

3

Depressive symptoms in cancer patients compared to individuals from the general population: the role of sociodemographic and medical factors

Abstract

This study examined: (1) depressive symptoms in cancer patients (n = 475) and a reference group of individuals without cancer from the general population (n = 255), and (2) their associations with sociodemographic and medical factors. Depressive symptoms were measured at 3 months (T1) and 15 months (T2) after diagnosis. Patients reported more depressive symptoms than references at T1 and T2.

Especially a younger age was related to the onset of depressive symptoms after a diagnosis of cancer. Higher educated patients and those with a lower stage of disease reported a greater decrease in depressive symptoms over time. Possible problems and solutions regarding the recognition and treatment of depressive symptoms in cancer patients are discussed.

Accepted pending revision:

Schroevers, M.J., Ranchor, A.V., & Sanderman, R. (2002). Depressive symptoms in cancer patients compared to individuals from the general population: the role of sociodemographic and medical factors. Journal of Psychosocial Oncology.

Introduction

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

The recognition and treatment of depressive symptoms in cancer patients is of crucial importance, since these symptoms may adversely affect patients' quality of life, compliance with treatment, the length of hospital stay, the ability to care for oneself, and perhaps even disease progression (McDaniel et al., 1995). Among cancer patients, however, the recognition of depressive symptoms is often hampered for several reasons (Kathol et al., 1990a; Kathol et al., 1990b). First, depressive symptoms are often an appropriate and normal reaction to a life-threatening event such as a diagnosis of cancer. In addition, somatic symptoms of depression, such as fatigue, weight loss, and sleep problems, may resemble symptoms of cancer or side-effects of its treatment. Patients may also find it difficult to disclose emotional problems with their doctor or nurses and, on the other hand, doctors and nurses may be reluctant and lack time and communication skills to probe into psychological problems (Maguire et al., 1980). Information about the risk factors related to an increased vulnerability to depressive symptoms may facilitate the early recognition, monitoring and treatment of high-risk patients (Sheard & Maguire, 1999). Important predictors of depressive symptoms in cancer patients include *sociodemographic* factors (such as gender, age, education, and marital status) and *medical* factors (such as cancer site, stage, and type of treatment) (Breitbart, 1995; Jacobsen et al., 1998; Moos & Schaefer, 1984; Van 't Spijker et al., 1997). Since these factors are known at diagnosis and unlikely to be modifiable, they may be particular useful markers for the identification of patients at high-risk for depressive symptoms.

In the initial period after diagnosis, about a quarter (24%) of cancer patients report depressive symptoms, although there exists a wide variability in the rates of these symptoms among studies that have examined the prevalence of depressive symptoms in cancer patients, ranging from 1% to 50% (McDaniel et al., 1995). Over time, many 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). Some studies, however, 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%, seems to continue to experience depressive symptoms up to 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, hospitalisation 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, they clearly demonstrate that depressive symptoms are common in recently diagnosed cancer patients.

A limitation of most previous studies on depressive symptoms in 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 in cancer patients, hereby taking into account that depressive symptoms are also prevalent in the general population (Blazer et al., 1994). A few empirical studies among cancer patients included a reference group of individuals from the general population, but the results of these studies are inconsistent (Dean, 1987; Groenvold et al., 1999). Dean (1987) found that cancer patients were significantly more depressed than controls, whereas Groenvold et al. (1999) found that the proportion of cases of depression in patients and controls was not significantly different. A recent meta-analysis of 58 studies among cancer patients on psychological problems found that patients were significantly more depressed in the first months after diagnosis, in comparison with the general population (Van 't Spijker et al., 1997). In sum, the conflicting results of these studies provide only limited information about the magnitude of depressive symptoms as a response to a diagnosis of cancer. Still, little is known about to what extent depressive symptoms in cancer patients are the result of the diagnosis *or* reflect premorbid (general) psychological dysfunction. Furthermore, if cancer patients develop depressive symptoms as a response to the diagnosis, what happens in the year after diagnosis, when they have finished treatment and returned home? Do they continue to experience elevated levels of depressive symptoms? Clearly, these issues need further investigation. Therefore, the first purpose of the present study is to examine the presence and course of depressive symptoms in cancer patients, in comparison with a gender- and age-matched reference group of individuals from the general population at 3 and 15 months after diagnosis.

The inclusion of such a reference group is also useful when examining the role of sociodemographic factors in the onset and course of depressive symptoms after a diagnosis of cancer. That is, sociodemographic factors have also been related to depressive symptoms in the general population. In general, women, persons in the age of 20 and 50, persons with a lower education, and those without a partner (separated, widowed, or divorced) are more at risk of

developing depressive symptoms, compared to their counterparts (Adler et al., 1994; Bebbington et al., 1998; Blazer et al., 1994; Kaplan et al., 1994). It is not surprising, therefore, that sociodemographic factors have also been associated with depressive symptoms in cancer patients. For instance, it has been found that female patients reported similar (DeFlorio & Massie, 1995; Greimel et al., 1998; Rodrigue, 1994) or higher levels of depressive symptoms than male patients (Baider et al., 1989; Liang et al., 1990). Furthermore, younger cancer patients seem to experience more depressive symptoms and psychological problems than older patients (Compas et al., 1999; Ganz et al., 1992; Pasacreta, 1997; Vinokur et al., 1990; Wenzel et al., 1999). A few studies, however, failed to find this relationship between age and depressive symptoms (Derogatis et al., 1983; Maunsell et al., 1992; Rodrigue, 1994).

Interestingly, in contrast to findings in the general population, education and marital status seem to be weakly related to depressive symptoms in cancer patients, both in the initial period after diagnosis and one year thereafter (Maunsell et al., 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 a diagnosis of cancer.

In sum, since most previous studies among cancer patients lack of reference group from the general population, little is known about whether certain sociodemographic factors place people at a higher risk of developing depressive symptoms after a diagnosis of cancer *or* whether they primarily reflect morbidity in the general population. Therefore, the second purpose of the present study was to examine differences between the patient and reference group in the relationships between sociodemographic factors and the presence and course of depressive symptoms.

Medical factors such as cancer site, stage, and treatment have also been frequently examined in relationship with depressive symptoms (Loge et al., 1997; Van 't Spijker et al., 1997). For instance, patients with certain cancer sites such as pancreatic cancer have been found to report elevated levels of depressive symptoms, compared to patients with breast, colon, and gynaecological cancer (McDaniel et al., 1995; Newport & Nemeroff, 1998). However, Given, Given & Stommel (1994) found no significant differences in depressive symptoms between patients with breast, colon, gynaecologic, prostate, lung, and lymphoma cancer. Regarding stage, most studies did not find elevated levels of psychological distress in patients with an advanced stage in the first year after diagnosis, compared to those with a low stage (Ell et al., 1989; Hoskins, 1997; Maunsell et al., 1992). Regarding treatment, it has been found that patients treated with chemotherapy reported elevated levels of depressive symptoms in the first months after diagnosis (Hoskins, 1997; Maguire et al., 1980). Pasacreta (1997), however, found no significant difference in depressive symptoms between patients treated with or without chemotherapy.

The forementioned medical characteristics of patients are likely to be strongly related to their sociodemographic characteristics (Coebergh et al., 1995; Schaapveld & Otter, 1998). For instance, breast cancer is primarily found in female patients and often diagnosed at an earlier age (i.e. 45 to 75 years old) than, for instance, colorectal cancer (i.e. 60 years or older). These strong interrelationships may cause problems in the interpretation of the associations of sociodemographic and medical factors with depressive symptoms. For instance, when a relationship is found between gender and depressive symptoms, this relationship may be confounded by age and site. Most studies among cancer patients have not systematically examined both sociodemographic and medical factors in relationship to depressive symptoms (Ford et al., 1995). Therefore, the third purpose of the present study was to examine, within the patient group, the relationships among the sociodemographic and medical factors and the independent effects of sociodemographic and medical factors on the presence and course of depressive symptoms.

In conclusion, in order to provide more insight in the onset of depressive symptoms after a diagnosis of cancer, we conducted a longitudinal study in a large group of newly diagnosed cancer patients and an age- and gender-matched reference group of individuals without cancer from the general population. The first purpose of the study was to examine to what extent cancer patients report more depressive symptoms at 3 and 15 months after diagnosis than references. A second purpose was 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. A third purpose was to explore the relationships between the medical factors and the presence and course of depressive symptoms in cancer patients. Fourth, we examined 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 cancer patients.

Methods

Subjects and 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). Cancer 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 (CCCNN). Based on the cancer registration of the

CCCNN, patients were selected on the basis of cancer site and disease stage. The inclusion criteria for study participation were: (a) age 18 years or older, (b) newly diagnosed with cancer, (c) no distant metastases, (d) a life expectancy of at least one year, and (e) informed on the diagnosis of cancer. A letter containing information about the project and a participation form was attached to the patients' medical status and patients were approached for participation in the study by their doctor. Patients were interviewed and filled in a questionnaire at three points in time: at 3 months, at 9 months, and at 15 months after diagnosis. The references were selected from the register office of five townships in the same region as the patients. These individuals without cancer from the general population were matched at group level on age and gender with the patient group. These references were also interviewed and filled in a questionnaire at three points in time with the same intervals as patients. In the present study, we focused on the interview at 3 and 15 months after diagnosis, hereafter labelled as T1 and T2. 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. It has not been registered consistently how many cancer patients actually received a participation form by their medical specialist. Therefore, information on the exact response rate is not available. At three months after diagnosis (T1), 475 (92% of the 516) entered the study and 403 patients (85% of 475) also participated at 15 months after diagnosis (T2). The main reasons for drop out were serious illness and death. Based on the gender and age distribution of the patient group, 559 references were selected and sent a participation form. At T1, 255 (46% of 559) entered the study and 225 references (88% of 255) participated also at T2. The main reasons for drop out were unwillingness to participate, the impossibility to locate references, or incomplete questionnaire data.

In the analyses of the present study, we included those cancer patients and references who participated both at 3 months and at 15 months after diagnosis (T1 and T2, respectively). Comparisons between the patients who were included and those who dropped out after T1 showed that patients with lung or colorectal cancer, those with stage III or IV, those treated with chemotherapy (with or without surgery) or radiotherapy ($p < .01$), and male, older, and lower educated patients ($p < .05$) were more likely to have dropped out of the study. Obviously, patients with a worse prognosis had dropped out of the study relatively more often. However, we found no significant differences in the level of depressive symptoms between patients who were included and those who dropped out. Comparisons between the references in the present study and those who dropped out revealed no significant differences on the sociodemographic factors, neither on depressive symptoms.

Measures

The Center for Epidemiologic Studies Depression (CES-D) scale is a 20-item self-report instrument of *depressive symptoms* (Radloff, 1977; Weissman et al., 1977). In the present study, we used a sumscore based on the 16 negatively formulated CES-D items. In a previous study, we found that a sumscore based on the 16 negatively formulated CES-D items, excluding the four positively formulated items, was a more valid measure of depressive symptoms, both in 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 S.D. above the mean score in the reference group). In the present study, Cronbach's alpha was .86 and .84 in the patient and reference group, respectively.

Sociodemographic factors (gender, age, education, and marital status) were collected in a semi-structured interview. For the analyses in the present study, we classified age into three groups: 18-44 years, 45-64 years, and 65 years or older, thus making a distinction between mature adults, older adults, and ageing adults, respectively (Rowland, 1989a). Education was classified into four groups: primary, lower vocational/secondary, middle vocational/secondary, and higher vocational/university. Marital status was dichotomised 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 Tumour Node Metastasis (TNM) classification of malignant tumour, the stage is based on the tumour size and the presence of local or distant metastases and may range from I to IV (Hermanek & Sobin, 1992). Since only a few patients in the present study were diagnosed with stage IV, we combined patients with stage III and IV into one group. Treatment was classified into the following categories: only surgery, surgery and radiotherapy, surgery and chemotherapy, surgery and radio- and chemotherapy, surgery and hormonal therapy, surgery and radio- and hormonal therapy, and other (e.g. only radiotherapy).

Results

Descriptives

The characteristics of the present sample are described in Table 1. The majority of the patient and reference group were female, lower educated, and having a partner. The average age of the patient group was 58.0 years (SD = 14.3 years) and that of the reference group 57.4 years (SD = 15.2 years). Using t-tests, we found no

significant differences between the two groups in age and Pearson Chi-square analyses revealed no significant differences in gender, education, and marital status.

Regarding the medical factors, the two most important cancer sites were breast cancer (47%) and colorectal cancer (27%). The majority of the patients (89%) were diagnosed with a stage I or II, indicating a relatively good prognosis. Most patients were treated with surgery only (48%) or surgery and radiotherapy (22%).

The 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 T1 and T2 between the patient and reference group. We used paired t-tests to examine the course of depressive symptoms over time *within* the patient and reference group.

Repeated measures analysis, with group (i.e. patient or reference) as a between-subjects variable and time (i.e. depressive symptoms at T1 and T2) as a within-subjects variable were performed to examine differences between the patient and reference group in the course of depressive symptoms. 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 et al., 1999).

Table 1. Sample characteristics

	Patient group (n = 403)		Reference group (n = 225)	
	n	%	n	%
Gender				
Female	295	73	157	70
Male	108	27	68	30
Age				
18-44	84	21	50	22
45-64	168	42	97	43
≥ 65	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
Cancer site				
Breast	189	47		
Colorectal	107	27		
Gynaecological	62	16		
Lung	29	7		
Other	11	3		
Stage				
I	165	45		
II	161	44		
III-IV	40	11		
Initial treatment				
Only surgery	195	48		
Surgery and radiotherapy	88	22		
Surgery and chemotherapy	29	7		
Surgery, radio- and chemotherapy	25	6		
Surgery and hormonal therapy	15	4		
Surgery, radio- and hormonal therapy	29	7		
Other	22	6		

Note. Comparisons between the patient and reference group were not significant ($p > .05$).

Table 2. Mean scores of depressive symptoms

	T1 Mean (SD)	T2 Mean (SD)
Patient group	6.09 (6.00) ***	5.17 (6.36) **
Reference group	4.13 (4.81)	3.86 (4.66)

Note. Independent t-test between the patient and reference group. *** $p < .001$; ** $p < .01$.

As can be seen in Table 2, cancer patients reported significantly more depressive symptoms at 3 months (T1) and 15 months (T2) after diagnosis than references (T1, $t = 4.44$, $p < .001$; T2, $t = 2.93$, $p < .01$)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 by group, $F(1, 619) = 3.52$, $p = .06$). In other words, there were no significant differences between the two groups in the course of depressive symptoms over time.

We found strong correlations between depressive symptoms at T1 and T2, in patients ($r = .68$) and in references ($r = .55$) ($p < .001$). This indicates that, at an intra-individual level, the amount of depressive symptoms was rather stable over time in the year after diagnosis, especially in patients.

The examination of the percentage of possible *cases* of depression, using Pearson Chi-square analysis, revealed a similar picture as above. Compared to the reference group, a significantly greater percentage of the patients was classified as a possible case of depression, at T1 (23% in patients versus 12% in references; $\chi^2 = 10.43$, $p < .01$) and at T2 (18% in patients versus 10% in references; $\chi^2 = 7.65$, $p < .01$). In order to examine the course of possible cases of depression over time, we determined four groups of persons:

(1) non-cases both at T1 and T2, (2) possible cases both at T1 and T2, (3) possible cases at T1 only, and (4) possible cases at T2 only. The majority of the patients (71%) and references (83%) were non-cases at both points in time. However, the percentage of possible cases at both points in time was twice as high in patients (11%) as in references (5%). In addition, the percentage of possible cases at T1 only (thus these persons improved over time) was higher in patients (11%) than in references (7%). This is in line with the findings above, which showed a

smaller number of possible cases in patients at T2, compared to T1. Finally, a number of patients (7%) and references (5%) were classified as a possible case at T2 only (thus these persons worsened over time).

Sociodemographic factors and depressive symptoms in patients and references

The presence of depressive symptoms

To investigate our second research question, we used analyses of variance to examine the relationships between sociodemographic factors and the presence of depressive symptoms, in the patient and reference group separately. In order to examine differences between the two groups in these relationships, additional analyses of variance were performed in the total sample, using group (i.e. patient or reference), one of the sociodemographic factors, and the interaction of group by the sociodemographic factor as the independent factors. A significant interaction indicates that the relationship between the sociodemographic factor and depressive symptoms differs significantly for patients and references.

Gender was in both groups significantly related to depressive symptoms, indicating that women reported significantly more depressive symptoms than men (patients, at T1, $F(1, 398) = 21.18$; at T2, $F(1, 399) = 11.07$, $p < .001$; references, at T1, $F(1, 223) = 5.10$; at T2, $F(1, 221) = 4.60$, $p < .05$). Comparisons between the patient and reference group revealed no significant differences in this relationship between gender and depressive symptoms (see Figure 1a). That is, a cancer diagnosis did not change the likelihood that women would report either more or less depressive symptoms, compared to men.

Age was only in the patient group significantly related to depressive symptoms at T1 ($F(2, 397) = 8.49$, $p < .001$) and nearly significant at T2 ($F(2, 398) = 2.88$, $p = .06$). Pairwise comparisons showed that patients younger than 65 years reported significantly more depressive symptoms than those of 65 years or older ($p < .001$). The finding that a younger age was only in the patient group related to higher levels of depressive symptoms was confirmed by a significant group by age interaction in the total group, both at T1 (group by age, $F(2, 619) = 8.08$, $p < .001$) and at T2 (group by age, $F(2, 618) = 3.31$, $p < .05$). Younger patients reported more depressive symptoms than younger references (see Figure 1b). Older patients and references reported similar levels of depressive symptoms.

Figure 1a. Mean scores of depressive symptoms in female and male patients and references

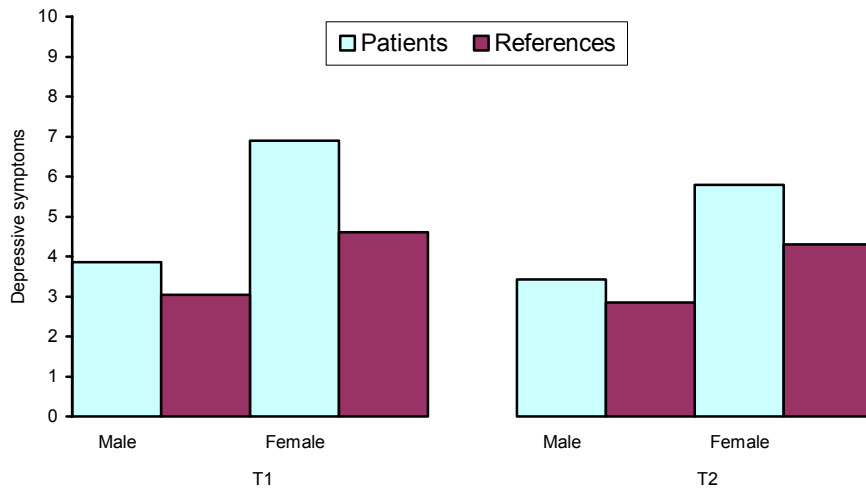


Figure 1b. Mean scores of depressive symptoms in patients and references in the following age-groups: younger than 45 years, 45 to 64 years, and 65 years or older, respectively

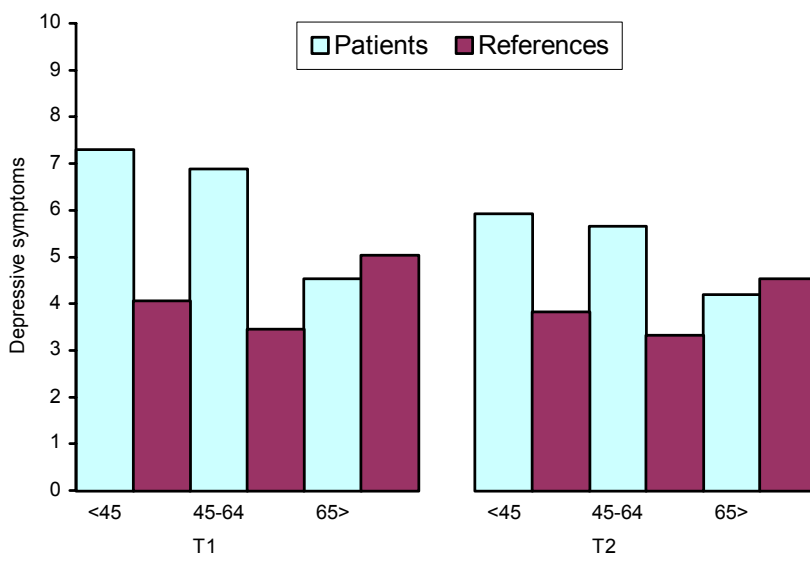


Figure 1c. Mean scores of depressive symptoms in patients and references with primary education (level 1), lower vocational/secondary education (level 2), middle vocational/secondary education (level 3), and higher vocational education/university (level 4), respectively.

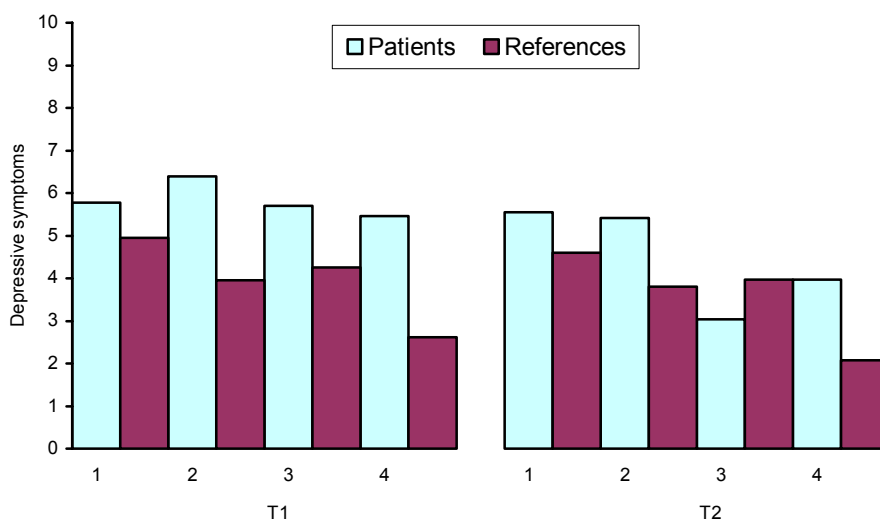
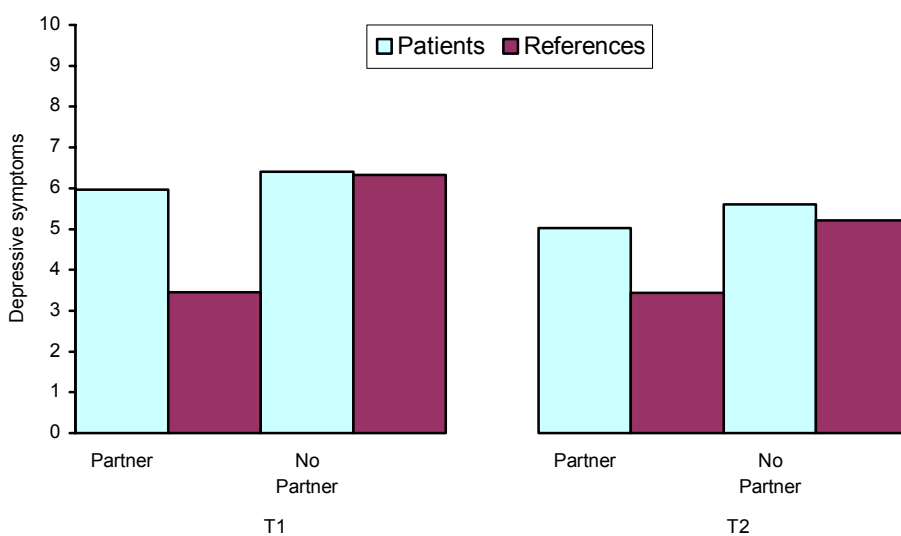


Figure 1d. Mean scores of depressive symptoms in patients and references with or without a partner.



Education was not significantly related to depressive symptoms, neither in the patient nor in the reference group. We also found no significant differences between the two groups in this relationship between education and depressive symptoms (see Figure 1c).

Marital status was only in the reference group significantly related to depressive symptoms, showing that references without a partner reported significantly more depressive symptoms than those with a partner (at T1, $F(1, 223) = 15.28, p < .001$; at T2, $F(1, 221) = 5.96, p < .05$). In contrast, cancer patients with or without a partner reported similar levels of depressive symptoms. This difference between the patient and reference group in the relationship between marital status and depressive symptoms was significant at T1 (group by marital status, $F(1, 620) = 4.90, p < .05$). As can be seen in Figure 1d, patients with a partner reported more depressive symptoms than reference subjects with a partner, whereas patients and reference subjects without a partner reported similar levels of depressive symptoms.

Multivariate analyses including all four sociodemographic factors were performed to examine whether the sociodemographic factors were independently related to depressive symptoms. Besides 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 by age interaction on depressive symptoms at T1 ($F(2, 594) = 3.08, p < .05$). At T2, only gender had a main effect on depressive symptoms ($F(1, 593) = 6.05, p < .05$).

The course of depressive symptoms

Repeated measures analyses were performed to examine the associations of each of the sociodemographic factors with the course of depressive symptoms. None of the sociodemographic factors was significantly related to the course of depressive symptoms, neither in the patient nor in the reference group.

In cancer patients, we found a nearly significant relationship between education and the course of depressive symptoms ($F(3, 384) = 2.56, p = .05$), indicating that higher educated patients reported a greater decrease in depressive symptoms than lower educated patients. However, comparisons 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.

Medical factors and depressive symptoms in patients

The presence of depressive symptoms

To investigate our third research question, we focused on the patient group and used analyses of variance to examine the relationship between medical factors and the presence of depressive symptoms (see Table 3).

Cancer site was significantly related to depressive symptoms, at T1 ($F(4, 390) = 5.77, p < .001$) and at T2 ($F(4, 391) = 3.65, p < .01$). Pairwise comparisons showed that, at T1, patients with breast or gynaecological cancer reported more depressive symptoms than patients with colorectal or lung cancer ($p < .01$). At T2, women with breast or gynaecological cancer still reported significantly more depressive symptoms than patients with colorectal cancer ($p < .05$).

Stage and *treatment* were not significantly related to depressive symptoms, neither at T1 nor at T2. As can be seen in Table 3, there was a

Table 3. Mean scores of depressive symptoms in the patient group, according to cancer site, stage, and treatment

	T1 Mean (SD)	T2 Mean (SD)
Cancer site		
Breast	7.12 (6.44)	6.15 (6.40)
Colorectal	4.40 (4.62)	3.30 (5.12)
Gynaecological	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		
Stage I	5.88 (6.02)	4.44 (6.16)
Stage II	6.31 (6.00)	5.70 (6.51)
Stage III-IV	4.95 (4.03)	4.95 (5.52)
Treatment		
Only surgery	5.46 (6.58)	4.71 (6.70)
Surgery and radiotherapy	6.66 (5.04)	4.76 (5.42)
Surgery and chemotherapy	5.59 (4.72)	5.07 (6.72)
Surgery, radio- and chemotherapy	7.16 (5.42)	5.92 (6.21)
Surgery and hormonal therapy	5.47 (4.60)	5.67 (6.59)
Surgery, radio- and hormonal therapy	8.61 (7.04)	7.00 (5.64)
Other	5.95 (4.95)	7.36 (7.06)

tendency showing that certain types of treatment (e.g. the combination

of radiotherapy and chemo- or hormonal therapy) were associated with relatively higher levels of depressive symptoms.

When using multivariate analyses including all three medical factors, cancer site was the only medical factor that was significantly related to depressive symptoms, at T1 ($F(4, 350) = 2.92, p < .05$) and T2 ($F(4, 352) = 2.40, p = .05$).

The course of depressive symptoms

Repeated measures analyses were performed to examine the associations of each of the medical factors with the course of depressive symptoms. However, none of the medical factors was significantly related to the course of depressive symptoms. There were some trends, indicating a small increase in depressive symptoms in lung cancer patients, compared to a small decrease in these symptoms in patients with other sites. In addition, patients with stage I and those treated with radiotherapy (with or without chemo- or hormonal therapy) reported a slightly greater decrease in depressive symptoms than their counterparts.

Medical and sociodemographic factors and depressive symptoms in patients

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

Next, we examined whether medical and sociodemographic factors were independently associated with the presence of depressive symptoms in patients. Multivariate analyses of variance including all sociodemographic and medical factors showed that only age was significantly related to depressive symptoms at T1 ($F(2, 333), p < .01$) and nearly significant at T2 ($F(2, 335), p = .06$). These results are in line with the earlier analyses, which indicated that age was significantly related to depressive symptoms in the patient group only.

Repeated measures analysis showed that both stage and education were independently significantly related to the course of depressive symptoms over time (stage, $F(2, 332)$; education, $F(3, 332)$, $p < .05$). Pairwise comparisons showed a greater decrease in depressive symptoms in patients with stage I, compared to stage II or higher ($p < .05$). Moreover, higher educated patients reported a greater decrease than those with a lower education ($p < .01$).

Discussion

The results of the present study broaden our understanding of the magnitude of depressive symptoms in cancer patients and the role of sociodemographic (gender, age, education, and marital status) and medical factors (site, stage, and treatment) herein in several ways. First, the findings showed that, as a group, cancer patients reported significantly more depressive symptoms at three months after diagnosis than age-matched references without cancer from the general population. Despite a small decrease in patients' depressive symptoms over time, patients continued to report significantly more depressive symptoms at 15 months after diagnosis than the reference group. Second, multivariate analyses revealed that, at three months after diagnosis, age was the only sociodemographic factor that was differently related to the presence of depressive symptoms in the patient and reference group. This suggests that, in the present sample, especially younger patients experience 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, regarding the course of depressive symptoms over time, we found that higher educated patients and those with a low stage reported a greater decrease in depressive symptoms over time.

The findings regarding the presence and course of depressive symptoms in cancer patients are in line with those of 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 may be regarded as a life crisis, which may shatter persons' basic assumptions about their life and future (Janoff-Bulman & Frieze, 1983). The confrontation with the multiple physical and psychosocial strains may lead to feelings of loss, for instance, of a good physical health and independency, valued social roles, and, more fundamental, of identity and the meaning of one's life. As a result, patients may feel depressed and a lack of joy and interest in daily activities. The results also indicated that, at an intra-individual level, the amount of depressive

symptoms was rather stable over time in the year after diagnosis, especially in 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 was the finding that not all cancer patients, but especially younger patients reported more depressive symptoms in the initial period after diagnosis, compared to the reference group. Other studies have also stressed the importance of patient's 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 experience more intrusive thoughts about the cancer, compared to older patients (Epping-Jordan et al., 1999; Wenzel et al., 1999). A possible explanation for these findings may be that, since cancer is usually a disease of the elderly, younger patients may be less anticipated and therefore, a diagnosis of cancer may be more disruptive and distressing at a younger age. Health care providers should carefully monitor possible signs of depression 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 as a result of the diagnosis of cancer may provide insight into the psychological problems likely to result from the disease. That is, younger patients may be particularly confronted with the following issues: (a) uncertainty in planning the future and interruption of certain life goals and expectations, (b) infertility or sterility, diminished attractiveness, and problems in establishing or maintaining a sexual relationship, (c) feeling different and isolated, confrontation with unsatisfying social relationships, and concerns about the impact of the disease on the partner and children, (d) a sense of physical vulnerability, increased dependency on others, and role reversals, normally associated with ageing, and (e) a heightened introspection and reflection, which may lead to despair about the meaningfulness of life (Rowland, 1989a; Siegel et al., 1999).

Regarding the other sociodemographic factors, multivariate comparisons revealed no significant differences between the patient and the reference group in the associations of gender, education, and marital status with depressive symptoms. For instance, similar to other studies, we found that female patients reported more depressive symptoms than male patients (Baider et al., 1989), but this relationship between gender and depressive symptoms was about equally strong in the reference group. These findings suggest that certain sociodemographic factors (such as gender) may primarily reflect pre-morbid psychological dysfunction rather than risk factors of developing depressive symptoms in response to a diagnosis of cancer. This finding has certain practical implications. Apart from the possibility of identifying patients at increased risk of depressive symptoms, this finding also

suggest that higher levels of depressive symptoms in some cancer patients are not so much cancer-specific but rather reflect, at least to some extent, general dysfunction. Thus for certain cancer patients, general psychosocial care rather than cancer-specific psychosocial interventions may be more suitable.

Apart from these multivariate analyses, bivariate analyses showed a significant difference between the patient and reference group in the relationship between marital status and depressive symptoms, indicating that marital status (i.e. having a partner) was only in the reference group related to lower levels of depressive symptoms. The weak relationship between marital status and depressive symptoms in cancer patients has also been reported by other studies (Maunsell et al., 1992; Omne-Ponten et al., 1992). A possible explanation for this finding may be that a diagnosis of a life-threatening disease such as cancer may present a challenge to 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). It is likely that differences in marital quality play an important role, with worse relationships conveying the same or a greater risk as not being married (Coyne & Anderson, 1999; Pistrang & Barker, 1995; Rodrigue & Park, 1996). However, when controlling for gender, age, and education, the significant difference between the two groups in the relationship between marital status and depressive symptoms disappeared. Possibly, this relationship was confounded by age.

Interestingly, education was not significantly related to depressive symptoms, neither in the patient nor in the reference group. However, patients with a higher education reported a greater decrease in depressive symptoms over time than lower educated patients. In other words, cancer patients, regardless education, showed a similar initial reaction to the diagnosis of cancer, but higher-educated patients seem to adjust better over time. Possibly, higher educated patients have a more adequate access to social and personal resources (such as social support and feelings of control, optimism, and self-esteem) to cope with the cancer and its treatment (Thoits, 1995). The findings suggest that education may play an important role in the recovery of depressive symptoms in cancer patients.

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 and gynaecological cancer reporting relatively more depressive symptoms. However, this relationship between site and depressive symptoms disappeared, when examined simultaneously with the sociodemographic factors. Interestingly, although a higher stage was not significantly related to higher levels of depressive symptoms, we found that, when examined simultaneously with sociodemographic factors, patients with a low stage reported a greater decrease in depressive symptoms over time than those with a higher stage.

The overall weak relationship between medical factors and depressive symptoms has also been demonstrated by other studies (Ell et al., 1989; Given et al., 1994; Hoskins, 1997; Pasacrete, 1997). There are several possible explanations for this weak relationship. First, the subjective appraisal of the stressfulness of the situation may be more important than objective medical factors regarding the prognosis (Dunkel-Schetter et al., 1992). Secondly, we do not know for sure to what extent patients receive and understand medical information about the severity of the situation and their prognosis. Thirdly, the presence of severe physical impairment may have a stronger impact on patients' functioning than medical characteristics such as treatment (Given et al., 1994). A large number of physical problems may lead to more concerns about a recurrence and loss of confidence in own body, which may consequently lead to higher levels of depressive symptoms. Finally, since 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 (e.g. advanced stage or treatment with chemotherapy).

Several limitations should be kept in mind when interpreting the results of the present study. 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, lower educated, and living with a partner, and diagnosed with a relatively good prognosis. This may affect the validity of the findings. Second, the moderate number of references that returned the participation form may also cause concern regarding the validity of the findings. Still, the finding that the levels of depressive symptoms in references were comparable with those in other samples of references from the general population underpins the representation of the reference group. Furthermore, the present study is the first study 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 take into account the strong interrelationships among the sociodemographic and medical characteristics. Still, the existence of these strong interrelationships (e.g. the overlap between gender and site) precludes drawing definite conclusions regarding their associations with depressive symptoms.

In conclusion, this study demonstrates that, especially in younger cancer patients, a diagnosis of cancer may induce depressive symptoms. Additional research is needed to identify other risk factors of depressive symptoms in response to a diagnosis of cancer, 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 cancer patients at increased risk of developing depressive symptoms after a diagnosis of cancer. Furthermore, psychosocial interventions targeted at those

patients at risk may prove to be more effective and able to prevent the development of severe depressive symptoms.

Notes

¹ Using the 20-item version of the CES-D, we found the following mean scores in the patient and reference group, respectively: at T1, 9.82 and 7.79 ($p < .001$) and at T2, 9.35 and 8.26 ($p = .07$). Using the original cut-off point of 16 as an indicator of possible caseness, we found the following percentage of possible cases in the patient and reference group, respectively: at T1, 18% and 10% ($p < .01$) and at T2, 18% and 12% ($p = .06$).

