment) (Breitbart, 1995; Jacobsen et al., 1998; Moos & Schaefer, 1984; van't Spijker, Trijsburg, & Duivenvoorden, 1997). Because these factors are known at diagnosis and are unlikely to be modifiable, they may be particularly useful markers for identifying patients at high risk for depressive symptoms.

In the initial period after diagnosis, approximately one-fourth (24%) of cancer patients report depressive symptoms, although the rates of these symptoms vary widely–from 1% to 50% (McDaniel et al., 1995). Over time, a number of studies found a decrease in depressive symptoms in the year after diagnosis (Chaturvedi & Maguire, 1998; Fallowfield et al., 1990; Goldberg et al., 1992; Nordin & Glimelius, 1999), whereas other studies found no significant decrease in depressive symptoms over time (Omne-Ponten et al., 1992; Vinokur et al., 1990). Furthermore, a significant minority of cancer patients, ranging from 15% to 30%, apparently continues to experience depressive symptoms one year after diagnosis (Fallowfield et al., 1990; Goldberg et al., 1992; Grassi et al., 1997). Interpreting the variability in the results about the presence and course of depressive symptoms is difficult because the studies vary by medical factors (e.g., site, stage, treatment, hospitalization status, time since diagnosis), study cohort (e.g., gender, age), definition of depression (syndrome versus symptom), and diagnostic method (self-report versus interview) (DeFlorio & Massie, 1995; McDaniel & Nemeroff, 1993). Nevertheless, the studies clearly demonstrate that depressive symptoms are common among recently diagnosed cancer patients.

Limitation of Previous Studies

A limitation of most previous studies on depressive symptoms among cancer patients is the lack of a reference group of individuals without cancer from the general population. The inclusion of such a reference group is needed to examine the magnitude of depressive symptoms among patients, taking into account the fact that depressive symptoms also are prevalent in the general population (Blazer et al., 1994).

A few studies included a reference group of individuals from the general population, but the results were inconsistent. Dean (1987) found that cancer patients were significantly more depressed than controls were, whereas Groenvold et al. (1999) found that the proportion of cases of depression in patients and controls was not significantly differ-

ent. In their meta-analysis of 58 studies on psychological problems among cancer patients, van't Spijker, Trijsburg, and Duivenvoorden (1997) found that patients were significantly more depressed in the first months after diagnosis compared with the general population. The conflicting results of these studies provide only limited information about the magnitude of depressive symptoms in response to a cancer diagnosis.

Little is known about the extent to which depressive symptoms in cancer patients are the result of the diagnosis or reflect premorbid psychological dysfunction. Furthermore, if patients develop depressive symptoms as a response to the diagnosis, what happens in the year after diagnosis, when they have completed treatment and returned home? Do they continue to experience elevated levels of depressive symptoms? Clearly, these questions need further investigation.

Sociodemographic Factors and Depressive Symptoms

Because sociodemographic factors have been related to depressive symptoms in the general population, including such a reference group also is useful when examining the role of sociodemographic factors in the onset and course of depressive symptoms after a diagnosis of cancer. In general, women, people between the ages of 20 and 50, people with less education, and people who are separated, divorced, or widowed are more prone to develop depressive symptoms than are their counterparts (Adler et al., 1994; Bebbington et al., 1998; Blazer et al., 1994; Kaplan, Sadock, & Grebb, 1994). Therefore, it is not surprising that sociodemographic factors also have been associated with depressive symptoms in cancer patients. For instance, several studies found that female patients reported similar or higher levels of depressive symptoms than male patients did (Baider, Perez, & De-Nour, 1989; DeFlorio & Massie, 1995; Greimel, Padilla, & Grant, 1998; Liang et al., 1990; Rodrigue, 1994). Furthermore, younger patients seemed to experience more depressive symptoms and psychological problems than older patients did (Compas et al., 1999; Pasacreta, 1997; Vinokur et al., 1990; Wenzel et al., 1999). However, a few studies failed to find this relationship between age and depressive symptoms (Derogatis et al., 1983; Maunsell, Brisson, & Deschenes, 1992; Rodrigue, 1994).

Interestingly, in contrast to findings in the general population, level of education and marital status seemed to be weakly related to depressive symptoms in cancer patients during the initial period after diagnosis and one year later (Maunsell, Brisson, & Deschenes, 1992; Omne-Ponten et

al., 1992). Thus, a higher education and having a partner does not seem to buffer cancer patients against the negative consequences of the diagnosis. Because most previous studies lacked a reference group from the general population, little is known about whether certain sociodemographic factors place people at a higher risk for developing depressive symptoms after a cancer diagnosis or whether such factors primarily reflect morbidity in the general population.

Medical Factors and Depressive Symptoms

The relationship between medical factors, such as cancer site, stage, and treatment, and depressive symptoms also has been examined frequently (e.g., Loge et al., 1997; van't Spijker, Trijsburg, & Duivenvoorden, 1997). For instance, patients with certain cancers (e.g., pancreatic cancer) have reported elevated levels of depressive symptoms compared with patients with breast, colon, and gynecological cancers (McDaniel et al., 1995; Newport & Nemeroff, 1998). However, Given, Given, and Stommel (1994) found no significant differences in depressive symptoms among patients with breast, colon, gynecologic, prostate, and lung cancers and lymphoma.

Regarding stage of disease, most studies did not find elevated levels of psychological distress among patients with advanced disease in the first year after diagnosis, compared with patients with earlier-stage disease (Ell et al., 1989; Hoskins, 1997; Maunsell et al., 1992). Regarding treatment, patients treated with chemotherapy reported elevated levels of depressive symptoms in the first months after diagnosis (Hoskins, 1997; Maguire et al., 1980). However, Pasacreta (1997) found no significant difference in depressive symptoms between patients treated with or without chemotherapy.

Patients' medical characteristics are likely to be strongly related to their sociodemographic characteristics (Coebergh, Van der Heijden, & Janssen-Heijnen, 1995; Schaapveld & Otter, 1998). For instance, breast cancer is found primarily in female patients and often is diagnosed at an earlier age (age 45 to 75 years) than is colorectal cancer, for example (age 60 years or older). These strong interrelationships may cause problems when attempting to interpret the associations of sociodemographic and medical factors with depressive symptoms. For instance, when a relationship is found between gender and depressive symptoms, it may be confounded by age and site. Most studies of cancer patients have not systematically examined both sociodemographic and medical factors in relation to depressive symptoms (Ford, Lewis, & Fallowfield, 1995).

Finally, to provide more insight into the onset of depressive symptoms after a cancer diagnosis, we conducted a longitudinal study in a large group of newly diagnosed cancer patients and an age-and gender-matched reference group of people without cancer from the general population. The goals of the study were fourfold:

- to examine the extent to which cancer patients reported more depressive symptoms at 3 and 15 months after diagnosis than did members of the reference group,
- to explore the relationships between the sociodemographic factors and the presence and course of depressive symptoms in patients and references and differences in these associations between the two groups,
- to explore the relationships between the medical factors and the presence and course of depressive symptoms in patients, and
- to examine the interrelationships among the medical and sociodemographic factors and whether sociodemographic and medical factors were independently related to the presence and course of depressive symptoms in patients.

METHODS

Procedures

The data for the present study were collected as part of a longitudinal study on the quality of life of cancer patients in the year after diagnosis (De Ruiter, 1995). Patients were recruited from 12 hospitals in the northern part of The Netherlands with the assistance of the Dutch Cancer Registration of the Comprehensive Cancer Centre North Netherlands. Patients were selected on the basis of site and stage of disease. The criteria for inclusion in the study were as follows: (1) age 18 years or older, (2) newly diagnosed with cancer, (3) no distant metastases, (4) a life expectancy of at least one year, and (5) informed about the diagnosis. A letter containing information about the project and a participation form were attached to the eligible patients' medical records, and the patients' physicians approached them regarding participation in the study. Patients who agreed to participate were interviewed and filled out a questionnaire at three points: 3 months, 9 months, and 15 months after diagnosis.

Members of the reference group were selected from the register offices of five townships in which the patients lived. These people were matched at the group level on age and gender with the patient group. They also were interviewed and completed the questionnaire at the same intervals as the patients.

In the present study, we focused on the interviews at 3 and 15 months after diagnosis, hereafter labeled Time 1 and Time 2. These two points in the course of the illness are believed to capture the period of crisis (3 months) and short-term adjustment to cancer (15 months).

Over a period of two years, 516 patients returned the participation form. Because the number of patients who actually received a participation form from their physician was not registered consistently, information on the exact response rate is not available. At Time 1, 475 of the 516 patients (92%) entered the study; at Time 2, 403 of the 475 patients (85%) participated. The main reasons for dropping out after submitting the participation form were serious illness and death.

According to the distribution of gender and age in the patient group, 559 reference individuals were selected and received a participation form. At Time 1, 255 of them (46%) entered the study; at Time 2, 225 of the 255 (88%) participated. The main reasons for dropping out were unwillingness to participate, inability to find them, or incomplete questionnaire data.

In the analyses of the present study, we only included patients and references who participated at both time periods. Comparisons between the patients who completed the study and those who dropped out after Time 1 showed that patients who had lung or colorectal cancer, had Stage III or IV disease, were treated with chemotherapy (with or without surgery) or radiotherapy ($p < .01$), and were male, older, and less educated ($p < .05$) were more likely to have dropped out. Obviously, patients with a poor prognosis tended to drop out more often than other patients did. However, we found no significant differences in the level of depressive symptoms between patients who participated at both time points and those who dropped out after Time 1. Comparisons between members of the reference group who completed the study and those who dropped out revealed no significant differences regarding sociodemographic factors or depressive symptoms.

Measures

Depressive symptoms. The Center for Epidemiologic Studies-Depression (CES-D) scale is a 20-item self-report instrument of depres-

sive symptoms (Radloff, 1977; Weissman et al., 1977). In the present study, we used a total score based on the 16 negatively formulated items on the scale. In a previous study, we found that a total score based on the 16 negatively formulated items, excluding the 4 positively formulated items, was a more valid measure of depressive symptoms in both cancer patients and healthy individuals (Schroevers et al., 2000). A score of 10 or higher was defined as an indicator of possible caseness of depression (i.e., more than one standard deviation above the mean score in the reference group). In the present study, Cronbach's alphas were .86 and .84 in the patient and reference group, respectively.

Sociodemographic and medical factors. Sociodemographic factors (gender, age, education, and marital status) were collected in a semistructured interview. For the analyses in the present study, we classified age into three groups: 18 to 44 years, 45 to 64 years, and 65 years or older, thus making a distinction between mature adults, older adults, and aging adults (Rowland, 1989). Education was classified into four groups: primary, lower vocational or secondary, middle vocational or secondary, and higher vocational or university. Marital status was dichotomized into two groups: having a partner (i.e., married or cohabited) or not having a partner (i.e., widowed, divorced, or single).

Medical data (site, stage, and treatment) were derived from the cancer registration from the Comprehensive Cancer Centre North Netherlands. According to the tumor node metastasis (TNM) classification of malignant tumor, the stage is based on the tumor's size and the presence of local or distant metastases and may range from Stage I to Stage IV disease (Hermanek & Sobin, 1992). Because only a few patients in the present study were diagnosed with Stage IV disease, we combined patients with Stages III and IV into one group. Treatment was classified into the following categories: surgery only; surgery and radiotherapy; surgery and chemotherapy; surgery, radiotherapy, and chemotherapy; surgery and hormonal therapy, surgery, radiotherapy, and hormonal therapy; and other (e.g., radiotherapy only).

RESULTS

Characteristics of the Sample

The characteristics of the sample are described in Table 1. The majority of members of the patient and reference groups were female, were less educated, and had a partner. The patients' average age was 58.0

TABLE 1. Sociodemographic Characteristics of the Patient and Reference Groups[a]

Characteristic	Patients (*n* = 403)		References (*n* = 225)	
	Number	Percentage	Number	Percentage
Gender				
Female	295	73	157	70
Male	108	27	68	30
Age (years)				
18-44	84	21	50	22
45-64	168	42	97	43
65 or older	151	37	78	35
Marital status				
Partner	310	77	172	76
No partner	92	23	53	24
Education				
Primary	153	39	79	36
Lower vocational/secondary	155	39	77	35
Middle vocational/secondary	46	12	36	16
Higher vocational/university	39	10	29	13

[a]Differences between the patient and reference groups were not significant (*p* < .05).

years (*SD* = 14.3 years), and the average age of the reference group was 57.4 years (*SD* = 15.2 years). Student's *t*-tests indicated no significant differences in age between the two groups, and Pearson chi-square analyses revealed no significant differences in gender, education, and marital status.

Regarding the patients' medical characteristics, the two most important cancers were breast cancer (47%) and colorectal cancer (27%) (see Table 2). The majority of patients (89%) were diagnosed with Stage I or II disease, indicating a relatively good prognosis. Most of them were treated with surgery alone (48%) or surgery and radiotherapy (22%).

Presence and Course of Depressive Symptoms

To investigate our first research question, Student's *t*-tests were used to examine mean differences in depressive symptoms at Times 1 and 2 between the patient and reference groups. We used paired *t*-tests to examine the course of depressive symptoms over time within each group separately. Repeated measures analysis, with the patient or reference

TABLE 2. Medical Characteristics of the Patient Group ($N = 403$)

Characteristic	Number	Percentage
Type of cancer		
Breast	189	47
Colorectal	107	27
Gynecological	62	16
Lung	29	7
Other	11	3
Stage of disease		
I	165	45
II	161	44
III or IV	40	11
Initial treatment		
Surgery only	195	48
Surgery and radiotherapy	88	22
Surgery and chemotherapy	29	7
Surgery, radiotherapy, and hormonal therapy	29	7
Surgery, radiotherapy, and chemotherapy	25	6
Surgery and hormonal therapy	15	4
Other	22	6

group as a between-subjects variable and time (i.e., depressive symptoms at Times 1 and 2) as a within-subjects variable, were performed to examine differences in the course of depressive symptoms between the two groups. Mean scores of depressive symptoms in the reference group were similar to those identified by other studies in the general population (Bouma et al., 1995; Hann, Winter, & Jacobsen, 1999).

As Table 3 indicates, patients reported significantly more depressive symptoms at Time 1 and Time 2 after diagnosis than members of the reference group did (Time 1: $t = 4.44$, $p < .001$; Time 2: $t = 2.93$, $p < .01$).[1] Over time, patients showed a significant decrease in depressive symptoms in the year after diagnosis ($t = 4.19$, $p < .001$). However, the results from the repeated measures analysis showed only a small, nearly significant difference between patients and references in the course of depressive symptoms over time (time $\times$ group, $F[1,619] = 3.52$, $p = .06$). In other words, no significant differences between the two groups in the course of depressive symptoms were found over time.

At an intraindividual level, we found strong correlations between depressive symptoms at Times 1 and 2 in patients ($r = .68$) and in references ($r = .55$) ($p < .001$). Thus, there was some individual variation in the course of depressive symptoms over time.

TABLE 3. Mean Scores of the Patient Group on the CES-D Scale[a] at Times 1 and 2 versus the Reference Group[b]

Group	Time 1	Time 2
	Mean (*SD*)	Mean (*SD*)
Patient group	6.09 (6.00)***	5.17 (6.36)**
Reference group	4.13 (4.81)	3.86 (4.66)

[a]Center for Epidemiologic Studies-Depression scale.
[b]*T*-test between the patient and reference groups:
**$p < .01$, ***$p < .001$.

The examination of the percentage of possible cases of depression, using Pearson chi-square analysis, revealed a similar picture. Compared with the reference group, a significantly higher percentage of the patients was classified as having a possible case of depression at Time 1 (23% of patients versus 12% of references: $\chi^2 = 10.43$, $p < .01$) and at Time 2 (18% of patients versus 10% of references: $\chi^2 = 7.65$, $p < .01$).

To examine the course of possible cases of depression over time, we determined four groups of people: (1) noncases at both Time 1 and Time 2, (2) possible cases at both Time 1 and Time 2, (3) possible cases at Time 1 only, and (4) possible cases at Time 2 only. The majority of patients (71%) and references (83%) were noncases at both time points. However, the percentage of possible cases at both time points was twice as high among patients (11%) as among references (5%). In addition, the percentage of possible cases at Time 1 only (thus, these people improved over time) was higher among patients (11%) than among references (7%). This finding is in line with the previous findings, which showed a smaller number of possible cases among patients at Time 2 compared to Time 1. Finally, 7% of patients and 5% of references were classified as possible cases of depressive symptoms at Time 2 only (thus, these people worsened over time).

### Sociodemographic Factors and Depressive Symptoms

To investigate our second research question, we used analyses of variance (ANOVAs) to examine the relationships between sociodemographic factors and the presence of depressive symptoms in the patient and the reference group separately. To examine differences between the two groups in these relationships, additional ANOVAs were performed in the total sample, using group (patients or references), one socio-

demographic factor, and the interaction of group $\times$ sociodemographic factor as the independent factors. A significant interaction indicated that the relationship between the sociodemographic factor and depressive symptoms differed significantly for patients and references.

Gender. Gender was significantly related to depressive symptoms in both groups, indicating that women reported significantly more depressive symptoms than men did (patients at Time 1: $F[1,398] = 21.18$; at Time 2: $F[1,399] = 11.07$; $p < .001$, and references at Time 1: $F[1,223] = 5.10$; at Time 2: $F[1,221] = 4.60$, $p < .05$). We found no significant differences between patients and references in the relationship between gender and depressive symptoms, as indicated by a nonsignificant group $\times$ gender interaction at Times 1 and 2 (Figure 1). That is, a cancer diagnosis did not change the likelihood that women would report either more or less depressive symptoms compared to men.

Age. Age was significantly related to depressive symptoms at Time 1 only in the patient group ($F[2,397] = 8.49$, $p < .001$) and was nearly significant at Time 2 ($F[2,398] = 2.88$, $p = .06$). Pairwise comparisons showed that patients younger than 65 years reported significantly more

FIGURE 1. Mean scores for depressive symptoms among male and female patients ■ and age-matched members of the reference group □ at Times 1 and 2.
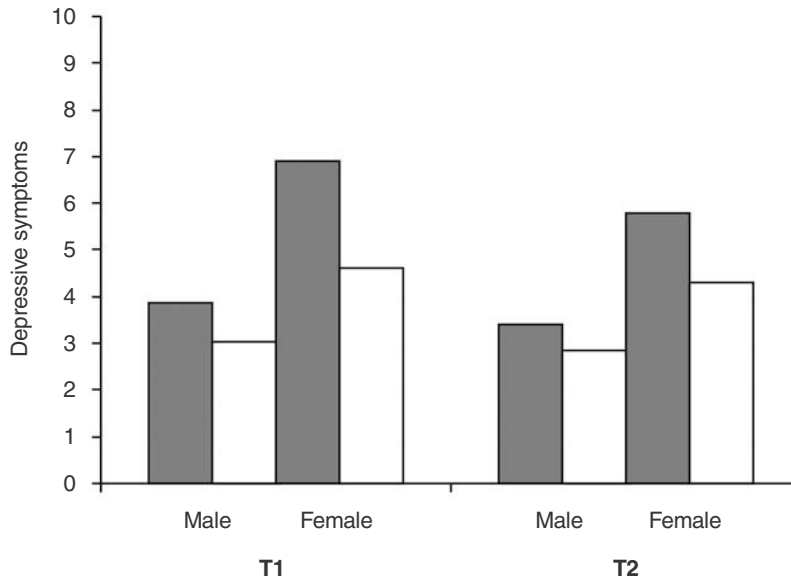
depressive symptoms than did patients aged 65 or older ($p < .001$). The finding that a younger age was related to higher levels of depressive symptoms only in the patient group was confirmed by a significant group $\times$ age interaction in the total group at both Time 1 (group $\times$ age: $F[2,619]) = 8.08$; $p < .001$) and Time 2 (group $\times$ age: $F[2,618] = 3.31$; $p < .05$). As Figure 2 shows, younger patients reported more depressive symptoms than did younger references, whereas older patients and references reported similar levels of depressive symptoms.

Education. Education was not significantly related to depressive symptoms in either the patient group or the reference group. We also found no significant differences between the two groups in this relationship between education and depressive symptoms (Figure 3).

Marital status. Marital status was significantly related to depressive symptoms only in the reference group, showing that references without a partner reported significantly more depressive symptoms than those with a partner did (at Time 1: $F[1,223] = 15.28$, $p < .001$; at Time 2: $F[1,221] = 5.96$; $p < .05$). In contrast, cancer patients with or without a

FIGURE 2. Mean scores for depressive symptoms at Times 1 and 2 among patients ■ and references □ in the following age groups: younger than 45 years, 45 to 64 years, and 65 years or older.
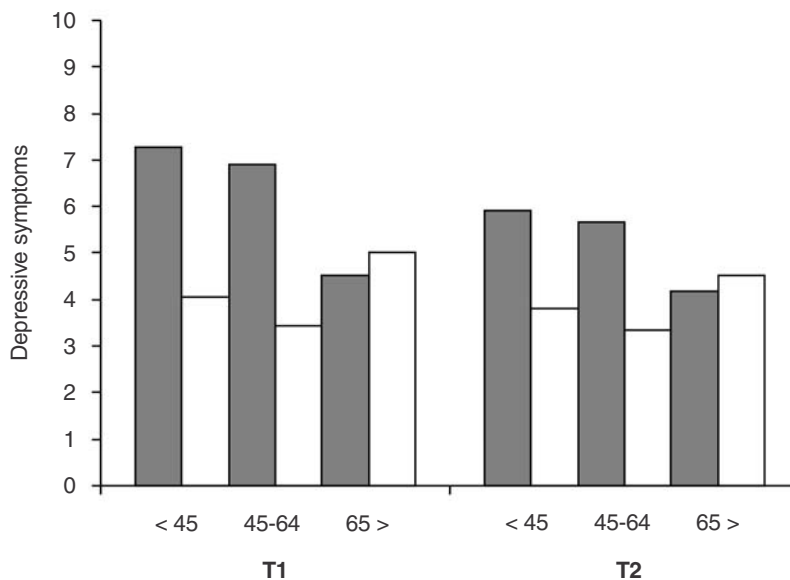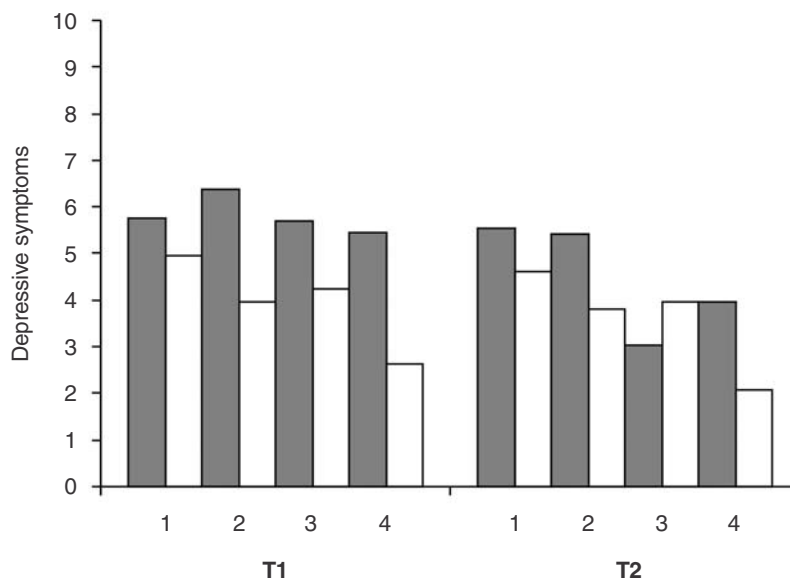
FIGURE 3. Mean scores for depressive symptoms at Times 1 and 2 among patients ■ and references □ with a primary education (Level 1), a lower vocational or secondary education (Level 2), a middle vocational or secondary education (Level 3), and a higher vocational or university education (Level 4).


partner reported similar levels of depressive symptoms. This difference between the patient and reference groups concerning the relationship between marital status and depressive symptoms was significant at Time 1 (group × marital status: $F[1, 620] = 4.90, p < .05$). Patients with a partner reported more depressive symptoms than references with a partner did, whereas patients and references without a partner reported similar levels of depressive symptoms (Figure 4).

Multivariate analyses including all four sociodemographic factors were performed to examine whether the sociodemographic factors were independently related to depressive symptoms in both groups. In addition to a significant main effect of gender ($F[1,594] = 10.94, p < .01$) and marital status ($F[1,594] = 7.02, p < .01$), we found a significant group × age interaction on depressive symptoms at Time 1 ($F[2,594] = 3.08, p < .05$). At Time 2, only gender had a main effect on depressive symptoms ($F[1,593] = 6.05, p < .05$).

Course of depressive symptoms. Repeated measures analyses were performed to examine the association of each sociodemographic factor

FIGURE 4. Mean scores for depressive symptoms at Times 1 and 2 among patients ■ and references □ with or without a partner.
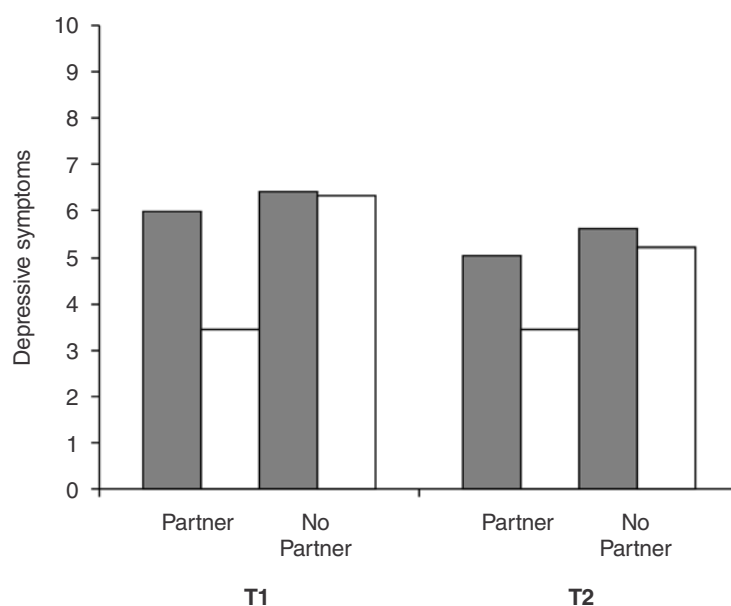
with the course of depressive symptoms. No sociodemographic factor was significantly related to the course of depressive symptoms in either group. In the patient group, we found a nearly significant relationship between education and the course of depressive symptoms ($F[3,384] = 2.56$, $p = .05$), indicating that patients with more education reported a greater decrease in depressive symptoms than did less educated patients. However, a comparison of patients and references showed no significant differences between the two groups in the relationships between the sociodemographic factors and the course of depressive symptoms.

Patients' Medical Factors and Depressive Symptoms

To investigate our third research question, we focused on the patient group and used ANOVAs to examine the relationship between medical factors and the presence of depressive symptoms (Table 4).

Cancer site. Site of the cancer was significantly related to depressive symptoms at Time 1 ($F[4,390] = 5.77$, $p < .001$) and Time 2 ($F[4,391] =$

TABLE 4. Patients' Mean Scores on the CES-D[a] at Times 1 and 2 According to Type and Stage of Cancer and Its Treatment (N = 403)

Medical Characteristic	Time 1 Mean (*SD*)	Time 2 Mean (*SD*)
Type of cancer		
Breast	7.12 (6.44)	6.15 (6.40)
Colorectal	4.40 (4.62)	3.30 (5.12)
Gynecological	7.10 (6.93)	5.42 (7.50)
Lung	3.68 (3.33)	5.10 (6.77)
Other	3.73 (4.00)	3.55 (5.97)
Stage of disease		
I	5.88 (6.02)	4.44 (6.16)
II	6.31 (6.00)	5.70 (6.51)
III or IV	4.95 (4.03)	4.95(5.52)
Treatment		
Surgery only	5.46 (6.58)	4.71 (6.70)
Surgery plus radiotherapy	6.66 (5.04)	4.76 (5.42)
Surgery plus chemotherapy	5.59 (4.72)	5.07 (6.72)
Surgery, radiotherapy, and hormonal therapy	8.61 (7.04)	7.00 (5.64)
Surgery, radiotherapy, and chemotherapy	7.16 (5.42)	5.92 (6.21)
Surgery and hormonal therapy	5.47 (4.60)	5.67 (6.59)
Other	5.95 (4.95)	7.36 (7.06)

[a]Center for Epidemiologic Studies-Depression scale.

3.65, $p < .01$). Pairwise comparisons showed that at Time 1, patients with breast or gynecological cancer reported more depressive symptoms than patients with colorectal or lung cancer did ($p < .01$). At Time 2, women with breast or gynecological cancer still reported significantly more depressive symptoms than patients with colorectal cancer did ($p < .05$).

Cancer stage and treatment. Stage of disease and type of treatment were not significantly related to depressive symptoms at either Time 1 or Time 2. There was a trend showing that certain types of treatment (e.g., the combination of radiotherapy and chemotherapy or hormonal therapy) were associated with relatively higher levels of depressive symptoms (Table 4). When we used multivariate analyses that included all three medical factors, cancer site was the only factor that was significantly related to depressive symptoms at Time 1 ($F[4,350] = 2.92$, $p < .05$) and Time 2 ($F[4,352] = 2.40$, $p = .05$).

Course of depressive symptoms. When repeated measures analyses were performed to examine the associations of each medical factor with

the course of depressive symptoms, no medical factor was significantly related to the course of depressive symptoms. However, there were some trends indicating a small increase in depressive symptoms among patients with lung cancer, compared to a small decrease in these symptoms in patients with cancer at other sites. In addition, patients with Stage I disease and those treated with radiotherapy (with or without chemotherapy or hormonal therapy) reported a slightly greater decrease in depressive symptoms than did their counterparts.

Patients' Medical and Sociodemographic Factors and Depressive Symptoms

As we mentioned in the review of the literature, patients' medical characteristics are likely to be related to their sociodemographic characteristics. This section examines these relationships using chi-square analysis. As expected, we found significant relationships among site, stage, treatment, gender, and age ($p < .001$). Patients with breast (all female) or gynecological cancer had a mean age of 55 years, whereas patients with colorectal or lung cancer (the majority were male) had a mean age of 65 years. In addition, 83% of patients with gynecological cancer were diagnosed with Stage I disease, whereas 63% of patients with breast cancer, 64% with colorectal cancer, and 34% with lung cancer were diagnosed with Stage II disease or higher. Moreover, 83% of the patients with colorectal cancer were treated with surgery only, whereas 44% of patients with breast cancer and 53% with gynecological cancer also received radiotherapy, chemotherapy, or both.

Next, we examined whether patients' medical and sociodemographic factors were independently associated with the presence of depressive symptoms. MANOVAs including all sociodemographic and medical factors showed that only age was significantly related to depressive symptoms at Time 1 ($F[2,333]$, $p < .01$) and was nearly significant at Time 2 ($F[2,335]$, $p = .06$). These results are in line with the earlier analyses indicating that age was significantly related to depressive symptoms only in the patient group.

Repeated measures analysis showed that both stage of disease and education were independently significantly related to the course of depressive symptoms over time (cancer stage: $F[2,332]$; education: $F[3,332]$, $p < .05$). Pairwise comparisons showed a greater decrease in depressive symptoms among patients with Stage I disease, compared with those with Stage II disease or higher ($p < .05$). Moreover, patients

with more education reported a greater decrease than those with less education did ($p < .01$).

DISCUSSION

The results of the present study broaden our understanding of the magnitude of depressive symptoms in cancer patients and the role of sociodemographic and medical factors in several ways. First, the findings showed that, as a group, cancer patients reported significantly more depressive symptoms at 3 months after diagnosis than did a reference group of age-matched people without cancer from the general population. Despite a small decrease in patients' depressive symptoms over time, patients continued to report significantly more depressive symptoms 15 months after diagnosis than did the reference group.

Second, multivariate analyses revealed that three months after diagnosis, age was the only sociodemographic factor that was related differently in the patient and reference groups to the presence of depressive symptoms. This finding suggests that in the present sample, younger patients, especially, experienced depressive symptoms in response to a diagnosis of cancer.

Third, medical factors were not independently related to the presence of depressive symptoms when examined simultaneously with the sociodemographic factors. Fourth, we found that patients with more education and those with early stages of cancer reported a greater decrease in depressive symptoms over time.

The findings regarding the presence and course of depressive symptoms among the patients are in line with the findings in previous studies and suggest that a significant minority of cancer patients (approximately 20%) experience depressive symptoms that may persist until one year after diagnosis and initial treatment (McDaniel et al., 1995; Pasacreta, 1997). The findings clearly demonstrate that a diagnosis of cancer can be regarded as a life crisis that may shatter patients' basic assumptions regarding their life and future. For instance, the confrontation with the multiple physical and psychosocial strains may lead to feelings of loss regarding good physical health, independence, valued social roles, and, more fundamentally, one's sense of identity and the meaning of one's life. As a result, patients may feel depressed and lack joy and interest in daily activities.

Role of Sociodemographic Factors

The results also indicate that, at an intraindividual level, the amount of depressive symptoms is relatively stable over time in the year after diagnosis, particularly among cancer patients. These findings are in line with those of other studies and demonstrate the importance of the early identification of patients at increased risk of depressive symptoms as a response to cancer. Therefore, of particular interest is the finding that younger patients, especially, reported more depressive symptoms in the initial period after diagnosis compared with the reference group. Other studies also have stressed the importance of age for the adjustment to cancer (Northouse, 1994; Pasacreta, 1997; Wenzel et al., 1999).

Younger patients seem to perceive the cancer to be a greater threat to their lives (Vinokur et al., 1990) and to experience more intrusive thoughts about the disease than older patients do (Epping-Jordan et al., 1999; Wenzel et al., 1999). A possible explanation for these findings may be that, because cancer is usually a disease of the elderly, younger patients may anticipate it less; therefore, a diagnosis of cancer may be more disruptive and distressing to them. Thus, health care providers should monitor possible signs of depression carefully in younger cancer patients in the initial period after diagnosis. If treatment of depression is indicated, information about what tasks and future life goals are threatened or interrupted because of the diagnosis may provide insight into the psychological problems likely to result from the disease. That is, younger patients particularly may be confronted with the following issues: (1) uncertainty in planning the future and interruption of certain life goals and expectations, (2) infertility or sterility, diminished attractiveness, and problems in establishing or maintaining a sexual relationship, (3) a feeling of being different and isolated, facing unsatisfying social relationships, and being concerned about the impact of the disease on the partner and children, (4) a sense of physical vulnerability, increased dependency on others, and role reversals normally associated with ageing, and (5) heightened introspection and reflection, which may lead to despair about the meaningfulness of life (Rowland, 1989; Siegel, Gluhoski, & Gorey, 1999).

Regarding the other sociodemographic factors, multivariate comparisons revealed no significant differences between the patient and reference groups in the associations of gender, education, and marital status with depressive symptoms. For instance, similar to the findings by Baider et al. (1989), we found that female patients reported more depressive symptoms than male patients did, but this relationship between

gender and depressive symptoms was about equally strong in our reference group. These findings suggest that certain sociodemographic factors, such as gender, primarily may reflect premorbid psychological dysfunction rather than risk factors concerning the development of depressive symptoms in response to a cancer diagnosis.

These findings have certain practical implications. Apart from the possibility of identifying patients at increased risk of experiencing depressive symptoms, these findings also suggest that higher levels of depressive symptoms in some cancer patients are not so much cancer-specific but instead reflect general dysfunction, to some extent at least. Thus, for certain patients, general psychosocial care rather than cancer-specific psychosocial interventions may be more suitable.

Apart from the results of the multivariate analyses, bivariate analyses that showed a significant difference between the patient and reference groups regarding the relationship between marital status and depressive symptoms indicated that having a partner was related to lower levels of depressive symptoms only in the reference group. The weak relationship between marital status and depressive symptoms in the patient group also was reported by Maunsell et al. (1992) and Omne-Ponten et al. (1992). One possible explanation may be that confronting a diagnosis of a life-threatening disease, such as cancer, may challenge the emotional stability of an intimate relationship. Having a partner may not always or merely have beneficial effects on patients' psychological well-being (Manne, 1998; Penninx et al., 1998). Differences in marital quality are likely to play an important role, with poorer relationships conveying the same or greater risk as not being married (Coyne & Anderson, 1999; Pistrang & Barker, 1995; Rodrigue & Park, 1996). However, when gender, age, and education were controlled for in the present study, the significant difference between the patient and reference groups in the relationship between marital status and depressive symptoms disappeared. This relationship possibly was confounded by age.

Interestingly, education was not significantly related to depressive symptoms in either group. However, patients with a higher education reported a greater decrease in depressive symptoms over time than did less educated patients. In other words, although cancer patients, regardless of educational level, showed a similar initial reaction to the diagnosis of cancer, those with more education seemed to adjust better over time, possibly because they had more adequate access to social and personal resources (e.g., social support and feelings of control, optimism, and self-esteem) that helped them cope with the cancer and its treatment

(Thoits, 1995). The findings suggest that education may play an important role in recovering from depressive symptoms in cancer patients.

Role of Medical Factors

Regarding the role of medical factors in depressive symptoms, we found that only cancer site was related to the presence of depressive symptoms, with women with breast or gynecological cancer reporting relatively more depressive symptoms. However, this relationship between cancer site and depressive symptoms disappeared when examined simultaneously with the sociodemographic factors.

Interestingly, although a higher stage of disease was not significantly related to higher levels of depressive symptoms, we found that, when examined simultaneously with sociodemographic factors, patients with earlier stages of disease reported a greater decrease in depressive symptoms over time than did those with later stage disease.

Other studies also have demonstrated the overall weak relationship between medical factors and depressive symptoms (Ell et al., 1989; Given et al., 1994; Hoskins, 1997; Pasacreta, 1997). There are several possible explanations for this weak relationship.

First, subjective appraisal of the stressfulness of the situation may be more important than objective medical factors regarding the prognosis (Dunkel-Schetter et al., 1992). Second, we cannot be certain about the extent to which patients receive and understand medical information about the severity of the situation and their prognosis. Third, the presence of severe physical impairment may have a stronger impact on patients' functioning than do medical characteristics, such as treatment (Given, Lewis, & Stommel, 1994). A large number of physical problems may lead to more concerns about a recurrence and loss of confidence in one's own body, which consequently may lead to higher levels of depressive symptoms. Finally, because most studies, including the present study, focused on patients with a relatively good prognosis, it may be difficult to detect a significant effect of certain medical factors, such as advanced-stage disease or treatment with chemotherapy.

Limitations of the Study

Several limitations should be kept in mind when interpreting our results. First, it needs to be mentioned that no information was available about how many patients did not return the participation form. Furthermore, the majority of the patients were female, less educated, living

with a partner, and diagnosed with a relatively good prognosis. These factors may affect the validity of the findings.

Second, the moderate number of reference-group members who returned the participation form also may cause concern regarding the validity of the findings. Still, the finding that the levels of depressive symptoms in members of the reference group were comparable to levels in other samples of references from the general population underpins the representativeness of our reference group. Furthermore, the present study was the first to compare the level of depressive symptoms and its associations with sociodemographic factors in cancer patients with an age- and gender-matched reference group.

Third, we have made an effort to account for the strong interrelationships among the sociodemographic and medical characteristics. Still, the existence of these strong interrelationships (e.g., the overlap between gender and cancer site) preclude drawing definite conclusions regarding their associations with depressive symptoms.

CONCLUSION

This study demonstrates that a diagnosis of cancer may induce depressive symptoms–especially among younger patients. Additional research is needed to identify other risk factors for depressive symptoms in response to a cancer diagnosis, such as a lack of psychosocial resources (e.g., low perceptions of social support, self-esteem, optimism, and control), a past history of depression, and other coexisting stressful life events and chronic illnesses. This information may facilitate the early identification and monitoring of patients at increased risk for developing depressive symptoms after the diagnosis. Furthermore, psychosocial interventions targeted at patients at risk may prove to be more effective and able to prevent the development of severe depressive symptoms.

NOTE

1. Using the 20-item version of the CES-D, we found the following mean scores in the patient and reference groups, respectively: at Time 1: 9.82 and 7.79 ($p < .001$); at Time 2: 9.35 and 8.26 ($p = .07$). Using the original cutoff point of 16 as an indicator of possible caseness, we found the following percentages of possible cases in the patient and reference groups, respectively: at Time 1: 18% and 10% ($p < .01$); at Time 2: 18% and 12% ($p = .06$).

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