Perceived social support and self-efficacy and quality of life before and after cancer rehabilitation


Submitted

Abstract

Background: Rehabilitation programs are offered to cancer patients to improve their quality of life. The reasons why some patients benefit more from rehabilitation than others do, however, are unclear. This study examines the effect of a cancer rehabilitation program on social support and self-efficacy, and the effects of these personal resources on quality of life.

Methods: Sixty-three cancer patients with various diagnoses, all of whom had undergone cancer treatment, completed questionnaires before (T0) and after (T1) a 15-week multidimensional rehabilitation program. Measures: positive and negative social support experiences (Social Experiences Checklist), self-efficacy (General Efficacy Scale) and quality of life in terms of physical, social and mental functioning (RAN-36).

Results: Negative social support experiences and self-efficacy were unchanged at T1, and positive social support experiences had decreased. Positive and negative social support and self-efficacy explained between 17% and 47% of the variance in quality of life at T0 and T1. Negative social support had unique negative effects on social functioning at T0 and on all quality-of-life domains at T1, along with a slight prospective effect on mental functioning. Self-efficacy had independent positive effects on mental functioning at T0 and on physical and mental functioning at T1. Positive support had a negative effect only on physical functioning at T1. The explained variance of change in quality of life varied from 52% to 63%, with pre-existing quality of life as the most powerful predictor. Decreased negative support and increased self-efficacy were uniquely associated with improved quality of life.

Conclusion: Cancer rehabilitation had little effect on the personal resources of the patients. Negative social support and self-efficacy appeared to be more consistent predictors of quality of life than was positive social support. Although the program neither increased self-efficacy nor decreased experiences of negative social support for the group as a whole, improvements in quality of life were associated with increased self-efficacy and reductions in negative social support experiences.
Introduction

Cancer and cancer treatment have serious effects on patients’ quality of life, not only during treatment, but also years after treatment has been completed [1]. Adaptation to the cancer experience involves adjusting to a loss of functioning in the physical, social, and mental domains of quality of life [2], and it requires patients to refocus on future plans and goals [3]. Although the majority of cancer patients and their family members seem to cope effectively with the disease, a significant minority (± 30%) experience continuing adjustment problems and low quality of life [4,5].

Patients whose quality of life remains low may need and benefit from professional support. Psychological interventions [6-9], physical exercise training [10,11] and multidimensional rehabilitation programs [12,13] that include both physical and psychosocial components have been shown to have beneficial effects on quality of life. We recently reported on the beneficial and clinically relevant effect of a multidimensional rehabilitation program on quality of life and [14] and cancer-related fatigue [15], with effect sizes ranging from .38 to .99.

Although statistically significant improvements after multidimensional cancer rehabilitation were shown, little is known about the mechanisms that are associated with improved quality of life after rehabilitation. The reasons why some patients benefit more from rehabilitation than others do are unclear. The present study was performed to obtain more insight into variables associated with improvement in quality of life, based on the following. It has been suggested that the ability to adjust to cancer involves possessing and utilizing external and internal personal resources to meet the demands of the disease and its treatment [16]. An external resource would be perceived social support [17] and an internal resource one’s perception of self-efficacy [16,18]. Both have been described as secondary appraisals and seem to have a positive direct or buffering effect on the adjustment to cancer [19,20].

Social support may strengthen or maintain feelings of social identity, self-evaluation, and social integration, and it may counteract feelings of loneliness. Receiving positive social support may have beneficial effects on patients’ quality of life, while a lack of support (particularly, a lack of emotional support) seems to hinder the adjustment of cancer patients [21]. Negative aspects of social relationships are apparently independent of the positive aspects of social support, and they appear to be strongly negatively related to psychological functioning [22,23].

Self-efficacy involves people’s subjective estimation of their capacity for engaging in particular actions in particular situations [24]. According to self-efficacy theory, those who have greater confidence in their ability to execute courses of action tend to be more likely to attain goals such as maintaining a desired state of quality of life. Numerous and varied experiences of failure and success in various domains of functioning may generate generalized beliefs of self-efficacy that have explanatory values with regard to behavior in general [25]. Self-efficacy may have a positive effect on both physical [26] and mental health [27]. A cancer experience apparently has negative effects on self-efficacy, which may tend to increase psychological distress and decrease quality of life [16,18,28]. In contrast, those who are more self-efficacious are more likely to display such healthy behaviors as physical activity [29], which can positively affect physical functioning and quality of life after cancer.
Little information is available concerning the extent to which (multidimensional) cancer rehabilitation affects personal resources. It has been reported that psychosocial interventions that provide a supportive forum in which patients can actively contemplate and discuss difficult thoughts may facilitate cognitive processing, alleviate distress and increase well-being [30]. Furthermore, psychosocial interventions that include self-efficacy as an important therapeutic ingredient were reported to have a greater effect on quality of life than did interventions that involved fewer or no self-efficacy components [31]. Physical interventions (e.g., exercise) have also been reported to have beneficial effects on self-efficacy [32,33]. To our knowledge, no studies have examined the effects of multidimensional rehabilitation programs on perceived social support and self-efficacy. The association of improvements in quality of life after a multidimensional program with changes in perceived personal resources have also not been examined.

In the present study, therefore, we explore the effect of the abovementioned multidimensional rehabilitation program on social support and self-efficacy. Although the primary goal of the intervention was to improve physical, mental and social functioning [14], we theorized that the program had also the potential to affect perceived personal resources. For example, the group approach and mastery experiences may enhance perceived positive social support and self-efficacy, respectively. Because we expected that the program would affect personal resources and quality of life, we will examine the effect of perceived social support and self-efficacy on quality of life before and after cancer rehabilitation. We will also investigate associations between changes in quality of life and changes in perceived personal resources. Earlier studies reported that changes in perceived social support was associated with changes in quality of life [34] and that change in self-efficacy was associated with change in physical activity [35].

Our first hypothesis was that positive changes in perceived personal resources (i.e., social support and self-efficacy) would be evident after the program. The second hypothesis was that perceived social support and self-efficacy would have a positive effect on physical, social, and mental functioning, both before and after the rehabilitation program. Finally, we hypothesized that improved quality of life after the program would be associated with positive changes in personal resources.

**Patients and Methods**

**Patients**

Patients who met the following criteria were eligible for the study: age ≥ 18 years, last cancer-related treatment > 3 months before the study, estimated life expectancy ≥ 1 year, referred by hospital specialists or general practitioners, and an indication for rehabilitation. The latter criterion referred to positive findings for at least three of the following conditions, as judged by the physician who referred the patient: a) physical complaints (e.g., aching muscles, problems with co-ordination, headache, nausea, heart palpitations, shortness of breath); b) reduced physical capacity compared to before the illness (e.g., decreased ability to walk or cycle); c) psychological problems (e.g., increased anxiety, depression, uncertainty, lack of energy, or nervousness); d) increased fatigue; d) sleep disturbances; or e) problems in coping with reduced physical and psychosocial functioning due to cancer.
Patients who met any one of the following criteria were excluded: a) a very low level of activity according to the classification of Winningham [36], (e.g., ambulant for less than 50% of the day), apparent rapid fatigue when performing low levels of physical activity, or dependency in activities of daily living; b) inability to travel independently to the rehabilitation center; c) cognitive disturbances that may interfere with participation in the rehabilitation program; or d) serious psychopathology or emotional instability that may impede participation in the rehabilitation program.

All patients provided written informed consent to participate in the study and to allow the retrieval of medical information from their hospital charts. Medical data were verified by record linkage with the population-based cancer registry of the Comprehensive Cancer Center North Netherlands (CCCN). The Medical Ethics Committee of the University Medical Center Groningen approved the study.

Procedures
Setting and intervention
The fifteen-week rehabilitation program was offered in an outpatient setting within the Center for Rehabilitation of the University Medical Center Groningen. The program took place in groups of between eight and twelve cancer patients. It consisted of a physical training component, which included programs in “Individual Exercise” and “Sports/Games”, along with a psychological training component, which consisted of programs in “Psycho-education” and “Information”.

The Individual Exercise program consisted of 15 sessions of 1.5 hours each and was supervised by a physical therapist. The program was divided into aerobic bicycle training and a muscle-force training program. Patients followed an incremental protocol in both training programs, with the goal of increasing aerobic exercise capacity, muscle force and endurance. The Sports and Games program consisted of seventeen one-hour sessions, which were supervised by a physical therapist. The sessions were directed towards “enjoying sports”, “self-confidence”, and “body knowledge”, and they provided a variety of sport and game activities.

The psycho-educational program consisted of nine two-hour sessions, each of which was supervised by an experienced psychosocial health care provider. The program was aimed at reducing negative emotions and improving the ability to cope with the disease. Rational-emotive therapy, breathing and relaxation exercises were aimed at reducing stress. Expressive-supportive techniques were addressed to emphasize the relevance of sharing emotions with others. Other aspects of social support (e.g., “asking for help from significant others and health care providers”) were also addressed. The information program, which consisted of ten one-hour sessions, was aimed at reducing possible uncertainty due to lack of knowledge about the disease and changing irrational perceptions about the illness [37]. Both goals were addressed through the provision of information regarding cancer-related subjects. The program has been described more extensively elsewhere [14,15].

In addition to the intended effect of improving quality of life, the program also included a number of components that could affect personal resources. Because of its group-oriented approach, the program was expected to have a positive effect on social support. The choice for a group-oriented program was based on studies that show that peer contact may facilitate processes of social support, social comparison, and modeling among
rehabilitation-program participants [21]. Peer contact may also provide opportunities for validation, reappraisal, and finding meaning [30]. The physical training program was expected to have a positive effect on self-efficacy through the successful performance of physical tasks and by changing the level of physiological arousal [38]. The psychological training component also provided tools for optimizing self-efficacy. The exercises that were included in the program could affect self-efficacy through the performance accomplishment of such psychological tasks [38] as gaining greater control over irrational cognitions [39] and decreasing feelings of distress [38]. Vicarious experiences among peers could also have positive effects on self-efficacy [38]. Finally, verbal persuasion by the health care providers could also be expected to increase self-efficacy [38].

**Design**

A single-group, pre-post test design was used to examine the effects of a multidimensional rehabilitation program on social support and self-efficacy. The design also allowed the examination of change in study measures over time, the concurrent and prospective effects of social support and self-efficacy on quality of life, and associations between change in perceived personal resources and change in quality of life.

**Measures**

- **Sociodemographic variables**
  Age, gender, level of education, and employment status were assessed.
  - **Disease and treatment-related variables**
    Diagnosis, stage of disease at diagnosis, time since diagnosis, type of treatment received, and time since completion of treatment were attained from the patients’ medical records.
  - **Quality of life**
    Three sub-scales of the **RAND-36**, a multidimensional self-report questionnaire, were used to assess health-related quality of life: physical functioning (10 items), social functioning (2 items), and mental health (5 items) [40]. After recoding and transformation, scores on the questionnaire range from 0 to 100, with higher scores representing better health. Cronbach’s α scores for the present study ranged from .84 to .85 for the three subscales at T0 and from .76 to .88 at T1.
  - **Social support**
    The Social Experiences Checklist (SEC) is a self-report questionnaire consisting of two subscales: one to measure experiences of positive (8 items) and one to assess experiences of negative (8 items) social support [41,42]. The SEC covers various dimensions of social support. The following are examples of perceived positive social items: “Have you experienced ‘warmth’ or ‘the help of someone’ in interactions with others?” The following are examples of perceived negative social items: “In interactions with others, have you experienced situations in which people did not provide enough ‘information’ or ‘comprehension’?” Respondents were asked to recall their experiences in contacts with people during the previous week. Responses to the sixteen items were presented on a four-point Likert-type scale ranging from “never” to “often”, and they could be summed to compute two total scores. Higher scores (range 8-32) reflect higher levels of perceived positive or negative social support. Reference scores of a random sample from the Dutch general population (n=201, 59% female, mean age 45.4) and of a
group of recently diagnosed and surgically treated cancer patients (n=109, 72% female, mean age 51.2) are available [41,42]. Cronbach’s α scores for the present study were .86 and .84 at T0 and T1, respectively, for positive support, and .64 and .74 at T0 and T1, respectively, for negative support.

Self-efficacy was assessed with the General Efficacy Scale (GES), which is a 16-item scale developed by Sherer [43] and translated and validated by Bosscher [25]. The GES covers three concepts: general feeling of competence, perseverance/maintenance in times of stress, and showing initiative. The following are examples of items from this scale: “I am a self-reliant person”, and “Failure just makes me try harder”. Responses to the 16 items are presented on a five-point Likert-type scale ranging from “strongly agree” to “strongly disagree”, and they are summed to compute a total score that may range from 16 to 80. Higher scores reflect higher levels of self-efficacy. Cronbach’s α scores for the present study were .82 at both T0 and T1.

Statistical analysis

Descriptive statistics were used to describe the study population. Paired t tests were used to assess differences in study outcome measures before and after the program. The following analyses were performed to examine the effect of the predictor variables on quality of life. Univariate associations of physical, social, and mental functioning with demographic variables, positive and negative social support experiences, and self-efficacy were examined using Pearson’s correlation analyses. Independent t tests were used to assess differences for dichotomous variables. Six multiple regression analyses were conducted to investigate the predictive effects of social support and self-efficacy on quality of life, concurrently (within time). Analyses were corrected for age and gender if these variables had significant effects on the outcome variable at baseline.

To investigate the prospective effects of social support and self-efficacy on quality of life, and to examine whether changes in social support and in self-efficacy were associated with changes in quality of life, we performed three separate hierarchical multiple regression analyses. In these analyses, a quality of life subscale post-intervention (T1) was the dependent variable. In the first step, quality of life at pre-intervention (T0) was entered to control for pre-intervention levels. In the second step, the personal resources pre-intervention (T0) were entered to investigate the prospective effect. In the third step, social support and self-efficacy (T1) were entered into the regression model to examine associations between changes in quality of life and changes in personal resources.

Correlational analyses between the independent variables and Variance Inflation Factors (VIF = 1/(1-R^2)) were calculated to assess multi-collinearity. Multi-collinearity is present if the mean VIF is considerably larger than 1 and if the largest VIF is greater than 10 [44].
Results

Patient characteristics
Eighty-one patients entered the study and have been described extensively elsewhere [14]. Sixty-three patients (78%) completed the program and the questionnaires. Twelve patients developed a cancer recurrence and dropped out of the program of their own volition. An additional six patients left the program, two for personal reasons, two because of malaise, and two for unknown reasons. \( \chi^2 \) tests and t tests revealed no significant differences in gender, age, having a partner, education level, or employment status between those who dropped out of the study and those who completed the program. T tests revealed no significant differences in the level of positive and negative social support and self-efficacy at T0 between those who dropped out of the study and those who completed the program.

Sixteen percent of the 63 patients were male. The mean age of the participants was 51.5 (SD=10.3) years. Most patients were living with partners and had moderately high levels of education. Forty percent of the patients were employed.

More than half of the patients were women with breast cancer. Two-thirds of the patients had either stage I or stage II disease. The vast majority of patients (90%) had received a combined treatment of chemotherapy and/or radiotherapy and/or surgery. The remaining patients (10%) had received surgery only. Sixty-seven percent of the participants had completed treatment during the preceding year (Table 1).

Physician-indicated criteria for rehabilitation were as follows: physical complaints (65%), reduced physical capacity (83%), psychological problems (68%), fatigue (87%), sleep disturbances (63%), and coping/acceptance problems (43%).

Preliminary analyses
At baseline, patients who were referred to the rehabilitation program perceived more negative social support (mean=13.4, SD=3.1) than did a reference group of recently diagnosed and treated cancer patients (mean=10.96, SD=2.15, p<.001) and the general population (mean=11.97, SD=2.93, p<.001). The cancer patients who were referred to the program reported more experiences of positive social support (mean=24.0, SD=4.1) than did the normal population (mean=21.32, SD=4.22, p<.001). The reference group of cancer patients (mean=25.87, SD=3.93, p=.01), however, reported more positive experiences than did the study population.

The effects of a multi-dimensional rehabilitation program on personal resources
Paired t tests between T0 and T1 showed a significant decrease in experiences of positive social support, but no significant changes in either negative social support or self-efficacy after the program (Table 2). As reported before, significant and clinically relevant improvements in physical, social, and mental functioning were found after the program [14].
Table 1

Patient characteristics, sociodemographic and disease-related characteristics, n=63

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age (SD), years</td>
<td>51.5 (10.3)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Male</td>
<td>10</td>
<td>15.9</td>
</tr>
<tr>
<td>- Female</td>
<td>53</td>
<td>84.1</td>
</tr>
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<td>Marital Status</td>
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<td></td>
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<tr>
<td>- Married/cohabiting</td>
<td>52</td>
<td>82.5</td>
</tr>
<tr>
<td>- Single</td>
<td>11</td>
<td>17.5</td>
</tr>
<tr>
<td>Level of education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Primary</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>- Lower vocational/secondary</td>
<td>17</td>
<td>27.0</td>
</tr>
<tr>
<td>- Middle vocational/secondary</td>
<td>30</td>
<td>47.6</td>
</tr>
<tr>
<td>- Higher vocational/university</td>
<td>15</td>
<td>23.8</td>
</tr>
<tr>
<td>Employment</td>
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<td></td>
</tr>
<tr>
<td>- Employed for wages</td>
<td>25</td>
<td>39.7</td>
</tr>
<tr>
<td>- Housekeeping</td>
<td>17</td>
<td>27.0</td>
</tr>
<tr>
<td>- Retired</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>- Disabled</td>
<td>11</td>
<td>17.5</td>
</tr>
<tr>
<td>- Unemployed</td>
<td>7</td>
<td>11.1</td>
</tr>
<tr>
<td>Diagnosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Breast cancer</td>
<td>37</td>
<td>58.8</td>
</tr>
<tr>
<td>- Non Hodgkin Lymphoma /M.Hodgkin</td>
<td>5</td>
<td>7.9</td>
</tr>
<tr>
<td>- Gynaecological cancer</td>
<td>5</td>
<td>7.9</td>
</tr>
<tr>
<td>- Head and neck cancer</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>- Rest category &lt; 5%</td>
<td>13</td>
<td>20.6</td>
</tr>
<tr>
<td>Stage of disease</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- In situ</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>- Stage I</td>
<td>11</td>
<td>17.5</td>
</tr>
<tr>
<td>- Stage II</td>
<td>30</td>
<td>47.6</td>
</tr>
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<td>- Stage III</td>
<td>13</td>
<td>20.6</td>
</tr>
<tr>
<td>- Stage IV</td>
<td>3</td>
<td>4.8</td>
</tr>
<tr>
<td>- Not applicable</td>
<td>4</td>
<td>6.3</td>
</tr>
<tr>
<td>- Missing</td>
<td>1</td>
<td>1.6</td>
</tr>
<tr>
<td>Time between treatment and rehabilitation program</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- &lt;6 months</td>
<td>20</td>
<td>31.7</td>
</tr>
<tr>
<td>- &gt;6-12 months</td>
<td>16</td>
<td>25.4</td>
</tr>
<tr>
<td>- &gt;12-18 months</td>
<td>14</td>
<td>22.2</td>
</tr>
<tr>
<td>- &gt;18 months</td>
<td>13</td>
<td>20.6</td>
</tr>
<tr>
<td>- Mean (SD) in months:</td>
<td>11.3 (13.2)</td>
<td></td>
</tr>
</tbody>
</table>
Table 2
Descriptive statistics of positive and negative social support experiences and self-efficacy, before (T0) and after (T1) the rehabilitation program, and paired t tests

<table>
<thead>
<tr>
<th>Personal resources</th>
<th>T0 Mean (SD)</th>
<th>T1 Mean (SD)</th>
<th>95% Confidence Interval of the difference Lower - Upper</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive social support</td>
<td>24.0 (4.1)</td>
<td>23.0 (3.9)</td>
<td>-1.71 to -.17 *</td>
</tr>
<tr>
<td>Negative social support</td>
<td>13.4 (3.1)</td>
<td>13.2 (3.2)</td>
<td>- .58 to 1.06</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>60.6 (10.0)</td>
<td>60.0 (10.1)</td>
<td>-5.80 to 1.06</td>
</tr>
</tbody>
</table>

* p<.05

Univariate associations among the study variables

Independent t tests revealed no significant differences between men and women in age, social support, self-efficacy, or quality of life. Pearson product-moment correlation coefficients showed a significant, but weak, negative association between age and physical functioning at T0 only (i.e., younger patients reported more physical problems).

Pearson product-moment correlation coefficients showed significant correlations between positive and negative social support at T0 and T1 (r=-.58, p<.001 and r=-.48, p<.001, respectively), between positive social support and self-efficacy at T0 and T1 (r=.47, p<.001 and r=.34, p<.01, respectively), and between negative social support and self-efficacy at T0 (r=-.38, p<.01), but not between negative social support and self-efficacy at T1 (r=.18, ns).

Significant correlations were found between positive social support at T0 and at T1 (r=-.68, p<.001), between negative social support at T0 and T1, r=.51, p<.001), and between self-efficacy at T0 and T1 (r=.70, p<.001).

Univariate associations of positive and negative social support and self-efficacy with quality of life at the two measurement times are displayed in Table 3. Associations between quality of life at T0 and at T1 are shown in Table 4.

Multivariate effects of social support and self-efficacy on quality of life at T0 and T1, concurrently

- Physical functioning: Age, positive and negative social support, and self-efficacy accounted for 17% of the explained variance in physical functioning at T0. Age appeared to have only an independent effect. At T1, positive and negative social experiences each had a unique negative effect, and self-efficacy had an independent positive effect on physical functioning at T1. The total variance explained was 26%.

- Social functioning: Positive and negative social support and self-efficacy explained 21% of the variance in social functioning at T0 and 27% of the variance at T1. Only negative social experiences had a unique negative effect on both measurement times.

- Mental functioning: Positive and negative social support and self-efficacy explained 47% of the variance of mental functioning at T0. Only self-efficacy had a unique positive predictive effect. At T1, the three variables together explained 40% of the variance in mental functioning. Self-efficacy had a unique positive effect, and negative social support had a unique negative effect on mental functioning at T1 (Table 3).

VIFs ranged from 1.1 to 1.7 in the regression models.
Table 3
Univariate relationships between the study variables, based on Pearson moment correlational analyses ($r$), and multiple regression analyses of quality of life and personal resources, concurrently (= within time)

<table>
<thead>
<tr>
<th></th>
<th>Physical functioning T0</th>
<th>Social functioning T0</th>
<th>Mental functioning T0</th>
<th>Physical functioning T1</th>
<th>Social functioning T1</th>
<th>Mental functioning T1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$r$ Beta R$^2$ F p</td>
<td>$r$ Beta R$^2$ F p</td>
<td>$r$ Beta R$^2$ F p</td>
<td>$r$ Beta R$^2$ F p</td>
<td>$r$ Beta R$^2$ F p</td>
<td>$r$ Beta R$^2$ F p</td>
</tr>
<tr>
<td>Age</td>
<td>-.27$^<em>$ -.31$^</em>$</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Pos. Soc. Support T0 / T1</td>
<td>.24 .17</td>
<td>.38$^*$ .16</td>
<td>.47$^*$ 12</td>
<td>.02 -.32$^*$</td>
<td>.19 -.12</td>
<td>.24 -.12</td>
</tr>
<tr>
<td>Neg. Soc. Support T0 / T1</td>
<td>.27 -.25</td>
<td>.44$^<em>$ -.32$^{</em>**}$</td>
<td>-.43$^*$ -.16</td>
<td>-.40$^<em>$ -.51$^{</em>**}$</td>
<td>-.48$^<em>$ -.50$^{</em>**}$</td>
<td>-.42$^<em>$ -.39$^</em>$</td>
</tr>
<tr>
<td>Self-efficacy T0 / T1</td>
<td>.10 -.07</td>
<td>.26 .07</td>
<td>.65$^<em>$ .53$^{</em>**}$</td>
<td>.24 .65$^*$</td>
<td>-.25 -.20</td>
<td>.53$^{*<strong>}$ .50$^{</strong>}$</td>
</tr>
</tbody>
</table>

* $p < .05$, ** $p < .01$, *** $p < .001$. 
Multivariate effects of social support and self-efficacy on quality of life, prospectively and change over time

- **Physical functioning:** Physical functioning at T0 accounted for 51% of the variance in physical functioning at T1. Social support and self-efficacy at T0 did not account for a significant increment. None of these baseline variables had significant unique effects. Social support and self-efficacy at T1 accounted for a significant increment of 13%. Self-efficacy had a unique positive effect, and negative social experiences had a negative effect. The predictor variables thus showed no evidence of prospective effects, but improvement in physical functioning was associated with increases in self-efficacy and with declines in negative social support. The total variance explained was 63%. VIFs ranged from 1.0 to 2.9.

- **Social functioning:** Social functioning at T0 accounted for 38% of the variance in social functioning at T1. Social support and self-efficacy at T0 accounted for a non-significant increment of 3%. None of the baseline variables had significant unique effects. Social support and self-efficacy at T1 accounted for a significant increment of 12%. Negative social experiences had a unique negative effect. The predictor variables thus showed no evidence of prospective effects, but improvement in social functioning was associated with declines in negative social experiences. The total variance explained was 53%. VIFs ranged from 1.0 to 2.6.

- **Mental functioning:** Mental functioning at T0 accounted for 30% of the variance in post-intervention mental functioning. Social support and self-efficacy at T0 accounted for a significant increment of 9%, and negative social experiences had a unique negative effect. Social support and self-efficacy at T1 accounted for a significant increment of 15%. Self-efficacy had a unique positive effect and negative social experience had a unique negative effect. Negative social support thus showed an unique prospective effect, and improvement in mental functioning was associated with increases in self-efficacy and declines in negative social experiences. The total variance explained was 55%. VIFs ranged from 1.0 to 2.7 (Table 4).
### Table 4
Multiple hierarchical regression analyses of quality of life and personal resources, prospectively and change over time

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Physical functioning T1</th>
<th>Social functioning T1</th>
<th>Mental functioning T1</th>
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</thead>
<tbody>
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<td></td>
<td>Beta</td>
<td>r²ch</td>
<td>Fch</td>
</tr>
<tr>
<td>To Quality of life</td>
<td>.51</td>
<td>63.7</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Step 2</td>
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<tr>
<td>To Positive social support</td>
<td>-.01</td>
<td>.26</td>
<td>ns</td>
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<tr>
<td>To Negative social support</td>
<td>-.07</td>
<td>-.15</td>
<td></td>
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<tr>
<td>To Self-efficacy</td>
<td>.02</td>
<td></td>
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<tr>
<td>Step 3</td>
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<tr>
<td>T1 Positive social support</td>
<td>.14</td>
<td>6.0</td>
<td>.001</td>
</tr>
<tr>
<td>T1 Negative social support</td>
<td>-.29*</td>
<td>-.34*</td>
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<tr>
<td>T1 Self-efficacy</td>
<td>.38*</td>
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<td>Total R square</td>
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*p < .05, **p < .01, ***p < .001.
Discussion

The present study revealed that this cancer rehabilitation program had no beneficial effects on the personal resources of the patients. Concurrently, negative social support and self-efficacy appeared to have a more consistent effect on quality of life than did positive social support. Prospectively, negative social support was found to have a small and negative effect only on mental functioning. Finally, although the program neither increased self-efficacy nor decreased experiences of negative social support for the whole group, improvements in quality of life were associated with increases in self-efficacy and reductions in negative social support.

Our first hypothesis was that social support and self-efficacy would change in a positive way following the multidimensional program. In contrast to the increase in positive support that was expected to follow the program (which consisted of a group program to stimulate the provision of peer support from fellow group members [17,21] and the request for positive social support from significant others and health care professionals if needed [45], patients reported receiving less positive social support after the program than they had received before the program. One explanation for the decrease in positive social support experiences after completion of the program may be that patients’ answers reflect the loss of support received from their fellow group members. Another explanation may be that due to the intervention, patients became aware that the social support received from their social network was less adequate. Such a change in patients’ internal standards, values or reconceptualization of social support may have occurred over the intervention trajectory [2], and may occur in any field where self-reported data are collected [46].

The lack of change in negative social support experiences may reflect social constraints that the patients experienced [30]. A social constraint refers to any social condition that causes trauma survivors to feel unsupported, misunderstood, or otherwise alienated from their social networks when they are seeking social support or attempting to discuss their cancer [30,47]. The possibility of such social constraints is supported by the finding that our patients had significantly higher scores on negative social support relative to the normal population and a reference group of recently diagnosed and treated cancer patients. They also experienced fewer positive social experiences relative to the recently diagnosed and treated cancer patients. Both of these findings suggest that the group of patients who were referred for rehabilitation might be a selected group of patients whose networks apparently do not fulfill their support needs in the desired way.

Contrary to the literature, which indicates that both physical and psychological intervention techniques may increase self-efficacy [31], no changes in self-efficacy were observed after the rehabilitation program. One possible explanation for this result is that the program was not powerful enough to strengthen self-efficacy. Future rehabilitation programs should therefore incorporate goal setting with a focus on self-generated, positive, and realistic goals. Such goals seem to be essential aspects of the motivation to change and to improve self-efficacy in specific situations [31,48,49]. Another explanation is that the General Self-efficacy Scale, while initially attractive because of its global nature may be problematic because of that same characteristic. Following Bandura’s original intent, the more specific the self efficacy rating, the more likely the measure is to detect the effect of an intervention. Therefore, behaviour specific or task specific self-efficacy ratings may be more appropriate.
Our second hypothesis focused on examining the effects of social support and self-efficacy on quality of life before and after rehabilitation. In general, the findings suggest that negative social support was a more important predictor of quality of life than was positive social support. Those who perceived less negative social support experienced better social functioning at baseline and better physical, social, and mental functioning after the program. Our findings are in line with other studies reporting that perceived negative social support has negative effects on psychological well-being [23,49].

“Positive social experiences” was the only variable to have a unique negative effect on physical functioning after the program. This finding is consistent with the results of another study, which reported a negative association between the number of quality of life problems that patients have and the level of positive social support they experience [42]. Conversely, patients who have fewer quality of life problems may need less social support; they may therefore be less likely to ask for social support, or their social networks may be less likely to provide positive social support [21,23,49].

Patients with higher levels of self-efficacy experienced better mental functioning at baseline and better mental and physical functioning post rehabilitation. These findings support the notion that self-efficacy is associated with less psychological stress [18,49], fewer depressive symptoms [50], and better adjustment [49,51,52] in cancer patients. The proportion of variance explained in the diverse domains of quality of life was found to be higher for mental functioning than it was for social and physical functioning. The variables that were included in our study were apparently more important predictors for the mental aspects of quality of life than they were for other aspects. This is not surprising. For example, self-efficacy expectancies are considered as cognitive control systems that determine the courses of action people choose, how much effort they make to attain particular goals, and how long they will persist in the event of failure [38]; all of these aspects refer to mental functioning.

The results revealed that personal resources had no prospective effect on physical and social functioning, with one exception: negative social experiences appeared to have a slight prospective predictive effect on mental functioning. Other variables that were not included in the present study may therefore be more relevant and should be taken into account in future studies. Possible relevant variables include personality characteristics, coping styles, and illness perceptions. Quality of life at baseline, however, was the most powerful predictor for later functioning; this finding is consistent with another study, which reported that pre-morbid distress is a strong predictor of short-term and later distress [53]. This suggests that patients who are at risk for problems should be identified earlier in the disease trajectory and referred for professional care.

Our last hypothesis concerned the positive associations between changes in quality of life and changes in personal resources. Although the program neither increased self-efficacy nor deceased experiences of negative social support for the whole group, the results suggest that individual-level improvements in quality of life were associated with increases in self-efficacy and reductions in perceived negative social experiences. Changes in positive social support did not affect quality of life at the individual level, although a group-level decrease in positive social support was found. These findings emphasize that the effects of rehabilitation in cancer patients may vary between patients.

Change in negative social support and self-efficacy were found to be associated with changes in quality of life. Decreases in perceived negative social support appeared to be associated
with improvements in all quality of life domains. This finding is consistent with other studies, which have revealed that those with poor social networks or socially constrained cancer survivors may benefit the most from supportive groups or psychosocial treatment [21,45]. In addition, increases in self-efficacy were associated with improvements in physical and mental functioning. This finding is consistent with self-efficacy theory, which is based on the idea that coping or adaptive skills can be learned, or on the belief that efficacy can change [16].

Practical implications
Several implications can be derived from the results of the present study. The finding that negative social experiences had the most consistent negative effect on quality of life suggests that patients with more negative social experiences are at risk for lower functioning later. It would therefore be worthwhile to provide special care in an earlier stage to patients who have high levels of negative social experiences. In other words, clinical health care providers should assess the social networks of cancer patients and their ability to ask for social support, in addition to their usual practice of assessing the physical and psychological complaints and functioning of their patients.

In addition to its role as a potential risk factor, negative social support may also be considered an important ingredient in the rehabilitation process. It would therefore be interesting to develop interventions that can effectively reduce negative social experiences. We suggest considering the concept of “social comparison” because of its predictive effect for health behavior [29] and its reported mediating effect between resources and benefit findings, which is considered a desirable outcome of adjustment over time [54]. Another suggestion would be to involve patients’ relevant others such as the patients’ partner, adult child or a friend in the program to increase their awareness of the specific support needs of the patient.

In addition, it would be interesting to develop future programs that focus more on improving self-efficacy. Improvements in self-efficacy may be realized by systematically addressing and manipulating all four sources of self-efficacy (i.e., the performance accomplishment of (physical) tasks, modeling, verbal persuasion, and physiological arousal) [24]. Improved self-efficacy may also be realized by providing the cancer rehabilitation program in the form of a self-management program, as previously reported for patients with chronic conditions [55].

Limitations of the study
The results regarding the program’s effectiveness should be interpreted with caution, as the study did not include a control group. Future research should involve prospective randomized controlled studies in order to examine the effects more thoroughly. The strength of the design is that we were able to determine predictors of quality of life at baseline in addition to examining the prospective effects of the predictor variables on quality of life, as well as investigating associations between change in predictors and change in quality of life over time.

The number of patients included in the study may be comparable to other intervention studies. However, considering the number of analyses conducted in the study, the number is relatively small. Therefore, the study should be repeated with a larger study group.

Multi-collinearity between the independent variables may be a point of concern with respect to the regression models. Correlation analyses and the low VIFs, however, show that this was not a concern in this study.
Conclusion
The multidimensional rehabilitation program had little effect on the personal resources of the patients. Personal resources had concurrent but slight prospective effects on quality of life. Negative social support experiences and self-efficacy were more consistent and important predictors of quality of life than were positive social experiences, both before and after the program. Although the program neither increased self-efficacy nor decreased experiences of negative social support for the group as a whole, improvements in quality of life appeared to be associated with increased self-efficacy and a reduction in negative social experiences.

Conflict of interest
None declared.
Reference List


Perceived social support and self-efficacy

[29] Luszczynska A, Gibbons FX, Piko BF, Tekozel M. Self-regulatory cognitions, social comparison, and perceived peers’ behaviours as predictors of nutrition and physical activity: a comparison among adolescents in Hungary, Poland, Turkey, and USA. Psychol Health 2005; 19: 577-593.


