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## **The role of age at the onset of cancer in relation to long-term adjustment: a controlled comparison over an eight-year period**

### **Abstract**

The goal of the study was to explore the role of age in survivors' long-term adjustment to cancer (n = 206), in comparison with references from the general population (n = 120). Both groups were assessed at three points in time: at 3 months, 15 months, and 8 years after diagnosis. First, within both groups separately, we examined age differences in physical and psychological functioning, positive consequences of illness, meaning in life, and more specific aspects of well being, as measured by a qualitative interview. Secondly, in order to distinguish the effects of cancer from those of ageing, comparisons were made between cancer survivors and similar-aged references. At eight years after diagnosis, younger survivors reported more physical problems and more depressive symptoms than references of their age. No significant differences between survivors and similar-aged references were found in meaning in life. Interestingly though, younger survivors experienced more positive consequences of illness than older survivors. Overall, the findings demonstrate that age is more than a statistical variable. Information about the time at which cancer occurs may provide further insight into the physical and psychological problems as well as benefits likely to result from cancer.

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## Introduction

Although a diagnosis of cancer is a stressful life-event for patients of all ages, the impact of cancer and its treatment on patients' functioning is believed to be strongly associated with patients' age at the time of diagnosis (Northouse, 1994).

Furthermore, there is a growing concern that, in the long term, the normal process of ageing may strongly affect survivors' functioning (Gotay & Muraoka, 1998). In order to address these issues, we conducted a longitudinal study on the long-term adjustment to cancer in three different age groups of cancer survivors. To distinguish the effects due to cancer from those due to ageing, we included an age- and gender-matched reference group of individuals *without* a history of cancer from the general population.

A diagnosis of cancer, like any other life-threatening disease, can have a profound impact on an individual's well being. Especially in the first months after diagnosis, cancer patients can face severe physical impairment and feelings of depression (Pasacrete, 1997; Schmale, 1983; Schroevers et al., 2001a). As time passes, the negative impact of the cancer event will become less salient and life will become more and more dominated by more mundane concerns associated with daily living (Fromm et al., 1996; Kornblith, 1998; Schroevers et al., 2001b). Still, long-term cancer survivors (i.e. those who have survived cancer for five years or longer) may continue to experience particular late effects of cancer, such as physical symptoms, a fear of cancer recurrence, and a preoccupation with physical symptoms (Ferrell et al., 1998b; Kornblith, 1998; Schroevers et al., 2001b; Tross & Holland, 1989). At the same time, a substantial number of cancer survivors report *positive* consequences of illness, such as more assertiveness, more concern for others, changed priorities, and a greater appreciation of life and relationships with others (Fredette, 1995; Fromm et al., 1996; Kornblith, 1998; Pelusi, 1997; Wyatt & Friedman, 1996). In the following paragraphs, we will review the theoretical and empirical evidence regarding the role of age in the adjustment to cancer. Hereby, we make a distinction between three important aspects of adjustment: physical functioning, psychological functioning (distress), and the experience of positive consequences of illness.

Regarding physical functioning, many cancer patients are in the age of 60 years or older when they receive a diagnosis of cancer. Therefore, they can suffer from comorbidity and general health problems (e.g. less energy, decreased activity), which may, in addition to cancer, impair their physical functioning (Greimel et al., 1997; Mor, 1992). Over time, the amount of cancer-related physical problems seems to diminish in the first year after diagnosis (Ganz et al., 1996; Schroevers et al., 2001b). As a consequence, the impact of the cancer is likely to become less

prominent and other illnesses and health problems may play a part in survivors' physical functioning in the long term (Gotay & Muraoka, 1998).

Empirical studies generally found no significant association of age with the amount of physical symptoms and functional limitations in cancer patients in the first year after diagnosis (De Haes et al., 1990; Given et al., 1994; Kurtz et al., 1994; Wenzel et al., 1999). However, among middle-term survivors (1 to 5 years after diagnosis), Ganz et al. (1998) found that physical and role functioning significantly declined as age increases. Similarly, among long-term survivors (6 to 18 years after treatment), Bush et al.

(1995) found that an increased age was associated with more fatigue and concentration problems. Thus, especially in the long-term, age seems to be significantly related to survivors' physical functioning.

According to the stress-coping model of Lazarus and Folkman (1984), the personal *meaning* of a stressful event is the most important aspect of stress with which a person must cope. They direct the person's coping strategies and ultimately his or her adjustment to the event (Lazarus, 1993). In the context of a physical illness, the appraisal (i.e. perceived meaning) of the illness is believed to be strongly associated to patients' age and developmental stage (i.e. where the person is with respect to life cycle-related biological, personal and social goals and tasks) at the time of diagnosis (Moos & Schaefer, 1984; Rowland, 1989a). Given that chronic illnesses, including cancer, are more common among the elderly, younger cancer patients may be less anticipated and therefore, a diagnosis of cancer may be more threatening and distressing at a younger age. Furthermore, younger cancer patients, especially those younger than 45 years, may have a more profound sense of loss and deprivation, as they may be especially challenged with the disruptions of their daily routines and roles, uncertainty about the future and important life goals, concerns about the relationship with their partner and children, feelings of being different and isolated, disfigurement and sexual problems, and a sense of physical vulnerability experienced normally at a later stage (Rowland, 1989a; Siegel et al., 1999; Vinokur et al., 1990). Older patients, especially those older than 65 years, may also be confronted with multiple negative consequences of the cancer, such as increased physical and functional impairment, social isolation, feelings of dependency, and fears of being a burden to others. However, they are more likely to have accomplished many important life goals and to be less involved in some social roles (e.g. work and family), thus having fewer competing demands and responsibilities (Aldwin et al., 1996). Moreover, their greater maturity and more extensive coping experience with previous stressful life events may help them to minimize problems and appraise the diagnosis of cancer as less stressful (Moos & Schaefer, 1984; Mor et al., 1994).

Based on the aforementioned notions regarding age differences in the perceived meaning of the cancer, it can be expected that younger cancer patients are more likely to experience depressive symptoms, particularly in the initial period after diagnosis. In the long term, especially when treatment has been successful and when experiencing few late physical side-effects, it can be hypothesized that younger cancer survivors are able to cope with the multiple demands of the illness and thus do not report elevated levels of depressive symptoms. On the other hand, when recognizing the significance of the multiple demands that younger cancer survivors have to face, it can also be questioned whether younger survivors are fully able to restore their psychological functioning. Thus, it can also be hypothesized that younger cancer survivors do still experience depressive symptoms to some extent.

Empirical studies have consistently shown that, in the first months after diagnosis, younger patients perceive the cancer to be more threatening and experience more intrusive thoughts and depressive symptoms than older cancer patients (Epping-Jordan et al., 1999; Schroevers et al., 2001a; Vinokur et al., 1990; Wenzel et al., 1999). As to the long term, Weitzner et al. (1997) found no significant relationship between age and depressive symptoms in cancer survivors (more than five years after diagnosis). However, in a study among long-term survivors (6 to 18 years after treatment), Bush et al. (1995) found that a younger age was associated with more health-related worries. Similarly, Schover et al. (1995) found that younger survivors (0 to 10 years after diagnosis) worried more often about a cancer recurrence than older survivors. Thus, in contrast to the initial period after diagnosis when a younger age is significantly related to higher levels of psychological distress, the psychological functioning of younger cancer survivors does not seem to be globally impaired but rather specific in terms of more concerns about health and cancer recurrence.

It has been suggested that, as a result of the greater psychological impact of a cancer diagnosis, younger cancer survivors are more likely to search for meaning in the cancer experience, both in terms of causal attributions (about the cause of the cancer and the question "Why me?") and in terms of a search for positive consequences of the cancer experience (Dirksen, 1995). However, only a few studies among cancer survivors have examined the association of age with a search for meaning in the cancer experience. Among survivors (0 to 17 years after diagnosis), Salmon et al. (1996) found that those younger than 65 years gained more appreciation of life from their illness than those older than 65 years. In addition, Dirksen (1995) found that younger cancer survivors (5 to 20 years after diagnosis) were more likely to report a reappraisal of life and changed priorities as a result of cancer than older cancer survivors.

In general, the most frequently mentioned positive changes *as a result* of the cancer experience are changed priorities and a greater appreciation of life (Fredette,

1995; Kornblith, 1998; Pelusi, 1997; Wyatt & Friedman, 1996). Little is known, however, to what extent such positive consequences prompted by and attributed to the cancer experience are related to a *global* sense of meaningfulness in life. As a consequence, the question can be raised to what extent survivors' age is related to a global sense of meaning in life. Furthermore, life-span development theories suggest that, in general, a global sense of meaningfulness in life is related to a person's age (Erikson, 1963; Levinson, 1978). For instance, individuals in the age of 40 and 50 often have a need to question the meaning and direction of their life. This process may ultimately lead to a new, more fulfilling life structure. Around the age of 60, people start to reappraise their life and to put life into a broader perspective. This may lead to a sense of meaning in life or to despair. The confrontation with cancer may accelerate or strengthen these developmental processes (Rowland, 1989a).

In sum, there is reason to believe that patients' age at diagnosis is strongly related to their physical and psychological adjustment to cancer over time. However, although the findings and explanations of previous studies may have some appeal, the empirical evidence is elusive. Particularly, since previous studies lack an age-matched control group, it remains unclear to what extent the physical problems in cancer survivors are due to cancer or to comorbidity and ageing in general. Secondly, most previous studies assessed cancer survivors only at one point in time, often with a wide variable time after diagnosis. Thirdly, many studies included only a limited range of outcome variables. Fourthly, many studies were correlational and have overlooked the importance of distinguishing distinct age groups and thus only show global trends. In the present study, we made an attempt to fill in these gaps, through the use of a longitudinal study design with fixed points in time since diagnosis, the inclusion of an age- and gender-matched reference group of individuals without a history of cancer from the general population, and the use of quantitative and qualitative data on the negative as well as the positive consequences of cancer. Based on the adult developmental model (Rowland, 1989a), we made a distinction between three different developmental groups: younger or mature adults (those younger than 45 years), older adults (those in the age of 45 to 65 years), and ageing adults (those of 65 years or older) at diagnosis.

The primary goal of the present study was to explore the role of age in long-term adjustment to cancer. In order to obtain a more comprehensive knowledge, we examined this issue from two perspectives. *First*, in a large group of long-term cancer survivors, we examined age differences in physical functioning (i.e. the presence of physical symptoms and functional limitations) and psychological functioning (i.e. depressive symptoms) at 3 months (T1), 15 months (T2), and 8 years after diagnosis (T3). The focus of the present article will be on survivors' long-term adjustment (T3). At this point in time, we also examined age differences in the report of positive consequences of illness, a global sense of meaningfulness in

life, and specific aspects of well-being, as measured by a qualitative interview. *Secondly*, to distinguish the effects of cancer from those of ageing, we compared the levels of outcomes in cancer survivors with those in similar-aged references.

## Methods

### Subjects and Procedures

The study was conducted among cancer survivors of a cohort of 475 newly diagnosed patients who have previously participated in a study on the social network of cancer patients and their adjustment to cancer in the first 15 months after diagnosis (De Ruiter, 1995; Van der Zee et al., 1996). This study also included a cohort of 255 references without a history of cancer from the general population.

#### *Initial study*

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). 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 their physician approached patients for participation in the study.

In the period from 1990 to 1992, 516 patients returned a participation form. At approximately three months after diagnosis, 475 of the 516 (92%) eligible patients entered the study. Patients were also interviewed and filled out a questionnaire at 9 and 15 months after diagnosis. In total, 403 patients (85% of 475) participated at 15 months after diagnosis. The main reasons for drop out during the first year were serious illness and death.

Based on the gender and age distribution of the patient group, 559 references were selected from the register office of five townships in the same region as patients and sent a participation form. Of the 559 eligible references, 255 references (46%) participated in the first interview. Similar to the patient group, references were also interviewed and filled out a questionnaire twice with time intervals of 6 months. In total, 225 references (88% of 255) participated at 15 months after diagnosis. The main reasons for drop out during the first year were unwillingness to participate, the impossibility to locate, or incomplete questionnaire data.

*Follow-up study*

At 15 months after diagnosis, 358 (of the 403) patients and 194 (of the 225) references gave informed consent to be approached for a follow-up study. Of these persons, 102 patients and 27 references died in the following seven years. For the present study, the 256 patients and 167 references who were still alive were sent a participation form, accompanied with a letter informing them of the follow-up study. A research assistant then telephoned participants when participants had not returned the participation form within 14 days of sending the letter.

In total, 206 patients participated in the study at eight years after diagnosis. The main reasons of non-response of the 50 patients who dropped out were ill health, unwillingness to participate, and reluctance to talk about the cancer experience. Compared to cancer survivors who participated at eight years after diagnosis, cancer survivors who dropped out since the first interview were significantly more often diagnosed with colorectal cancer or lung cancer, stage III or IV, and treated with only radiotherapy or chemotherapy ( $p < .01$ ). Patients who were older, male, and lower educated at T1 were also more likely to drop out ( $p < .01$ ).

In addition, 128 references participated in the follow-up study. The main reasons of non-response of the 39 references that dropped out were unwillingness to participate and ill health. For the analyses in the present study, we excluded eight references that were diagnosed with cancer in the past eight years, leading to a final sample of 120 references. Compared to the references who participated at eight years after diagnosis, references who dropped out of the study since the first interview were significantly older, lower educated, and less often had a partner at T1 ( $p < .05$ ).

The results presented in the present study are based on the 206 cancer survivors and 120 references that participated at 3 months (T1), 15 months (T2), and 8 years (T3) after diagnosis. These points in the course of the illness are considered to reflect the initial period of crisis (3 months), short-term adjustment (15 months), and long-term adjustment (8 years). Using Chi-square analysis and t-tests for independent samples, we found no significant differences between cancer survivors and references on the main demographic characteristics (i.e. gender, age, marital status, and education).

**Measures**

At all points in time, survivors and references filled out a self-report questionnaire and were interviewed at home, using a semi-structured interview. At T3, the semi-structured interview was followed by a more qualitative interview.

*Physical symptoms* were measured with the 17-item subscale Physical Symptom Distress from the Rotterdam Symptom Checklist (RSCL) (De Haes et al., 1990; De Haes et al., 1996). Persons were asked to indicate the degree to which they had been

bothered by each of the 17 symptoms (e.g. lack of appetite, fatigue, stomach-ache, back pain, dizziness, decreased sexual interest, and shortness of breath) during the last week on a 4-point scale (ranging from 1 to 4). Cronbach's alpha was .85 in survivors and .80 in references.

*Limitations in household activities* were measured with the Groningen Activities Restrictions Scale (GARS) (Kempen et al., 1996; Kempen et al., 1993). The subscale consists of 7 items. Examples of household activities include: doing light or heavy household jobs and preparing meals. Four additional items were developed to measure *limitations in social activities*. Examples of social activities include: paying a visit to someone, participating in outdoor activities, and doing strenuous hobbies. On both scales, persons were asked to indicate the degree to which they are able to do certain activities on their own on a 5-point scale (ranging from 1 to 5). For the Limitations in Household Activities scale, Cronbach's alpha was .90 in survivors and .93 in references. For the Limitations in Social Activities scale, Cronbach's alpha was .83 in survivors and .88 in references.

*Depressive symptoms* were assessed with the Dutch version of the Center for Epidemiologic Studies Depression (CES-D) scale (Bouma et al., 1995; Radloff, 1977; Weissman et al., 1977). Persons were asked to indicate how often they felt each of the symptoms during the last week on a 4-point scale (ranging from 0 to 3). In the present study, we used a sumscore based on the 16 negatively formulated CES-D items (e.g. depressed mood, feelings of anxiety and loneliness, difficulties to get going). 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). The 16-item version of the CES-D scale still includes some somatic items (e.g. lack of appetite and sleeping problems) that may represent symptoms of depression and/or symptoms of cancer and its treatment. Cronbach's alpha was .90 in survivors and .89 in references.

The Silverlining questionnaire (SLQ), a 38-item self-report questionnaire, was used to measure a wide variety of *positive consequences of illness* (Sodergren & Hyland, 2000). The items are based on the content of the interviews held with 55 people, either currently sick or having recovered from their illness. Examples of items include: "My illness helped me find myself" and "My illness strengthened my relationships with others". On a 5-point scale (ranging from 1 to 5), persons are asked to indicate whether they agree or not (or no opinion) with each of the statements. An overall score is obtained by scoring each item as 1 for responses "strongly agree" and "agree" and 0 for the responses "not sure", "disagree", and "strongly disagree". Thus the total score reflects the total number of items that patients agree with.



The Life Regard Index (LRI), a 23-item self-report questionnaire, was used to measure a global sense of *meaning in life* (Battista & Almond, 1973; Debats, 1990; Debats, 1998). The scale consists of two subscales: “Framework” (10 items) and “Fulfilment” (13 items). The Framework scale measures the degree to which individuals can envision their lives within some meaningful perspective or have derived a set of life goals (e.g. “I have a clear idea of what I’d like to do with my life”), whereas the Fulfilment scale measures the degree to which people see themselves as having fulfilled or being in the process of fulfilling their life goals (e.g. “I feel that I live fully”). On a 3-point scale (ranging from 1 to 3), persons are asked to indicate whether they agree or not (or had no opinion) with each of the statements. For the Framework scale, Cronbach’s alpha was .75 in survivors and .82 in references and for the Fulfilment scale .87 and .90, respectively.

The aim of the *qualitative interview* at eight years after diagnosis was to collect information about the more specific aspects of long-term adjustment to cancer and functioning in general. Both survivors and references were asked about their *current* physical and psychological functioning and the appreciation of their activities, relationships with others, themselves, and life in general as well as about possible *changes* herein in the past eight years since diagnosis. Cancer survivors were asked additional questions about their specific concerns regarding the cancer experience (e.g. attentiveness to physical symptoms, thoughts about a recurrence, about the cause of the cancer, and about the question “Why me?”). Based on pilot interviews and the literature on long-term adjustment to cancer, categories of response were developed to code these open-ended responses. During the interview, survivors and references were encouraged to talk freely at their own pace, but carefully prompted to talk about the aforementioned aspects of functioning. The trained interviewer then scored the answer to the questions on one or more response categories.

When cancer survivors reported a change, they were asked to indicate to what extent *cancer* had influenced this change. Thus, rather than asking cancer survivors directly about the consequences of cancer, we first asked them to indicate changes in their functioning, and subsequently, the influence of cancer upon these changes. By formulating the questions in such a neutral way, we wanted to avoid influencing patients’ response about the consequences of cancer. It also enabled us to ask the reference group the same questions.

Information about *sociodemographic characteristics* (gender, age, education, and marital status) was collected during the semi-structured interview. Information about *disease characteristics* (cancer site, stage, treatment) was derived from the cancer registration from the Comprehensive Cancer Centre North Netherlands. During the

semi-structured interview at T3, we asked patients whether they had experienced a recurrence of the cancer or a new primary tumour in the past eight years.

### **Statistical analyses**

Chi-square analysis was used to examine differences between the patient and reference group in their sociodemographic characteristics. Pearson's correlation coefficients were computed to examine the relationships among the variables of outcome. Analyses of variance (ANOVA) were performed to examine age differences in outcomes, in the patient and reference group separately. When the test reached significance ( $p < .05$ ), post-hoc tests were inspected to detect which age groups significantly differed from each other. The data from the qualitative interview were analysed using Chi-square analysis ( $p < .05$ ). T-tests for independent samples were used to examine differences in outcomes between survivors and references ( $p < .05$ ).

**Table 1.** Sample characteristics of cancer survivors (n = 206) and references (n = 120) at eight years after diagnosis

	Cancer survivors			References		
	< 45 (n = 58)	45 – 65 (n = 95)	≥ 65 (n = 53)	< 45 (n = 40)	45 – 65 (n = 62)	≥ 65 (n = 18)
Gender (% female)	84	80	72	80	66	67
Marital status (% with partner)	88	76	57	93	81	39
Education						
Elementary	17	28	53	5	34	50
Lower	55	47	23	28	43	39
Middle	14	15	14	40	13	5
Higher	14	10	10	27	10	6
Site						
Breast	60	52	47			
Colorectal	7	26	34			
Gynecological	24	17	15			
Lung	4	5	2			
Other	5		2			
Stage						
1	51	48	49			
= 2	49	52	51			
Treatment						
Surgery	43	45	57			
Surgery and radiotherapy	19	28	17			
Surgery and chemotherapy	21	6	2			
Surgery, radio- and chemotherapy	15	11	-			
Surgery and hormonal therapy	-	4	7			
Surgery, hormonal and radiotherapy	-	5	11			
Other	2	1	6			
Recurrence or new primary tumor	16	19	25			

**Table 2.** Intercorrelations among outcome variables in cancer survivors and references at eight years after diagnosis

	1	2	3	4	5	6
1 Physical symptoms	-	.48 ***	.52 ***	.66 ***	-.34 ***	-.49 ***
2 Household limitations	.48 ***	-	.85 ***	.45 ***	-.14	-.17
3 Social limitations	.51 ***	.83 ***	-	.43 ***	-.25 *	-.25 *
4 Depressive symptoms	.64 ***	.37 ***	.36 ***	-	-.32 **	-.56 ***
5 Meaning in life: Framework	-.22 **	-.29 ***	-.25 **	-.36 ***	-	.65 ***
6 Meaning in life: Fulfilment	-.37 ***	-.37 ***	-.36 ***	-.55 ***	.71 ***	-
7 Positive consequences	-.01	-.11	-.13	.04	.36 ***	.26 ***

Note. Correlations in survivors are below the diagonal, those in references are above the diagonal.  
 \*\*\* p < .001; \*\* p < .01; \* p < .05.

Thus, *within* the three different age groups, we examined differences between survivors and references. For instance, we compared levels of physical symptoms in survivors younger than 45 years with those in references younger than 45 years.

## Results

### Sample characteristics

The characteristics of the present sample at eight years after diagnosis (T3) are shown in Table 1. Using Chi-square analysis, we found that younger persons, both in the group of survivors and references, were more likely to be living with a partner and to have a higher education than older persons ( $p < .01$ ). Within the group of survivors, we found significant age differences in site ( $p < .05$ ) and treatment ( $p < .001$ ). Consistent with the associations of age with site and treatment (Coebergh et al., 1995), younger survivors were more likely to be diagnosed with breast or gynaecological cancer and to be treated with chemotherapy.

### Descriptives

The intercorrelations among the outcome variables are presented in Table 2, for survivors and references separately. In both groups, we found significant relationships between physical symptoms and limitations in household and social activities on the one hand and depressive symptoms and meaning in life on the other hand. This shows that higher levels of physical symptoms and limitations were associated with higher levels of depressive symptoms and lower levels of meaning in life. The strength of these associations was similar in survivors and references. The only exception was the relationship between limitations in household activities and meaning in life (both scales), which was stronger in survivors than in references.

### Physical functioning

In the first year after diagnosis, we found no overall significant relationship between patients' age and the level of physical symptoms and limitations in household and social activities (see Table 3). In the reference group, on the other hand, we found significant associations of age with measures of physical functioning, with persons aged 65 years or older reporting more limitations in household and social activities. When we compared patients' levels of physical functioning with those in similar-aged references, we

found, at three months after diagnosis (T1), that patients in the two age groups younger than 65 years reported significantly more physical symptoms and limitations in household and social activities than similar-aged references ( $p < .001$ ). At this point in time, survivors aged 65 years or older differed significantly from similar-aged references only in their level of limitations in social activities ( $p < .01$ ) and showed a non-significant tendency towards relatively higher levels limitations in household activities ( $p < .10$ ). At 15 months after diagnosis (T2), patients aged 45-65 years still reported more physical symptoms and limitations in household activities ( $p < .01$ ) and social activities ( $p < .001$ ) than similar-aged references. Patients younger than 45 years also showed higher levels of limitations in social activities than similar-aged references ( $p < .05$ ).

In contrast to the first year after diagnosis, we did find a significant relationship between survivors' age and physical symptoms ( $p < .05$ ) and limitations in household and social activities ( $p < .001$ ) at eight years after diagnosis (T3). In general, survivors in the two age groups younger than 65 years at diagnosis reported significant fewer physical symptoms and limitations in their household and social activities than survivors of 65 years or older. The only exception was found in survivors aged 45-65 years, who showed significant higher levels of physical symptoms than those younger than 45 years. In fact, at eight years after diagnosis, the level of physical symptoms in survivors aged 45-65 years was more comparable with that in survivors of 65 years or older.

In the reference group, we found similar associations of age with physical symptoms ( $p < .01$ ) and limitations in household and social activities ( $p < .001$ ) at eight years after the first interview (T3). Comparisons of survivors and similar-aged references revealed that survivors aged 45-65 years reported significantly more physical symptoms than similar-aged references ( $p < .001$ ). Such a tendency was also found in survivors younger than 45 years ( $p < .10$ ). Survivors in the two younger age groups also reported more limitations in their social activities than similar-aged references ( $p < .05$ ). In contrast, survivors aged 65 years or older reported comparable levels of physical symptoms and limitations in their activities as similar-aged references.

In line with these findings, the results of the qualitative interview showed that survivors in the two age groups younger than 65 years reported more cancer-related physical problems (e.g. fatigue and arm problems) at eight years after diagnosis than the oldest survivors group (69% and 51% versus 34%) ( $p < .01$ ).

**Table 3.** Age differences in outcome variables in cancer survivors and references at 3 months (T1), 15 months (T2), and 8 years (T3) after diagnosis

	Cancer survivors			References		
	<45	45 – 65	≥ 65	<45	45 – 65	≥ 65
Physical symptoms						
T1	24.29 (4.41)	25.17 (6.23)	24.10 (6.29)	20.78 (3.81)	21.29 (4.83)	21.61 (4.59)
T2	21.67 (3.61)	23.43 (6.09)	22.14 (4.61)	20.98 (5.04)	21.13 (4.22)	23.11 (5.50)
T3	22.63 (5.45) ‡	25.68 (7.26) ††	25.53 (6.31)	20.85 (3.51) ††	21.89 (4.70) ††	25.22 (5.36)
Limitations in household activities						
T1	10.84 (4.82)	11.92 (5.57)	12.13 (5.85)	7.63 (2.00) ††	7.61 (2.19) ††	9.44 (2.96)
T2	8.50 (2.77)	9.31 (3.99)	10.28 (4.83)	7.83 (4.45) ‡	7.55 (1.81) ‡	9.78 (4.02)
T3	9.00 (4.70) †††	9.57 (4.49) †††	13.63 (7.47)	7.79 (1.47) †††	8.65 (4.67) †††	13.38 (7.14)
Limitations in social activities						
T1	9.26 (4.81)	10.43 (4.92)	10.04 (4.91)	4.85 (2.44) ‡	4.73 (1.85) ††	6.28 (2.30)
T2	6.19 (3.27) †††	7.52 (4.11) ‡	8.92 (4.44)	4.85 (2.69) †††	5.37 (2.46) †††	8.06 (3.13)
T3	5.89 (3.31) †††	7.04 (3.98) †††	9.71 (5.34)	4.67 (1.24) †††	5.68 (3.53) †††	10.06 (4.95)
Depressive symptoms						
T1	6.66 (6.86) ‡	7.33 (6.74) ††	3.77 (4.29)	4.18 (4.54)	2.98 (3.85)	5.00 (4.93)
T2	5.17 (6.82)	5.60 (6.56)	3.51 (5.29)	4.33 (6.81)	3.06 (3.57)	4.33 (4.26)
T3	5.91 (7.36)	5.87 (6.62)	4.75 (4.31)	3.72 (4.29)	3.97 (4.46)	5.24 (4.88)
Meaning in life: framework						
T3	26.69 (3.12) ‡	26.40 (3.25) ‡	25.04 (3.82)	27.03 (3.01)	26.43 (3.47)	25.00 (4.75)
Meaning in life: fulfilment						
T3	34.04 (5.84) ‡	33.23 (5.50) ‡	31.21 (5.45)	33.09 (6.08)	33.05 (5.90)	30.75 (6.45)

‡Post-hoc test. Differs from the oldest age group (≥ 65 years). ‡ p < .05; †† p < .01; ††† p < .001.

†Post-hoc test. Differs from youngest age group (< 45 years). † p < .05; †† p < .01.

### **Psychological functioning**

At three months after diagnosis (T1), patients' age was significantly related to depressive symptoms ( $p < .01$ ), with patients in the younger two age groups reporting significantly more depressive symptoms than patients of 65 years or older. In references, on the other hand, age was not significantly related to the level of depressive symptoms. Comparisons of patients and similar-aged references showed that patients younger than 45 years ( $p < .05$ ) and those aged 45-65 years ( $p < .001$ ) reported significantly more depressive symptoms at three months after diagnosis (T1) than similar-aged references. At 15 months after diagnosis (T2), only patients aged 45-65 years still reported significantly more depressive symptoms than similar-aged references ( $p < .01$ ).

At eight years after diagnosis (T3), age was not significantly related to depressive symptoms, neither in cancer survivors nor in references. However, comparisons between survivors and similar-aged references revealed that survivors aged 45-65 years still reported more depressive symptoms than similar-aged references ( $p = .05$ ). The same tendency was found in survivors younger than 45 years ( $p < .10$ ). In contrast, older cancer survivors reported comparable levels of depressive symptoms as similar-aged references.

The results of the qualitative interview showed that younger cancer survivors were more preoccupied with the cancer experience than older cancer survivors at eight years after diagnosis. Specifically, compared to older survivors, the two youngest groups of survivors reported more general cancer-related thoughts (36% and 23% versus 15%) ( $p < .001$ ), more thoughts about a possible cause of the cancer (42% and 35% versus 13%) ( $p < .05$ ), and more thoughts about the question "Why me?" (24% and 22% versus 4%) ( $p < .01$ ). Furthermore, compared to older survivors, the two youngest groups of survivors (especially those younger than 45 years) reported to a greater extent that they had become more attentive to physical symptoms over time (60% and 38% versus 28%) ( $p < .05$ ). We found no significant association between age and a fear of recurrence (42%, 34%, and 31%, respectively in the three age groups).

### **Meaningfulness in life**

At eight years after diagnosis (T3), we found a significant relationship between survivors' age and both scales (i.e. framework and fulfilment) of a global sense of meaningfulness in life ( $p < .05$ ). Survivors in the two age groups younger than 65 years at diagnosis reported significantly more framework and fulfilment than survivors of 65 years and older. Thus, compared to older survivors, younger survivors reported to a greater extent that they had a meaningful perspective and important goals in life and that they gained a sense of fulfilment out of their life.



A similar tendency was found in the reference group, with those younger than 65 years at the time of the first interview reporting a greater sense of meaningfulness in life. Comparisons between survivors and similar-aged references showed no significant differences in a sense of meaningfulness in life. In other words, the levels of framework and fulfilment in younger survivors were comparable to those in younger references. Similarly, older survivors and older references reported comparable levels of framework and fulfilment.

### **Positive consequences of illness**

At eight years after diagnosis (T3), we asked cancer survivors about the positive consequences of illness. The results showed that survivors younger than 65 years at diagnosis reported more positive consequences of illness than those aged 65 years or older, but this was not significant. However, a closer look at the individual items showed that certain items were endorsed significantly more often by younger than by older cancer survivors ( $p < .01$ ). Specifically, compared to survivors of 65 years and older, survivors in the two younger age groups reported more often that they had become more mature (46% and 31% versus 12%), had a greater awareness of their own strengths (51% and 35% versus 22%), were less concerned about the approval of others (67% and 59% versus 35%), had a greater appreciation for life (87% and 77% versus 53%), and lived more intense (62% and 63% versus 37%) as a result of illness. Other items, however, were endorsed about equally frequent by the three age-groups, such as the illness made me: more tolerant, doing things for myself, stand up for one self, more determined, facing problems in life, having stronger relationships, others more open towards me, reflecting about myself, and about a goal in life.

The results of the qualitative interview at eight years (T3) also showed that survivors in the two youngest age groups reported more often than older survivors that they had a greater appreciation of their relationships with their family (42% and 26% versus 8%) and with their partner (47% and 26% versus 11%) than eight years ago ( $p < .01$ ). Survivors in the two youngest groups also reported more often that they had a greater appreciation of themselves (48% and 33% versus 4%) and of their life in general (65% and 52% versus 21%) than eight years ago ( $p < .01$ ). It is important to note that a substantial number of the younger survivors (about 30 to 60%) attributed these changes to the cancer experience. In response to the general question "Overall, to what extent has cancer changed your life?", the two younger groups of survivors were more likely to say that cancer had changed their life than those of 65 years or older (56% and 34% versus 13%) ( $p < .001$ ).

## Discussion

The aim of the present study was to examine how three different age groups of cancer survivors function in the eight years following diagnosis, in comparison with an age- and gender-matched reference group of individuals *without* a history of cancer from the general population. Overall, our findings suggest that, when taken into account the levels of functioning in the reference group, the impact of cancer and its treatment is greatest in patients younger than 65 years at the time of diagnosis. Specifically, compared to similar-aged references, younger cancer patients (especially those aged 45-65 years) reported a significantly poorer physical functioning (i.e. more physical symptoms and limitations in household and social activities) and poorer psychological functioning (i.e. more depressive symptoms) in the first year after diagnosis. At eight years after diagnosis, younger cancer survivors still reported more physical symptoms, limitations in social activities, and somewhat more depressive symptoms than similar-aged references. No significant differences between survivors and similar-aged references were found in a global sense of meaningfulness in life. Interestingly though, compared to older cancer survivors, younger cancer survivors sought more meaning in the cancer experience. That is, they reported more often that they had thought about a possible cause of the cancer and about the question “Why me?”. Besides such causal attributions, they also reported more positive consequences of the cancer experience.

First, the results demonstrated a strong association of age with survivors’ physical functioning at eight years after diagnosis, with survivors of 65 years or older at diagnosis reporting more physical symptoms and limitations in activities than those younger than 65 years. However, a similar association of age with physical functioning was found in the reference group. Comparisons of survivors and similar-aged references revealed no significant differences between the levels of physical impairment in cancer survivors in the age of 65 years or older and those in similar-aged references. Thus, older cancer survivors seem to experience levels of physical functioning, that are natural at an advanced age, with the increased incidence of chronic illnesses and general health problems. This finding does not preclude, that, at an individual level, older cancer survivors may still experience late physical problems as a result of cancer. The data from the qualitative interview showed that older cancer survivors reported fewer cancer-related physical problems than younger cancer survivors. Overall, the findings suggest that cancer has only a marginal impact on the physical functioning of older cancer survivors.

In younger cancer survivors, on the other hand, cancer does seem to have a strong impact on long-term physical functioning. That is, compared to similar-aged references, cancer survivors younger than 65 years at diagnosis (especially those aged 45-65 years) showed elevated levels of physical symptoms at eight years after

diagnosis than similar-aged references. Younger cancer survivors also reported more limitations in their social activities than similar-aged references. In addition, the data from the qualitative interview showed that, compared to older cancer survivors, younger cancer survivors had become more attentive to physical symptoms over time. On the whole, these findings provide support for the belief that, in younger cancer survivors, cancer and its treatment may accelerate the ageing process and accentuate a sense of physical vulnerability experienced normally with ageing (Rowland, 1989a). Since physical symptoms in cancer patients probably have both a somatic and a psychological component, it remains unclear to what extent this “speeding up” of the ageing process is real or imagined (Chaturvedi & Maguire, 1998). Providing information about the process of physical recovery and the late effects of cancer and its treatment during follow-up medical check-ups may help younger cancer survivors to deal with the physical symptoms and limitations and to maintain a balance between inattentiveness to and preoccupation with physical symptoms (Gray et al., 1998; Jenkins et al., 2001; Somerfield et al., 1999).

Consistent with the findings of the study of Weitzner et al. (1997), we found no significant association of survivors’ age with depressive symptoms at eight years after diagnosis. However, comparisons of survivors with similar-aged references revealed a different picture. These analyses showed that cancer survivors younger than 65 years at the time of diagnosis reported higher levels of depressive symptoms than similar-aged references. In the Introduction, we already mentioned several reasons for why younger cancer patients are more likely to report depressive symptoms. They may be less anticipated, have fewer prior coping experience with illness and adversity, more competing demands and responsibilities, and a greater sense of loss and deprivation. The process of social comparison may also play an important role herein. It can be imagined that in the aftermath of cancer and its treatment, younger cancer survivors compare themselves with family members and friends of their age. Since serious chronic illnesses are less common at this age, such comparisons may lead to feelings of being different and isolated and a sense of deprivation, seeing for example that others have a better physical health and fewer restrictions in their daily life (Van der Zee, 1996).

Regarding the search for meaning, we found that younger cancer survivors reported a greater search for meaning in the cancer experience than older survivors, in terms of more thoughts about the cause of the cancer and about the question “Why me?”. Younger cancer survivors were also more likely than older survivors to experience benefits of the cancer experience, such as a greater maturity, greater awareness of own strengths, less concern about the approval of others, living more intense, and a greater appreciation of the self, life in general, and relationships with others. Besides a greater search for meaning in the illness experience, younger cancer survivors reported a greater global sense of meaningfulness in life at eight

years after diagnosis than older cancer survivors. However, such an association was also found in references and comparisons between survivors and similar-aged references revealed no significant differences in a global sense of meaningfulness in life. Thus, in the long term, a diagnosis of cancer does not seem to affect a global sense of meaningfulness in life.

Why do cancer survivors, especially those being younger at the time of diagnosis, search for meaning in the cancer experience? The confrontation with a life-threatening event may challenge patients' basic beliefs about their personal invulnerability, their self-worth, and the meaningfulness of life (Janoff-Bulman & Frieze, 1983). In such periods of uncertainty and confusion, people often actively search for meaning, in an attempt to understand *why* the unexpected and stressful event happened and its personal significance (Taylor, 1983). The greater sense of threat and emotional response to a diagnosis of cancer may have motivated younger cancer patients to search for and create positive meaning (Folkman, 1997). These cognitive efforts may have enabled them to cope with the negative consequences of the illness and to restore their psychological well-being (Folkman, 1997; Taylor, 1983).

When interpreting the results of the present study, several methodological considerations should be considered. First, we examined a heterogeneous sample of cancer survivors, diagnosed initially with breast, colorectal, gynaecological, or lung cancer. These types of cancer represent the most common types of cancer. Thus the results of the present study are likely to be relevant for a large group of cancer patients (Visser et al., 1998). Still, cancer patients diagnosed with other types of cancer may show a different course of long-term adjustment. Secondly, in the present study, no information was available about the level of a global sense of meaningfulness in life and positive consequences of illness in the initial period after diagnosis. Consequently, no conclusions could be drawn about the short-term effect of cancer upon these outcomes. Finally, regarding the analyses, we have focused on age differences in the *presence* of functioning rather than in *changes* in functioning (e.g. difference scores), since the primary goal of the study was to elaborate on the role of age in survivors' long-term functioning at eight years after diagnosis. A problem with analysing changes is the lack of a true baseline assessment, that is, of a premorbid assessment of cancer patients. Given that patients were included after the diagnosis, their functioning was impaired by the cancer and its treatment. Therefore, comparisons between patients and references in difference-scores of functioning will misrepresent the process of adjustment to cancer.

Overall, the results of the present study demonstrate that age is more than a statistical control variable. The findings provide an intriguing description of the complex and interwoven processes of long-term adjustment to cancer and ageing and extend previous studies in several ways. First, the higher levels of physical

impairment in older cancer survivors are comparable with those in older individuals from the general population. Secondly, in comparison with similar-aged individuals from the general population, the short- and long-term impact of cancer and its treatment is greatest among younger cancer survivors. Future research is needed to examine more closely *why* a younger age is so strongly related to long-term adjustment to cancer. Furthermore, there is a need for multivariate studies that will identify those younger cancer survivors who are at greatest risk of poor long-term adjustment to cancer.

