

## 5. Results

This chapter comprises the results of the present study. Results are divided into five parts. The first part presents patients' adjustment profiles, i.e., negative affect, quality of life, pain, fatigue, and impairment attributed to illness; and examines the time effect on these indicators, and their associations with demographic (e.g., sex, age) as well as medical factors (e.g., cancer recurrence). This section provides answers to the hypotheses regarding patients physical and psychological health.

The second part describes patients personal and social resources, scrutinizes their concurrent and longitudinal correlations and their development over time. Related hypotheses regarding time effect on these variables are closely examined. Other factors affecting the aforementioned variables (e.g., age, sex) are investigated.

In the third part, different coping strategies that are predicted to be used by patient and their correlation with demographic and medical data, and their development over time were examined. This parts also investigates associations between coping strategies used and patients personal and social resources both concurrently and longitudinally.

In the fourth part, the development of meaning found in cancer was examined. In addition associations between meaning, demographic and medical factors, patients personal and social resources, and coping strategies were explored both longitudinally and concurrently. Furthermore, the mediating role of coping in the relationships between resources, i.e., personal and social resources, and meaning found in cancer were inspected. This part also investigates whether certain patterns of associations between the aforementioned parameters persist over time.

Finally, the relationships between meaning found in cancer and other indicators of well-being and adjustment were scrutinized.

## 5.1. Descriptive Results: Physical and Psychological Health

### 5.1.1. Negative Affect

Looking at the distribution of the scale revealed an acceptable levels of both *skewness* (.91) and *kurtosis* (.19). At the 3-day pre-surgery assessment (t1) low level of negative affect was reported ( $M = 10.64$ ,  $SD = 3.68$ ; scale range = 6 – 24,  $n = 354$ ). This result was not expected since high level of distress usually predominates in the aftermath of cancer diagnosis (Holland & Goen-Piels, 2000; Brennan, 2001). Therefore, other factors are examined to determine what influenced patients reports of negative affect at this measurement point in time.

**Sex, Age, and Marital Status.** Investigating sex differences in negative affect reported at t1 showed that women reported significantly higher level of negative affect ( $M = 11.81$ ,  $SD = 3.76$ ;  $n = 136$ ) than men ( $M = 9.86$ ,  $SD = 3.39$ ;  $n = 215$ ). These sex differences in negative affect reported at t1 continued to appear within recently diagnosed patients group (time since diagnosis < 30 days;  $t(n = 200) = 3.50$ ,  $p < .005$ ), as well as, within patients diagnosed with cancer for a longer time (time since diagnosis > 30 days;  $t(n = 141) = 3.36$ ,  $p < .005$ ), with women, in the two groups, reporting higher levels of negative affect than men.

Looking at the association between age and negative affect reported at t1, *Pearson* correlation coefficient revealed no significant association between the aforementioned variables ( $r = .08$ ,  $p = .12$ ;  $n = 354$ ). However, controlling for sex, partial correlation between age and negative affect revealed a marginally significant association ( $r = .09$ ,  $p = .09$ ;  $n = 348$ ).

Closer investigation of the relationship between age and negative affect (t1) by trichotomizing chronological age (age groups: 22 to 59 years (30.6%), 60 to 69 years (42.8%), and 70 to 89 years (26.6%)) and examining differences between these three age groups, using ANOVA, showed also a marginally significant effect for age ( $F(2, 351) = 2.76$ ,  $p = .06$ ). Post-hoc tests (*Scheffe*) indicated marginally significant differences between the oldest group ( $M = 9.92$ ,  $SD = 3.28$ ;  $n = 98$ ) and both the youngest group ( $M = 10.76$ ,  $SD = 3.65$ ;  $n = 111$ ), and the middle aged group ( $M = 11.03$ ,  $SD = 3.9$ ;  $n = 145$ ) indicating that the oldest group reported lower level of negative affect at t1 than the other two age-groups.

Examining the associations between patients' marital status and negative affect reported at t1 revealed a main effect of marital status ( $F(3, 333) = 3.59, p < .05$ ). Married patients or patients with partners reported the lowest level of negative affect measured at this point in time ( $M = 10.23, SD = 3.41; n = 244$ ), however, post hoc analyses revealed significant differences only between married/with partner patients and divorced patients ( $M = 12.31, SD = 4.15; n = 37$ ). Despite the different sub-sample size, no violation of the homogeneity of variance assumption was detected (Levene's test ( $p$ )  $> .05$ ).

**Medical Data.** Inspection of the dichotomized reported time elapsed since the initial diagnosis showed that 206 (44.9%) patients were recently diagnosed with cancer (time elapsed since diagnosis range between 1 day and 30 days), whereas 147 patients (32%) reported being diagnosed for more than one month; 106 patients (23%) provided no information regarding this time factor. Examining differences between within-one-month diagnosed patients (206 patients) and post-one-month diagnosed patients (147 patients) in negative affect reported at t1 indicated no significant differences ( $t(n = 341) = .20, p = .84$ ), although, recently diagnosed patients reported slightly higher level of negative affect ( $M = 10.74, SD = 3.72$ ) compared with post-one-month diagnosed patients ( $M = 10.65, SD = 3.63$ ).

Exploratory analyses of the associations between negative affect and other medical data including cancer recurrence and multi-morbidity revealed no significant associations. With regard to co-morbidity, t test revealed significant differences between patients with renal disease and other patients ( $t(n = 296) = 2.04, p < .05$ ). Patients with co-morbid renal disease reported significantly lower level of negative affect reported at t1 ( $M = 8.96, SD = 3.30, n = 19$ ) compared to patients without co-morbid renal disease ( $M = 10.73, SD = 3.68, n = 277$ ).

Thus, summarizing these results, report of negative affect at t1 was not, in general, high in the full sample, however, significantly higher levels of negative affect reported, at this point in time, were associated with being a female, divorced, and young or middle aged patient. Slightly higher levels of negative affect were found

among within-one-month diagnosed patients as compared to post-one-month diagnosed patients. No significant association between cancer recurrence and negative affect at t1 was found.

### Change in Negative Affect Over Time.

Repeated measurements ANOVA was used to investigate time effects on report of negative affect, that is, whether negative affect decreases over time, and whether this expected time change is related to selected demographic (e.g., age, sex, marital status) and medical variables (e.g., time elapsed since diagnosis, cancer recurrence). Greenhouse-Geisser Epsilon correction for violation of the sphericity assumption was used under conditions that Mauchly's test of sphericity showed departure from the assumption. Results indicated that although all means remained below the theoretical average of the scale (12; scale range 6 – 24), significant change over the repeated assessments appeared ( $F(4, 308) = 3.87, p < .004, \zeta^2 = .05$ )<sup>1</sup>.

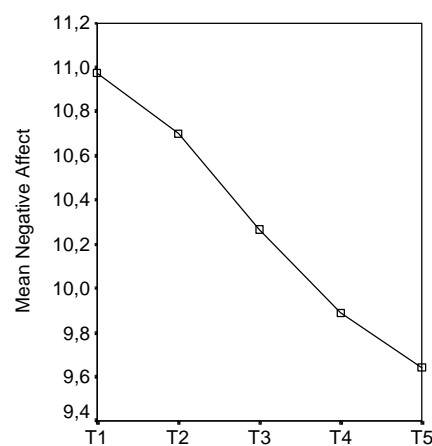


Figure 4. Means of Negative Affect at All Measurement Points in Time ( $n = 78$ ).

Greenhouse Geisser correction after the significant departure from sphericity, critical value for an alpha level of .5  $F(3.44, 264.61) = 3.87, p < .005, \zeta^2 = .05$ )<sup>1</sup>

Test of contrast, however, indicated no significant changes between the pre-surgery and the 7-day post-surgery assessment ( $F < 1.0$ ), whereas a marginally significant change between the pre-surgery and one-month follow-up was found (t3;  $F(1, 77) = 3.46$ ,  $p = .07$ ,  $\zeta^2 = .04$ ). Significant changes were found between the first assessment and both the 6-month post-surgery (t4;  $F(1, 77) = 6.08$ ,  $p < .05$ ,  $\zeta^2 = .07$ ) and the 12-month post-surgery follow-up (t5;  $F(1, 77) = 8.75$ ,  $p < .01$ ,  $\zeta^2 = .10$ ). Figure 4 shows means of reports of negative affect across all measurements.

With regard to the effect of sex, age, and time elapsed since the initial diagnosis on negative effect over time, results from a series of repeated measure ANOVA with the three aforementioned variables serving as independent variables, showed a main effect of sex with women reporting higher levels negative effect than men at all measurement points in time ( $F(1, 76) = 5.37$ ,  $p < .05$ ,  $\zeta^2 = .07$ ). Nevertheless, no significant time by sex interaction was found (see figure 5).

Investigating the effect of age on the negative effect over time by means of repeated measure ANOVA with the trichotomized age as the independent variable (age groups: 22 to 59 years, 60 to 69 years, and 70 to 89 years) showed a significant effect of age on report of negative effect ( $F(2, 75) = 3.13$ ,  $p < .05$ ,  $\zeta^2 = .08$ ). The group multiple comparison (*Scheffe'*) revealed significant differences between the middle age group (60 to 69 years) and the oldest group across all measurement points (see Figure 6). No significant time by age interaction was found.

No significant main effect for the time elapsed since the diagnosis and no significant interaction was found. However, when only patients without cancer recurrence ( $n = 49$ ) were included in the analyses, results indicated a significant time  $\times$  *chronicity* (i.e., time elapsed since the initial diagnosis) interaction ( $F(4, 188) = 2.93$ ,  $p < .05$ ,  $\zeta^2 = .06$ ). No violation of the homogeneity assumption was detected despite the unequal group size ( $p > .10$ ). These results, however, should be cautiously interpreted due to the small sample size (see Figure 7).

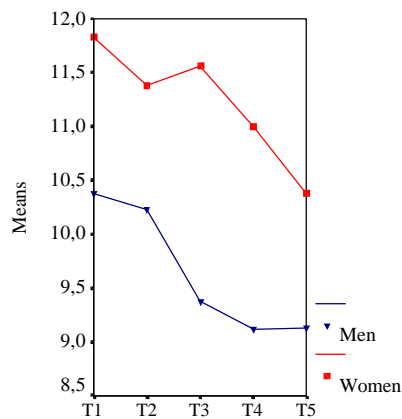


Figure 5. Means of Negative Affect for Men ( $n = 46$ ) and Women ( $n = 32$ ).

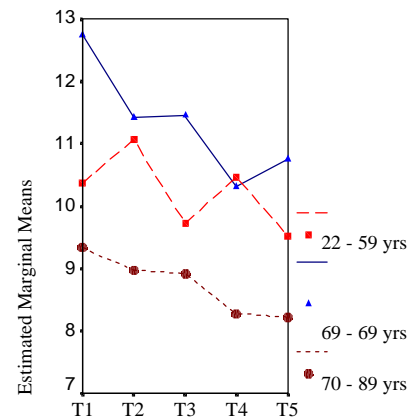


Figure 6. Means of Negative Affect for Young ( $n = 29$ ), Middle ( $n = 30$ ), and Old ( $n = 19$ ) Age-groups.

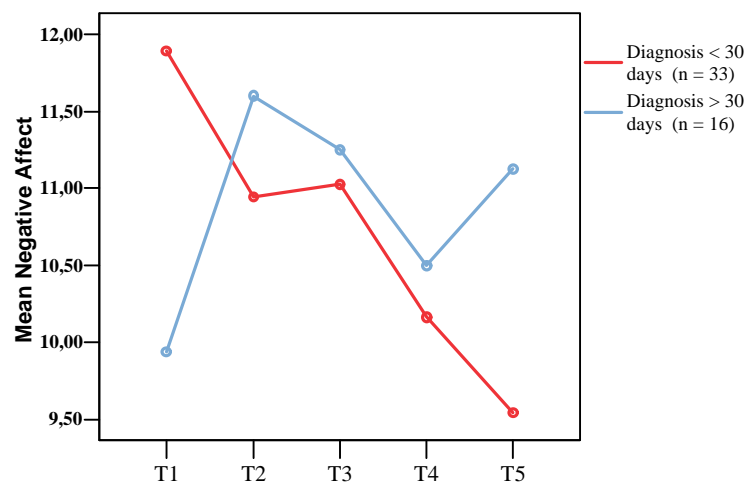


Figure 7. Means of Negative Affect : The Effect of Time Elapsed Since Diagnosis in Groups with no Cancer Recurrence.

These results confirmed the hypothesized decrement in negative affect in all the post-surgery assessments in all patients that became more significant in newly diagnosed patients with no cancer recurrence compared to post-one-month diagnosed patients with no recurrence. In addition sex differences in negative affect continued to exist

with women reporting higher level of negative affect. Significant age differences, mainly between the middle aged and the oldest group were also found.

### 5.1.2. Quality of Life

Investigating patients quality of life reported at t1 ( $n = 355$ ) showed that patients, in general, experienced a moderate level of quality of life at the pre-surgery assessment ( $M = 56.51$ ,  $SD = 23.50$ ; range 0 – 100). In addition to that, the distribution of the scale was satisfactory ( $Skewness = .08$ ;  $kurtosis = .12$ ).

**Sex, Age, and Marital Status.** Searching for sex differences in levels of quality of life reported at t1 showed no significant differences ( $t(n = 353) = 1.45$ ,  $p = .15$ ), although, men ( $M = 57.93$ ,  $SD = 22.30$ ,  $n = 221$ ) tended to report slightly higher level of quality of life at this point in time as compared to women ( $M = 54.23$ ,  $SD = 24.70$ ,  $n = 132$ ). Using ANOVA, differences between patients in quality of life reported at this point in time revealed no significant effect of their marital status ( $F(3, 337) = 1.94$ ,  $p = .12$ ). With regard to age, no significant association was found ( $p > .10$ ).

**Medical Data.** Concerning the associations between quality of life at t1 and medical data, comparison analyses, using t test, between the newly diagnosed patients ( $M = 54.94$ ,  $SD = 23.72$ ,  $n = 201$ ) as compared to post-one-month diagnosed patients ( $M = 58.63$ ,  $SD = 22.74$ ,  $n = 144$ ) indicated no significant differences between the two groups ( $t(n = 345) = .15$ ,  $p = .15$ ). Looking at other medical data, the *Spearman's rho* revealed significant and negative associations between indicators of the stage and severity of cancer and level of quality of life at t1. These indicators included the tumor grade (G;  $r = -.17$ ,  $p < .05$ ,  $n = 220$ ), the size of tumor (T;  $r = -.22$ ,  $p < .005$ ,  $n = 225$ ), the degree of involvement of regional lymph nodes (N;  $r = -.26$ ,  $p < .005$ ,  $n = 211$ ), and the presence of a residual tumor (R;  $r = -.21$ ,  $p < .05$ ,  $n = 137$ ).

Although for many patients cancer diagnosis was not confirmed until after surgery, these results indicate that cancer-related symptoms, before the surgery, were associated with lower level of quality of life measured at this point in time.

No association between the level of quality of life reported at t1 and multimorbidity, i.e., the number of unweighted non-cancerous medical diagnoses, was found. Examining associations between comorbidity, i.e., the presence of other non-

cancerous disease, and quality of life at t1 showed that patients with cardiovascular and pulmonary diseases reported significantly lower level of quality of life ( $M = 52.70$ ,  $SD = 20.76$ ;  $n = 86$ ) compared to other patients ( $M = 59.34$ ,  $SD = 23.26$ ;  $n = 211$ ). No other significant differences in quality of life attributed to the presence of comorbid disease other than pulmonary diseases (e.g., diabetes) appeared.

### **Change in Quality of Life Over Time.**

In general, reports of quality of life remained above the theoretical average of the scale (50, scale range 0 – 100) across all measurement points in time. Examining the effect of time on reports of quality of life measured at the five assessments using repeated measures ANOVA, revealed a departure from the sphericity assumption, accordingly, Greenhouse-Geisser Epsilon correction for violation of the sphericity assumption was used ( $F(4, 324) = 3.55$ ,  $p < .01$ ,  $\zeta^2 = .04$ )<sup>2</sup>. According to the results, significant time effect on reports of quality of life was found. Levels of quality of life, as expected, decreased between the first assessment (t1) and one-month post-surgery assessments (t3,  $F(1, 81) = 3.16$ ,  $p = .08$ ,  $\zeta^2 = .04$ ), although this decrement was marginally significant, it suggested the negative effect of both confrontation with the diagnosis and the surgery on patients quality of life (see Figure 8). Level of quality of life, however, started to increase significantly between both t3 and t4 ( $F(1, 81) = 4.52$ ,  $p < .05$ ,  $\zeta^2 = .05$ ), and t3 and t5 ( $F(1, 81) = 15.29$ ,  $p < .001$ ,  $\zeta^2 = .16$ ) signifying higher levels adjustment as compared to the initial two assessments (i.e., t1, t2).

Although significant differences in quality of life at t1 were found between patients with cardiovascular and pulmonary diseases compared to other patients, however, no significant time effect of being diagnosed with cardiovascular and pulmonary diseases was found ( $F(4, 272) = .64$ ,  $p = .63$ ,  $\zeta^2 = .009$ ).

<sup>2</sup>. Greenhouse Geisser correction after the significant departure from sphericity, critical value for an alpha level of .05 =  $F(3.535, 286.297) = 3.55$ ,  $p < .01$ ,  $\zeta^2 = .04$ .



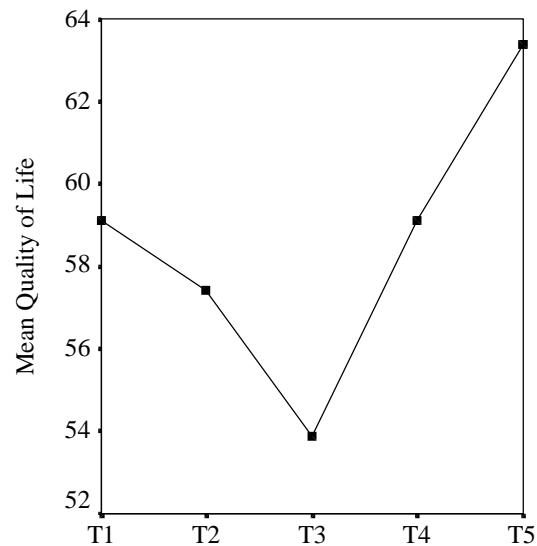


Figure 8. Means of Quality of Life at All Measurement Points in Time ( $n = 82$ ).

In sum, quality of life was low around the surgery as predicted, and increased significantly beyond surgery. Moreover, results attested to the negative effect of higher degree of severity of cancer, the presence of comorbid disease, in particular cardiovascular and pulmonary diseases, on patients' quality of life reported at the 3-days pre-surgery assessment.

### 5.1.3. Pain, Fatigue, and Impairment Attributed to Illness

Pain, fatigue, and impairment due to the illness were measured in all waves. At t1 ( $n = 362$ ), patients reported very low level of pain ( $M = 13.29$ ,  $SD = 21.36$ , range 0 – 100), low level of fatigue ( $M = 30.35$ ,  $SD = 27$ , range 0 – 100), and a moderate level of impairment attributed to illness ( $M = 53.67$ ,  $SD = 52$ , range 0 – 100). These results are expected since reports of pain, fatigue, and impairment are expected to increase around surgery and under conditions that patients experience cancer recurrence.

**Age, sex, and Marital Status.** Looking at associations between age, sex, marital status, and these three parameters, no significant associations between age, pain, and impairment attributed to illness reported at t1 were found, however, marginally significant correlation between chronological age and fatigue appeared ( $r = .09$ ,  $p = <.10$ ;  $n = 364$ ). This association indicated that older patients tended to report more fatigue at t1 compared to younger patients. Further examination of the effect of age on fatigue by means of ANOVA with the trichotomized age as the independent

variable (age groups: 22 to 59 years, 60 to 69 years, and 70 to 89 years) indicated no significant main effect of age ( $p > .10$ ).

With regard to the associations between sex, pain, fatigue, and impairment due to illness (t1), no significant sex differences in pain, and impairment were found. Sex differences, however, were found in fatigue ( $t(n = 364) = 3.07, p < .005$ ). Women reported higher level of fatigue ( $M = 35.65, SD = 27.18, n = 139$ ) than men did ( $M = 27.08, SD = 25.07, n = 225$ ), although the reported level of fatigue, in both groups, remained under the midpoint of the scale (50; scale range: 0 – 100).

ANOVA measures was also used to examine the effect of social status on reports of pain, fatigue, and impairment attributed to illness at t1. A significant effect for marital status on pain ( $F(3, 341) = 7.50, p < .001$ ), and on fatigue ( $F(3, 343) = 4.50, p < .01$ ) were found. Post-hoc analyses showed that single patients reported significantly higher levels of pain ( $M = 31.55, SD = 33.47, n = 22$ ) compared with divorced patients ( $M = 6.75, SD = 13.19, n = 32$ ). Single patients also reported higher levels of fatigue ( $M = 44.65, SD = 30.63, n = 23$ ) in comparison with married patients ( $M = 27.29, SD = 25.38, n = 253$ ).

**Medical Data.** With regard to medical data, comparing between within-one-month diagnosed patients and post-one-month diagnosed patients in pain, fatigue, and impairment attributed to illness, using t tests, showed that within-one-month diagnosed patients reported significantly lower levels of pain ( $t(n = 350) = 2.80, p < .01; M = 10.60, SD = 18.92, n = 204$ ), and of fatigue ( $t(352) = 1.99, p < .05; M = 28.35, SD = 25.34, n = 206$ ) compared to post-one-month diagnosed patients (pain:  $M = 17.27, SD = 23.25$ ; fatigue:  $M = 33.95, SD = 27.03$ ). No significant differences regarding impairment attributed to illness were found. Inspecting difference in pain, fatigue, and impairment due to illness that could be attributed to cancer recurrence revealed no significant differences in this measurement point in time (t1).

Examining associations between indicators of severity of cancer, pain, fatigue, and impairment due to illness revealed that impairment due to illness reported at t1 is significantly related to the degree of involvement of regional lymph nodes (N;  $F(2, 213) = 2.98, p = .05$ ) indicating that patients with a developing course of cancer

reported higher level of impairment. Significant association between impairment attributed to illness and tumor grading was also found ( $G; F(2, 225) = 3.56, p < .05$ ); patients with undifferentiated tumor were more likely to report higher degree of impairment compared to other patients. No other marked associations were found.

To draw conclusions, pain, fatigue, and impairment due to illness reported at t1 were low, as expected, however, differences in levels of pain and fatigue are associated with sex, age, marital status, and the time elapsed since the initial diagnosis. Whereas, differences in level of impairment were associated with indicators of severity of cancer. Thus, results so far, did not confirm the hypothesized association between cancer recurrence, pain, fatigue, and impairment attributed to illness.

### **Time Effect on Pain, Fatigue, and Impairment due to Illness.**

**Pain.** One way repeated measures ANOVA was used to examine time effect on reports of pain. Greenhouse-Geisser Epsilon correction for violation of the sphericity assumption showed significant time effect on pain ( $F(4, 360) = 13.19, p < .001, \eta^2 = .13$ )<sup>3</sup>. Although levels of pain reported remained lower than the midpoint of the scale across all measurement points in time (50; scale range:0 - 100), inspections of the contrasts revealed an increment in the level of pain reported between t1 and t2 pointing to the effect of cancer surgery on patients' physical health (t2,  $F(1, 90) = 40.75, p < .001, \eta^2 = .31$ ).

Pain reported increased slightly but not significantly between t2 and t3, and then started to decrease between t3 and t4 and between t4 and t5, however, this decrement was not significant. Thus, results so far confirmed the related hypothesis that pain should be high around the surgery compared to pre-surgery. Means of pain across all assessments are depicted in Figure 9.

<sup>3</sup>Greenhouse Geisser correction after the significant departure from sphericity, critical value for an alpha level of .5( $F(3.66, 329.210) = 13.19, p < .001, \eta^2 = .13$ ).

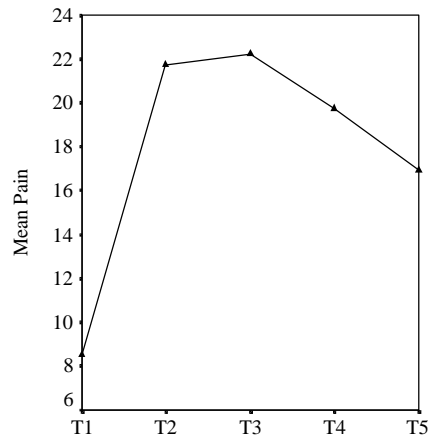


Figure 9. Means of Pain at All Measurement Points in Time ( $n = 91$ ).

**Fatigue.** Examining the time effect on fatigue using one way repeated measure ANOVA showed that all reports of fatigue across the different measurement points in time remained, in general, low (see Figure 10). However, reports of fatigue increased significantly in post-surgery compared to pre-surgery assessments ( $F(4, 356) = 16.22, p < .001, \zeta^2 = .15$ ). Examining the contrasts showed significant increase between t1 and t2 ( $F(1, 89) = 29.99, p < .001, \zeta^2 = .25$ ) signifying the effect of surgery. A marginally significant increase was observed between t2 and t3 ( $F(1, 89) = 3.55, p = .06, \zeta^2 = .04$ ), then report of fatigue decreased slightly between t3 and t4. This decrement, however, became significant between t4 and t5 ( $F(1, 89) = 5.35, p < .05, \zeta^2 = .06$ ). These results answered the hypothesis that fatigue increases around the surgery.

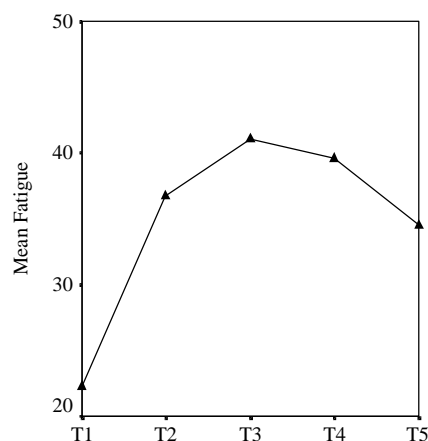


Figure 10. Means of Fatigue at All Measurement Points in Time ( $n = 90$ ).

**Impairment attributed to illness.** Concerning impairment due to illness repeated measurement ANOVA showed a significant time effect ( $F(4, 360) = 15.78, p < .001, \zeta^2 = .15$ )<sup>4</sup>. Reports of impairment was low at the initial assessment and then it increased significantly between t1 and t2 signifying the perceived impact of the cancer surgery on patients' daily life ( $F(1, 90) = 11.07, p < .001, \zeta^2 = .11$ ). Report of impairment, however, slightly decreased between t2 and t3 suggesting an ongoing adjustment process. This decrement continued and became significant between t3 and t4 ( $F(1, 90) = 18.95, p < .001, \zeta^2 = .17$ ), and between t4 and t5 ( $F(1, 90) = 6.62, p < .05, \zeta^2 = .07$ ). These patterns of time change imply that the highest impact of illness on patients' life was around the surgery (see Figure 11).

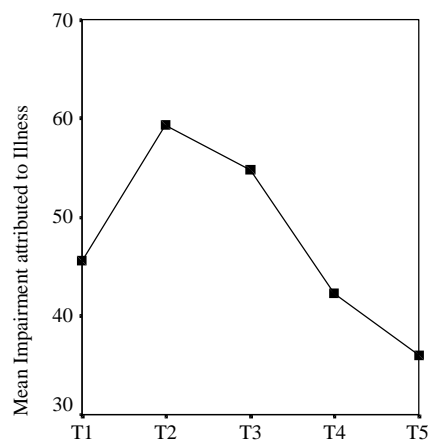


Figure 11. Means of Impairment Attributed to Illness at All measurement Points in Time ( $n = 91$ ).

<sup>4</sup>Greenhouse Geisser correction after the significant departure from sphericity, critical value for an alpha level of .5 ( $F(3.09, 278, 07) = 15.78, p < .001, \zeta^2 = .15$ )

## 5.2. Patients' Personal and Social Resources

### 5.2.1. Personal Resources: Descriptive Results

No directed prediction about patients' personal resources was made. Therefore descriptive results of personal resources measured by self-efficacy beliefs and their associations with other variables were reported. In general the mean of the reported self-efficacy beliefs was located markedly beyond the midpoint of the scale ( $M = 3.06$ ,  $SD = .54$ ; scale range: 1 – 4;  $n = 238$ ).

**Age, Sex, and Marital Status.** Pearson correlations between self-efficacy beliefs, sex, and age revealed only marginally significant association with sex ( $r = -.12$ ,  $p < .10$ ) with men scoring slightly higher ( $M = 3.12$ ,  $SD = .49$ ;  $n = 139$ ) than women ( $M = 2.99$ ,  $SD = .60$ ;  $n = 99$ ). Further examination of the association between self-efficacy and age by means of ANOVA and using the trichotomized chronological age as an independent variable (age groups: 22 to 59 years (30.6%), 60 to 69 years (42.8%), and 70 to 89 years (26.6%)) showed no significant differences between the three age groups.

ANOVA was used again to test whether there is significant differences between patients in self-efficacy beliefs that could be attributed to their marital status. Results indicated no significant differences and that all groups of patients, regardless of their marital status, reported moderate levels of self-efficacy.

**Medical Data.** Examining relationships between self-efficacy and some medical data revealed no significant associations, however, marginally significant correlation was found between self-efficacy and multimorbidity ( $r = .11$ ,  $p < .10$ ;  $n = 213$ ) indicating that patients with more than one non-cancerous diseases reported slightly higher level of self-efficacy compared to other patients. In addition undergoing curative surgery ( $M = 3.06$ ,  $SD = .54$ ) rather than palliative surgery ( $M = 2.86$ ,  $SD = .51$ ) was marginally associated with higher levels of self-efficacy beliefs ( $t(n = 214) = 1.70$ ,  $p < .1$ ).

To summarize these findings, the lack of strong and significant associations between self-efficacy beliefs, demographic, and medical data, attest to the independency of this *facet of the self-system* as referred to by Bandura (1986).

## 5.2.2. Social Resources: Descriptive Results

### 5.2.2.1. Received Social Support

To test the hypothesis concerning whether patients receive high social support at the pre-surgery assessment, descriptive analysis was used. Results showed that patients at this point in time reported receiving high social support ( $M = 3.67$ ,  $SD = .40$ , scale range: 1-4).

*Age, Sex, Marital Status, and Medical Data.* Investigating the associations between support received at t1 and these demographic variables revealed no significant associations with age and sex, however, support was significantly associated with the binary marital status ( $r = -.16$ ,  $p < .05$ ,  $n = 335$ ) indicating that married patients received significantly higher level of support compared to not married patients. A significant association between support received at t1 and number of support resources was also found ( $r = .14$ ,  $p < .005$ ,  $n = 343$ ) indicating the availability of multiple resources of support is associated with higher level of support received. Results, however, reflected no significant associations between support received at t1 and medical data including time elapsed since diagnosis, and cancer recurrence ( $p > 1.0$ ).

### Social Support: Unique Time effect

Testing change in social support received over one year period using a one-way repeated measures ANOVA showed that report of support received remained above the theoretical average of the scale (2.5; scale range: 1 – 4) over the five measurement points in time. Results also indicated a significant time effect on received support ( $F(4, 348) = 2.88$ ,  $p < .05$ ;  $\zeta^2 = .03$ )<sup>5</sup>. Inspection of the contrast yielded a significant changes between support reported at 7-day post-surgery (t2) and support reported at 12 months post-surgery (t5;  $F(1, 87) = 5.4$ ,  $p < .05$ ,  $\zeta^2 = .06$ ), and between support received at one month post-surgery (t3) and support reported 11 months later (t5;  $F(1, 87) = 6.33$ ,  $p < .05$ ,  $\zeta^2 = .07$ ).

Marginally significant change also appeared between support received at one month (t3) and support reported five months later (t4;  $F(1, 87) = 3.55$ ,  $p = .063$ ,  $\zeta^2 = .04$ ). Figure 12 shows means of support received in all waves. According to these results,

the highest levels of support received was reported around the surgery and then dropped off in the last two assessments (t4 and T5). These findings confirmed the hypotheses that support should be high around the surgery.

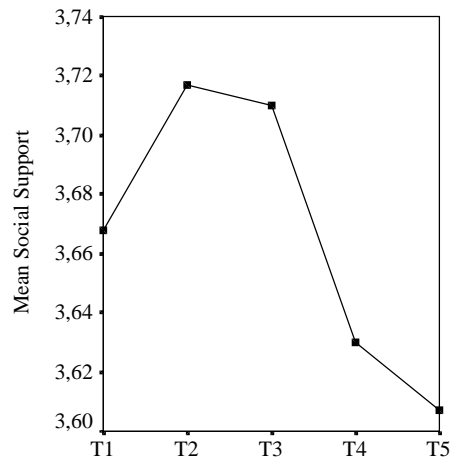


Figure 12. Means of Received Social Support at All Measurement Points in Time.

Examining whether there is a main effect of sex on support received over time, using a repeated measures ANOVA with sex as an independent variable showed a marked effect of sex on support received ( $F(1, 86) = 5.45, p < .05; \zeta^2 = .06$ ) as well as a significant time by sex interaction ( $F(4, 344) = 2.70, p < .05; \zeta^2 = .03$ )<sup>6</sup> indicating that men, across the different measurement points in time, receive more support than women (see Figure 13). Inspecting whether there is a main effect for marital status on support received showed no significant effect ( $p > 1.0$ ).

<sup>5</sup>Greenhauser-Geisser ( $F(3.48, 303.135) = 2.88, p < .05; \zeta^2 = .03$ ).

<sup>6</sup>Greenhouse Geisser ( $F(3.48, 299.36) = 2.70, p < .05; \zeta^2 = .03$ ).



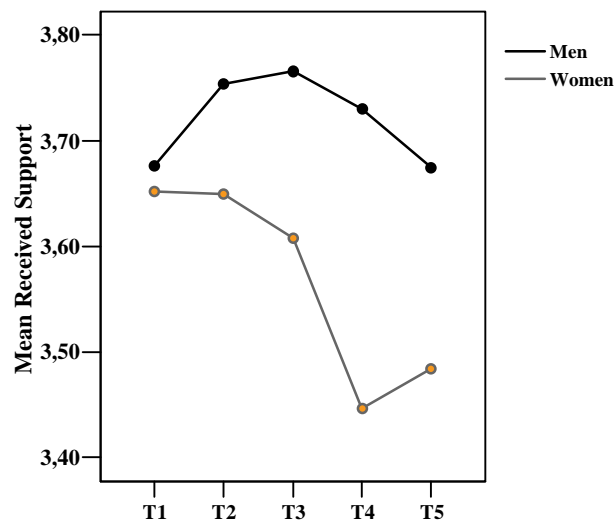


Figure 13. Means of Received Social Support among 57 Men and 31 Women at All Measurement Points in Time.

**Associations between Personal and Social Resources.** Examining associations between personal (i.e., self-efficacy beliefs) and social resources (i.e., received social support and number of resources ) using *product moment* correlation ( $r$ ) showed a marginally significant association between self-efficacy and received support measured at t1 ( $r = .13, p = .07, n = 184$ ) indicating that high self-efficacious patients receive more support at the 3-day pre-surgery assessment than low self-efficacious patients. No marked associations between self-efficacy and support measured at the other four assessments (t2 – t5) were found (See Appendix B). In addition to that, self-efficacy was not related to number of resources of support. Thus, the hypothesized association between personal and social resources is not confirmed.

### 5.3. Coping with Cancer

Inspections of active coping, accommodation, and avoidant coping assessed at the initial assessment (t1,  $n = 351$ ) showed that the three scales stayed within a satisfactory ranges of normal distribution (*Skewness*: .18 to -.53; *kurtosis*: -.50 to -

.84). At t1 patients reported higher level of accommodation ( $M = 2.94$ ,  $SD = .80$ ) as compared to both active coping ( $M = 2.52$ ,  $SD = .79$ ), and avoidant coping ( $M = 2.84$ ,  $SD = .99$ ). Moreover, the three scales remained above the midpoint of the scales (2.00; scale range 1 - 4).

**Age, Sex, and Marital Status.** Zero-order correlations between age, sex, and the three coping strategies applied at t1 revealed that women were more likely to use avoidant coping than men ( $r = .12$ ,  $p < .05$ ,  $n = 351$ ), whereas age was positively related to accommodation ( $r = .18$ ,  $p < .005$ ,  $n = 351$ ), and negatively correlated with active coping ( $r = -.14$ ,  $p < .01$ ,  $n = 351$ ). MANOVA measures were used to examine differences between the three coping strategies that can be attributed to marital status. Results indicated no multivariate effect of marital status on the three coping strategies reported at t1 ( $F < 1.0$ ).

**Medical Data.** At t1, correlations, independent sample t tests, and ANOVA measures revealed a few significant relations with medical data. Multimorbidity (i.e., the number of unweighted non-cancerous medical diagnosis) was positively but marginally associated with accommodation ( $r = .11$ ,  $p = .06$ ;  $n = 294$ ) indicating that more use of accommodation is associated with the presence of other non-cancerous diseases/symptoms.

Significant differences in accommodation were also found ( $t(n = 351) = 4.08$ ,  $p < .001$ ) between within one-month diagnosed patients ( $M = 2.79$ ,  $SD = .84$ ;  $n = 198$ ) as compared to post-one-month diagnosed patients ( $M = 3.13$ ,  $SD = .67$ ;  $n = 143$ ); and marginally significant difference between the former group (i.e., newly diagnosed patients;  $t(n = 351) = 1.72$ ,  $p = .08$ ;  $M = 2.45$ ,  $SD = .78$ ) and the later group in active coping were also found ( $M = 2.60$ ,  $SD = .80$ ).

Patients experienced cancer recurrence reported higher levels of accommodation ( $M = 3.08$ ,  $SD = .84$ ,  $n = 73$ ) than those experiencing cancer for the first time ( $t(n = 292) = 2.00$ ,  $p < .05$ ;  $M = 2.86$ ,  $SD = .78$ ,  $n = 219$ ); no other significant differences between these two groups were found.

Thus, the hypotheses concerning whether avoidant coping strategies used by patients are high among newly diagnosed patients (i.e., within one-month time elapsed since diagnosis) and patients with cancer recurrence compared to other patients were not confirmed. Newly diagnosed patients, however, reported slightly lower level of

active coping, and significantly lower levels of accommodation compared to post-one-month diagnosed patients.

### **Coping with Cancer: Unique Time Effects**

This part answers the hypotheses whether a marked decrease in avoidant coping in all post-surgery compared to the pre-surgery assessments appears; and whether a marked increase in active coping and accommodation should be found in all post-surgery assessments.

To test broad mean changes in avoidant coping, a one way repeated measures ANOVA was carried out with the five measurements points serving as time factors. Results indicated a significant time effect on avoidant coping ( $F(4, 372) = 8.51, p < .001, \eta^2 = .084$ )<sup>10</sup>. Examination of the contrasts revealed significant differences between the initial and one-month post-surgery assessments ( $t3; F(1, 93) = 9.36, p < .005, \eta^2 = .09$ ) indicating that patients reported higher levels of avoidance at t1. The initial assessment was also significantly higher than both the 6-month post-surgery assessment ( $t4; F(1, 93) = 12.32, p < .005, \eta^2 = .12$ ), and the 12-month post-surgery follow-up ( $t5; F(1, 93) = 15.52, p < .005, \eta^2 = .14$ ). No marked differences in avoidance coping reported around the surgery (i.e., between t1 and t2) were found (see Figure 14).

With regard to active coping, repeated measures ANOVA indicated a significant time effect ( $F(4, 372) = 11.79, p < .001, \eta^2 = .11$ ); and testing contrasts showed significant increase in all post-surgery assessment compared to the initial assessment (t1). Patients reported an increased level of active coping at 7-day ( $t2; F(1, 93) = 29.48, p < .001, \eta^2 = .24$ ), at one-month ( $t3; F(1, 93) = 24.66, p < .001, \eta^2 = .21$ ), at 6-month ( $t4; F(1, 93) = 32.64, p < .001, \eta^2 = .26$ ), and at one-year post-surgery ( $t5; F(1, 93) = 32.64, p < .001, \eta^2 = .21$ ) compared to the first assessment.

Greenhouse Geisser correction after significant departure from sphericity, critical value for an alpha level of .05 ( $F(3.464, 322, 129) = 8.51, p < .001, \eta^2 = .084$ )<sup>10</sup>

Examining the time effect of accommodation with the help of repeated measures ANOVA, revealed significant changes in broad means over time ( $F(4, 372) = 9.00, p < .001, \zeta^2 = .09$ )<sup>11</sup>. Inspecting the contrasts showed significant increment between the first assessment and the 7-day ( $t_2; F(1, 93) = 7.89, p < .01, \zeta^2 = .08$ ), one-month ( $t_2; F(1, 93) = 5.29, p < .05, \zeta^2 = .05$ ), 6-month ( $t_4; F(1, 93) = 14.91, p < .001, \zeta^2 = .14$ ), and 12-month post-surgery assessments ( $t_5; F(1, 93) = 21.28, p < .001, \zeta^2 = .19$ ). Reports of accommodation, however, remained very high across all measurement points in time ( $M > 2.94$ ; scale range 1 – 4).

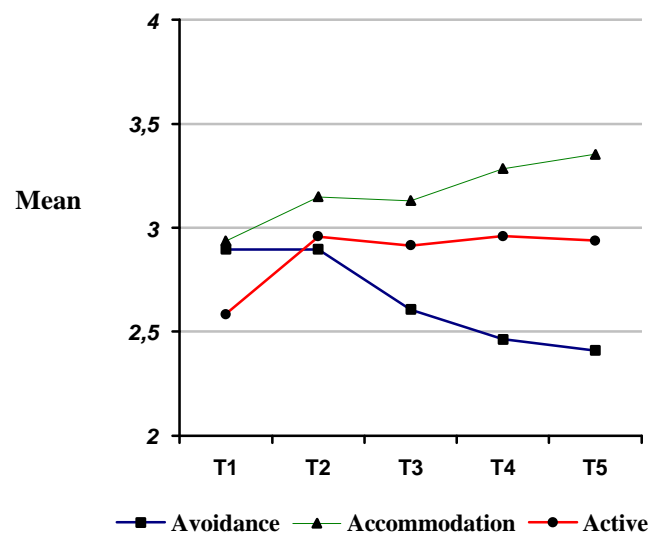


Figure 14. Means of Avoidance, Accommodation, and Active Coping Strategies Reported at All Assessments.

**Associations between Coping, Personal, and Social Resources.** *Product-moment Person* correlations were used to examine the concurrent associations between the three types of coping measured in this study and indicators of social support (i.e., received support and number of support resources). Analyses revealed significant associations between received support reported at t1, active coping ( $r = .24, p < .001$ ), accommodation ( $r = .16, p < .005$ ), and avoidant coping ( $r = .17, p < .005$ ) reported at t1.

<sup>11</sup>Greenhouse Geisser correction after significant departure from sphericity, critical value for an alpha level of .05 ( $F(3.283, 305, 315) = 9.00, p < .001, \zeta^2 = .088$ )

Concurrent significant correlations were also found between received support reported at t2, active coping ( $r = .23, p < .001$ ), accommodation ( $r = .16, p < .005$ ), and avoidant coping ( $r = .19, p < .001$ ), all reported at t2. However, at t3 received support was only significantly related to active coping (t3:  $r = .14, p < .05$ ) and marginally related to accommodation (t3:  $r = .11, p = .09$ ).

At the 6-month follow-up, received social support was both significantly associated with active coping ( $r = .19, p < .01$ ), and with accommodation ( $r = .15, p < .05$ ) reported at the same assessment. Received social support assessed at t5 was marginally associated with both active coping ( $r = .15, p = .08$ ), and accommodation ( $r = .16, p < .06$ ). No concurrent significant associations between received support and avoidance, except for t1 and t2, were found. With regard to the presence of a number of resources reported at t1, a significant concurrent association was found with active coping reported at t1 ( $r = .26, p < .05$ ). The availability of a number of resources was neither concurrently associated with accommodation nor with avoidant coping. Longitudinal associations, however, appeared between the number of resources reported at t1 and active coping measured at t2 (see Appendix B).

With respect to personal resources measured by self-efficacy, results indicated significant associations between self-efficacy beliefs, active coping, and accommodatory coping in all measurement points in time ranging from  $r = .21$  to  $.35$  ( $p < .05$ ), whereas a weak and negative association with avoidant coping at t1 was found ( $r = -.15, p < .05$ ). Avoidance measured in the other four waves was not significantly related to self-efficacy beliefs ( $p > .05$ ; see Appendix B).

These findings confirmed the hypotheses whether personal and social resources should be associated with both active and accommodatory coping strategies rather than avoidant coping across all measurement points in time. These results, on the other hand disconfirm the hypotheses that personal and social resources are not related to avoidant coping.

#### **5.4. Finding Meaning in Cancer**

Finding meaning in cancer, as previously mentioned (see section 4.4.6) was measured by means of two scales; a 7-item meaning scale that assesses, mainly, an increased appreciation of life, and a 17-item benefit finding scale that assesses other

domains of benefits and gains experienced by cancer patients. These domains incorporates acceptance of life imperfection, personal growth, positive changes in family relationships, and an increased sensitivity to other people.

#### 5.4.1. The 7-Item Meaning Scale

This part answers the questions whether patients can find meaning in cancer by reporting more appreciation of life as early as the pre-surgery assessment, and whether a marked increment in this type of meaning can be found in all post-surgery assessments.

At the 3-day pre-surgery assessment 351 patients provided data and reported a moderate level of meaning found in cancer ( $M = 2.89$ ,  $SD = .74$ ; scale range: 1 - 4). This result was not expected since at this phase cancer patients are predicted to be too busy coping with the diagnosis and treatment of cancer to consider searching for or finding meaning in it (Tomich & Helgeson, 2002). Consequently, other variables are examined to see what accounts for this early initiation and development of meaning found in cancer.

Inspection of the dichotomized time reported time elapsed since diagnosis among patients who completed the 7-item meaning scale at t1 ( $n = 351$ ) revealed that 143 (40.7%) patients reported more than 30 days time elapsed since diagnosis, 198 patients (56.4%) reported time elapsed since diagnosis ranging between 1 days and 30 days, and 10 patients (2%) did not provide information on this variable.

Using t test, significant differences between within-one-month diagnosed patients (< 30 days time elapsed since diagnosis) and post-one-month diagnosed patients (> 30 days time elapsed since diagnosis) in appreciation of life reported at t1 were found ( $t(341) = 2.68$ ,  $p < .01$ ). Results indicated that newly diagnosed patients scored significantly lower ( $M = 2.79$ ,  $SD = .73$ ) than post-one-month diagnosed patients ( $M = 3.00$ ,  $SD = .73$ ), although both groups scored higher than the midpoint of the scale (2.0, scale range: 1 - 4). Means and standard deviations of the two groups are depicted in Figure 15.

The frequency of patients with previous cancer diagnosis (i.e., recurrence) among patients participated at the base-line assessment (t1;  $n = 351$ ) and provided data on

the meaning scale was also investigated. Analyses showed that 73 patients (20.8%) reported cancer recurrence, about 229 (62.4%) patients reported no cancer recurrence, and 59 patients (16.8%) did not provide related information. Examining differences between patients with cancer recurrence and patients with no recurrence in appreciation of life reported at t1 indicated no significant differences between the two groups ( $t(n = 302) = .39, p > .05$ ).

To examine whether there is an interaction effect of cancer recurrence and time since diagnosis on appreciation of life at t1, UNOVA measures was used with the report of appreciation of life as the dependent variable and both the binary time elapsed since diagnosis and cancer recurrence as independent variables. No violation of the homogeneity of variance assumption was detected (Levene test ( $p$ ) > .05). Results also indicated significant effect of time elapsed since diagnosis ( $F(1, 288) = 10.17, p < .005, \zeta^2 = .04$ ); no significant effect of recurrence and no significant interaction between recurrence and time since diagnosis were found.

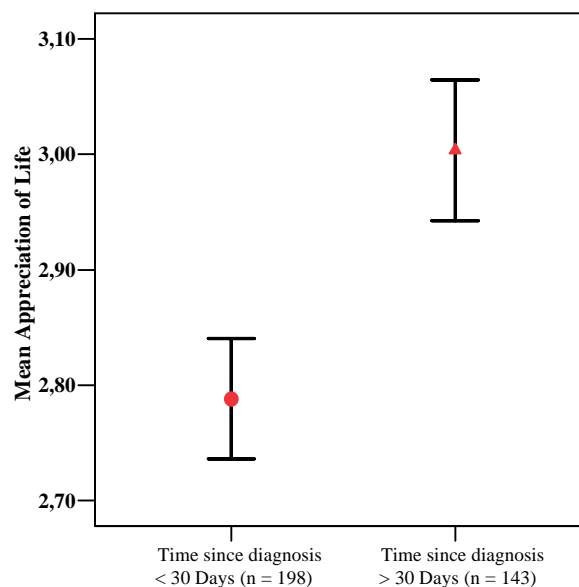


Figure 15. The 7-item Meaning Scale “Appreciation of Life”: Means (+/- One Standard Error, Range 1 to 4) at t1 among Within-One-Month and Post-One-Month Diagnosed Patients

Although significant effect of the time elapsed since the initial diagnosis on meaning reported at t1 was found, this result, however, does not explain the unexpected

moderate level of meaning reported by both within-one-month and post-one month diagnosed patients at the base line assessment (t1). To sum up these findings, patients do find meaning in cancer through perceiving an increased appreciation of life, as early as the pre-surgery assessment.

#### 5.4.2. The 7-item Meaning Scale: Change over Time

Reports of an increased appreciation of life across all measurement points in time (t1 - t5), were found to be generally above the midpoint of the scale (2.0). Close inspection of the scale's normal distribution across different measurement points in time showed acceptable ranges of *skwness* (-.40 to -.68), and *Kurtosis* (-.01 to -.56), except for the one-year post-surgery assessment (t5) at which most patients reported high level of appreciation of life resulting in high skewness (-1.01) and *kurtosis* (1.67).

**Age, sex, marital status, having children, number of children.** Product-moment correlation analyses were used to assess associations between demographic variables and appreciation of life reported at all measurement points in time. Person correlation coefficient ( $r$ ) indicated modest correlations between appreciation of life reported at the 3-day pre-surgery assessment (t1) and both sex ( $r = .15, p < .005, n = 351$ ) and chronological age ( $r = -.10, p = .06, n = 351$ ). These associations indicated that women ( $M = 3.03, SD = .72, t(n = 351) = 2.86, p < .005$ ; rather than men ( $M = 2.80, SD = .74$ ), and older patients rather than younger patients are more likely to report an increased appreciation of life at the pre-surgery assessment (see Figure 16). There was also a marginally significant relationship between more appreciation of life measured at 6 months post-surgery (t4) and sex ( $r = .13, p = .08, n = 197$ ) suggesting that women reported more appreciation of life than men at this point in time, too. No significant associations between appreciation of life reported at all assessments, marital status, having children, and number of children were found.

**Medical Data.** With regards to medical data, examinations of significant associations between the available medical data ( e.g., cancer recurrence, type of surgery, tumor size, metastasis, involvement of regional lymph nodes, and undergoing another



surgery) and reports of appreciation of life assessed in all waves (t1 – t5) revealed no significant associations other than with time elapsed since diagnosis at the first assessment (t1). Concerning demographic variables, no correlation exceeded .15 and most of them were significant/marginally significant at the base line assessments but not at the follow-up assessments. Accordingly no covariate will be used in further analyses of appreciation of life.

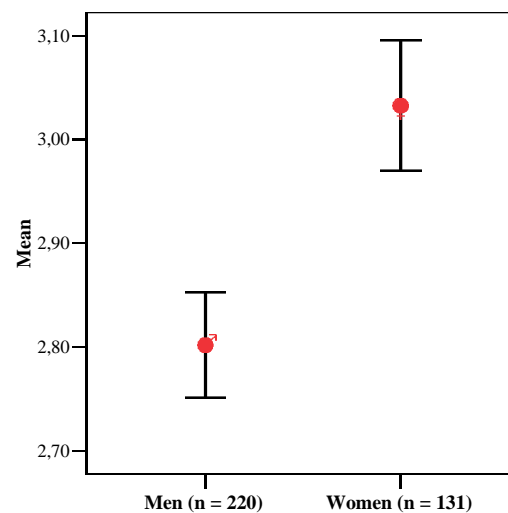


Figure 16. The 7-item Meaning Scale “Appreciation of Life” Means (+/- One Standard Error, Range 1 to 4) at t1 among Men and Women.

#### 5.4.3. Unique Time effects: More Appreciation of Life

To test whether an increment in this type of meaning can be found post-surgery compared to pre-surgery, one way repeated measure ANOVA was used with the five measurements as the time factors ( $n = 94$ ). Reports of appreciation of life were found to be above the average of the scale (2.0; scale range 1 - 4) across all measurements. Results also showed no departure from the sphericity assumption ( $p > .05$ ); and a repeated measurement main effect emerged ( $F(4, 372) = 4.25, p < .005, \zeta^2 = .04$ ).

Scrutinizing contrasts revealed that reports of appreciation of life increased between the initial (t1) and the 7-day post-surgery assessments (t2;  $F(1, 93) = 6.12, p < .05, \zeta^2 = .06$ ); the increment became marginally significant between the initial assessment (t1) and the 6-month follow-up (t4;  $F(1, 93) = 3.08, p = .08, \zeta^2 = .03$ ), and it became significant again between the initial reports and the one year post-surgery assessment (t5;  $F(1, 93) = 12.61, p < .005, \zeta^2 = .12$ ). Significant increase between the one-month

follow-up (t3) and the last assessments (t5;  $F(1, 93) = 9.36, p < .005, \zeta^2 = .09$ ), as well as, between the 6-month follow-up (t4) and the last assessment were also found (t5;  $F(1, 93) = 4.50, p < .05, \zeta^2 = .05$ ). Although reports of appreciation of life decreased between the 7-day and the one-month follow up assessments, however, this decrement was not significant ( $p > .10$ ). Thus, results, so far, attest to the hypothesized increment in meaning in post-surgery compared to pre-surgery assessments. Figure 17 shows means of appreciation of life at all assessments.

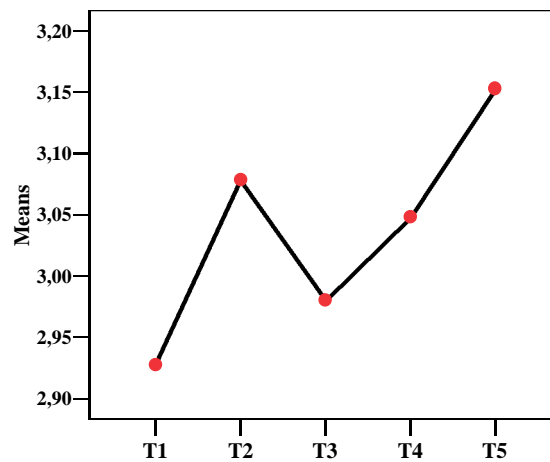


Figure 17. The 7-item Meaning Scale “Appreciation of Life”: Means Across all Measurement Points in Time ( $n = 94$ ).

**Sex, Age, and Marital Status.** A series of repeated measures ANOVAs of sex, marital status, and the trichotomized chronological age (age groups: 24 to 60 years (36.8%), 61 to 69 years (36.4%), and 70 to 89 years (26.8%)), with the 5 measurements of appreciation of life as dependent variables, revealed no significant effect of sex and marital status, however, significant time by age interaction was found ( $F(8, 364) = 2.42, p < .05, \zeta^2 = .05$ )<sup>6</sup>.

<sup>6</sup>Greenhouse Geisser correction after the significant departure from sphericity, critical value for an alpha level of .5 ( $F(7.515, 341.923) = .24, p < .05, \zeta^2 = .05$ )

ANOVA measures also showed that the youngest group (age: 24 - 60 years) scored significantly higher than and the middle age group (age: 61 - 69 years) at t4 ( $F(2, 91) = 3.54, p < .05, \zeta^2 = .07$ ); whereas the oldest group (age: 70 - 89 years) reported slightly higher level of appreciation of life than the middle age group at t5 ( $F(2, 91) = 2.52, p = .086, \zeta^2 = .05$ ). Figure 18 shows means of appreciation of life among different age-groups across all assessments.

Thus, summarizing these findings, a significant increase in appreciation of life between pre- and post-surgery assessments was found. This increment became even marked when patients were divided according to their age suggesting that time has different effects for the three age groups.

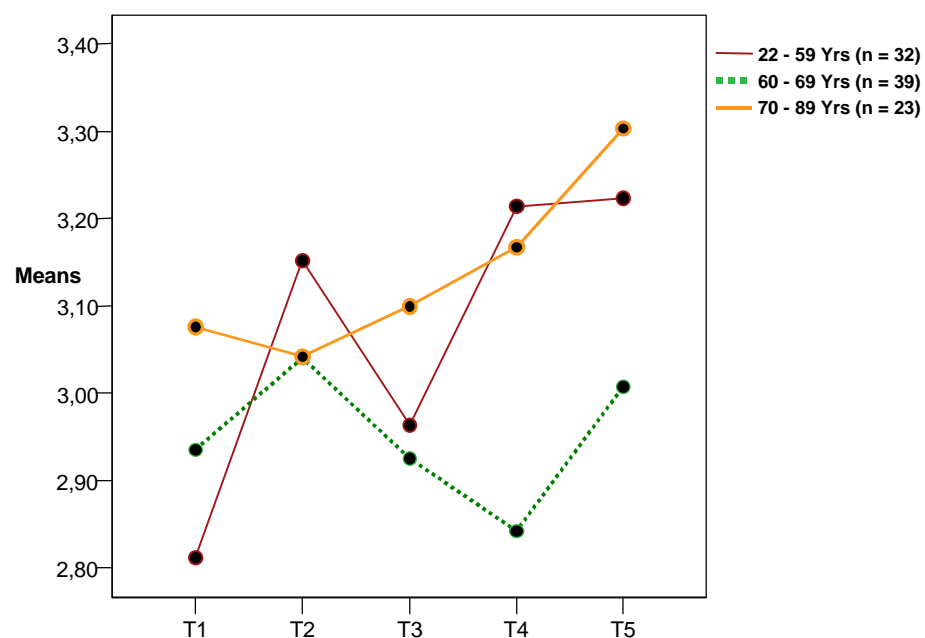


Figure 18. The 7-item Meaning Scale “Appreciation of Life”: Mean across All Measurement Points in Time in Different Age Groups.

#### 5.4.4. Benefit Finding: The 17-Item Scale

Regarding the 17-item benefit finding scale used at 12 months post-surgery, descriptive analyses showed normal distribution (*skewness* = *-.78*; *kurtosis* = *.23*), as well as, an average response equivalent to a moderate level of benefits and gains found in cancer ( $M = 3.60$ ,  $SD = .92$ ;  $n = 136$ ); a finding that is in line with other previous studies (Antoni et al., 2001; Cruess et al., 2000).

#### Benefit Finding: Comparison between Two Samples

The benefit finding scale was also used, as previously mentioned (section 4.4.6.2) in a study done by Antoni et al. (2001) to assess the effect of cognitive behavioral stress management on different indicators of physical and psychological adjustment including benefit finding among breast cancer patients ( $N = 100$ ). In Antoni et al.'s study the total score of benefit finding scale was assessed among two sub-samples (i.e., intervention and control groups) in 14-month follow-up four assessments. Significant differences between pre- and post-intervention benefit finding, as well as, between intervention group as compared to control group were reported.

In the present study, benefit finding was assessed one-year post-surgery among an intervention-free 136 male and female German patients with different site of cancer. Meta-analyses program (Schwarzer, 1989) was used to examine whether there is significant differences between benefit finding reported by the German sample as compared to both the American intervention group's (47 patients) and control group's (53 patients) reported benefit finding. No directed prediction about differences in benefit finding between the American (i.e., both intervention and control groups) and German sample was made.

Results of pair wise t tests of the reported benefit finding, however, showed significant differences between the German sample (assessed at one-year post-surgery) and both the Antoni et al.'s (2001) intervention group at the initial assessment (i.e., at 4- to 8-week post-surgery assessment;  $t_{.05, 1 \text{ df}} = 3.62$ ,  $p = .0004$ ), and their control group at the four measurement points in time applied in their study. Means and standard deviations of all groups, at all assessments, are shown in Table 14.

Taking in to account that the American sample is more homogenous than the German sample (i.e., including only breast cancer patients with no comorbid non-cancerous disease), these significant differences should be cautiously interpreted.

Table 14

*Scores on Benefit Finding among 136 German Cancer Patients at One-Year Post-surgery Assessment, and 100 American Breast Cancer Patients at Initial Assessment, Post-treatment, and 3- and 9 Month Follow-up.*

	The American Sample						The German Sample			t	p
	Intervention			Control			12 months post-surgery				
	M	SD	N	M	SD	N	M	SD	N		
Initial	3.08 <sup>a</sup>	.82	47	3.13 <sup>a</sup>	.96	53	3.60 <sup>b</sup>	.92	136	> 3.06	<.005
Post-treatment	3.59 <sup>b</sup>	.83	47	3.18 <sup>a</sup>	1.04	53				3.06	.003
3 Months	3.49 <sup>b</sup>	.88	47	3.13 <sup>a</sup>	1.13	53				2.57	.011
9 Months	3.47 <sup>b</sup>	.95	47	3.21 <sup>a</sup>	1.06	53				2.70	.004

*Note.* Within rows, means with a common subscript do not differ significantly from each other.

#### 5.4.5. Subscales of Benefit Finding

Exploratory and confirmatory factor analyses of the 17-item benefit finding scale measured at 12 months post-surgery confirmed the possibility of selecting items from the original scale to assess four types of benefits including acceptance of life imperfection, personal growth, positive changes in family relationships, and an increased sensitivity to other people (see section 4.4.6.2). Distribution of the newly built subscales were within satisfactory ranges of normality (*skewness range*: .001 to - .98; *kurtosis range*: .27 to -.93) with the exception of acceptance of life imperfection that showed a high *skewness* (-1.04), but normal *kurtosis* (.38), indicating a tendency among patients to report high level of this type of meaning found in cancer. All the means were located markedly beyond the midpoints of the four subscale (2.5). Means and standard deviation of all subscales are depicted in Figure 19.

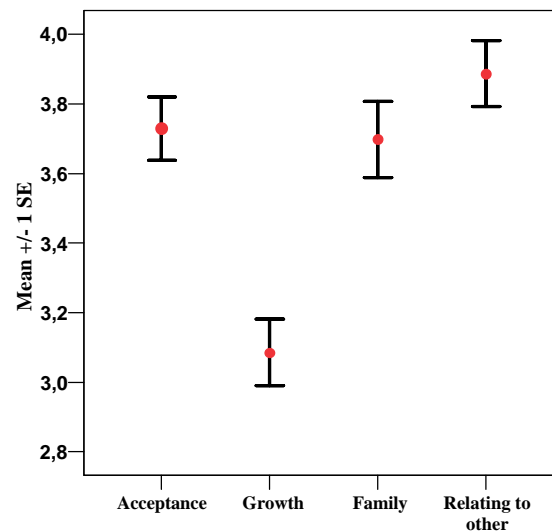


Figure 19. The Benefit Finding Subscales: Means (+/- One Standard Error, range 1 to 5) at t5 ( $n = 136$ ).

**Sex, Age, Marital Status, Having Children, and Number of Children.** Zero-order correlations (*Pearson*) between sex, age, having children, number of children, the total score, and the four subscales of benefits found in cancer indicated only one significant association between sex and positive changes in family relationship ( $r = -.21$ ,  $p < .05$ ;  $n = 136$ ); with men reporting higher level of positive changes in family relationships ( $M = 3.92$ ,  $SD = 1.27$ ;  $n = 81$ ) than women did ( $M = 3.37$ ,  $SD = 1.23$ ;  $n = 55$ ), although both groups reported high level of positive changes (see Figure 20). Marginally significant differences in personal growth also appeared ( $t(n = 136) = 1.67$ ,  $p = .097$ ) with women reporting slightly higher level of personal growth ( $M = 3.28$ ,  $SD = 1.13$ ;  $n = 55$ ) than men did ( $M = 2.95$ ,  $SD = 1.10$ ;  $n = 81$ ).

Regarding social status, due to the presence of missing values among patients who participated at t5 assessment ( $n = 139$ ), the available data on the four categories single, married, divorced and widowed are recoded into a new binary variable that classifies patients into currently married/with partner ( $n = 87$ ) and currently not married (i.e., single, widowed, and divorced;  $n = 23$ ).

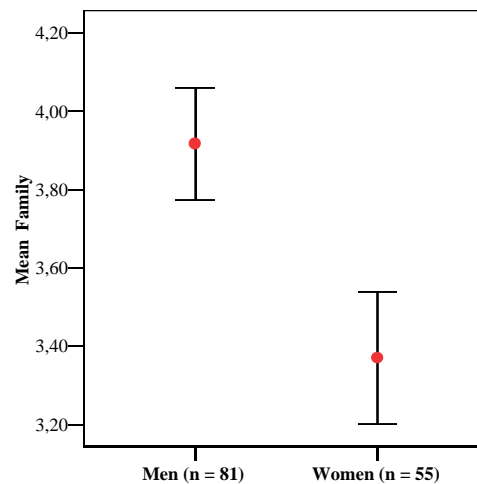


Figure 20. Mean Positive Changes in Family Relationships (+/- One Standard Error, Range 1 to 5) at the One Year Post-surgery Assessment among Men and Women.

Using MANOVA measures with the newly built marital status serving as an independent variable, differences between the two groups in the four types of benefits found in cancer reported at t5 were examined. Results showed no deviation from the homoscedasticity assumption (Box's M ( $p > .05$ ), no deviation of the homogeneity assumption (Levene's test ( $p > .05$ ), and a significant multivariate effect of marital status (Hotelling's T-Square = 11.34,  $F(4, 105) = 2.76$ ,  $p < .05$ ,  $\zeta^2 = .095$ )<sup>1</sup>. However, post hoc univariate F test of group differences indicated significant differences only in reported positive changes in family relationship ( $F(1, 108) = 7.44$ ,  $p < .05$ ,  $\zeta^2 = .06$ ); with the married patients/with partners reporting higher levels of changes ( $M = 3.94$ ,  $SD = 1.14$ ;  $n = 87$ ) than currently not married patients did ( $M = 3.17$ ,  $SD = 1.40$ ;  $n = 23$ ), although, both groups scored moderately high (scale range: 1 – 5) in this type of meaning found in cancer (see Figure 21).

<sup>1</sup> Hotelling's T-Square test is used because there are two groups formed by the independent variable. The value of T-square coefficient is assessed by multiplying Hotelling's Trace coefficient by (N-g), where N is the sample size across all groups and g is the number of groups. The T-square results have the same F value, degree of freedom, and significance level as the trace coefficient (Garson, (2004).

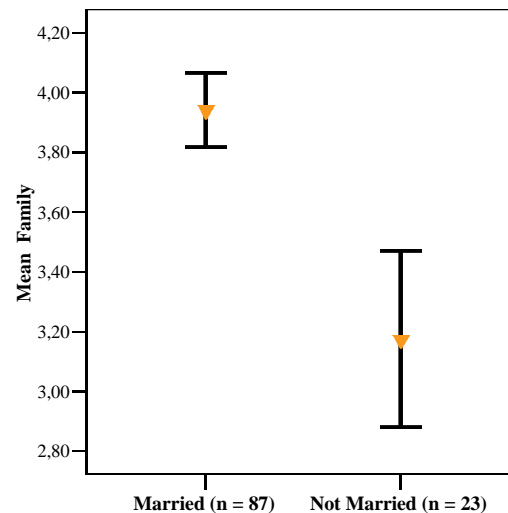


Figure 21. Mean Positive Changes in Family Relationships (+/- One Standard Error, Range 1 to 5) at the One Year Post-surgery Assessment among Married and Not Married Patients.

**Medical Data.** Examining associations between medical data, the total benefit finding score, and subscales measured at one year post-surgery (t5) showed no significant effect of the time elapsed since the initial diagnosis on the total score and the four subscales of benefits found in cancer. However, marginally significant differences in report of acceptance of life imperfection ( $t(n = 74) = 1.99, p = .054$ ) between the newly diagnosed patients according to t1 assessment (i.e., within-one-month diagnosed patients;  $M = 3.37, SD = 1.18; n = 44$ ) and post-one-month diagnosed patients ( $M = 3.86, SD = .89; n = 30$ ) when only patients with no cancer recurrence were included in the analyses.

MANOVA measures were used to examine differences in the four types of meaning that can be attributed to undergoing another surgery in the time between the third (t3) and the last assessments (t5). No violation of the homogeneity of variance assumption was detected (Levene's test  $p > .05$ ). Although the multivariate effect of undergoing another surgery on the four types of benefits barely missed an acceptable significant level (Hotelling's T-Square = 7.64,  $F(4, 131) = 1.85, p = .12$ )<sup>2</sup>, the univariate effects on both acceptance of life imperfection ( $F(1, 134) = 6.10, p < .05, \eta^2 = .04$ ) and personal growth ( $F(1, 134) = 4.55, p < .05, \eta^2 = .03$ ) were significant.



These results indicated that patients who underwent another surgery ( $n = 20$ ) reported lower levels of acceptance of life imperfection and personal growth compared to patients who did not ( $n = 116$ ). Means of the two groups (see Figure 22), however, remained above the theoretical average of the scale (2.5, scale range: 1 – 5). Examining associations between the total score and subscales of the benefit finding scale and other medical data indicated no significant associations.

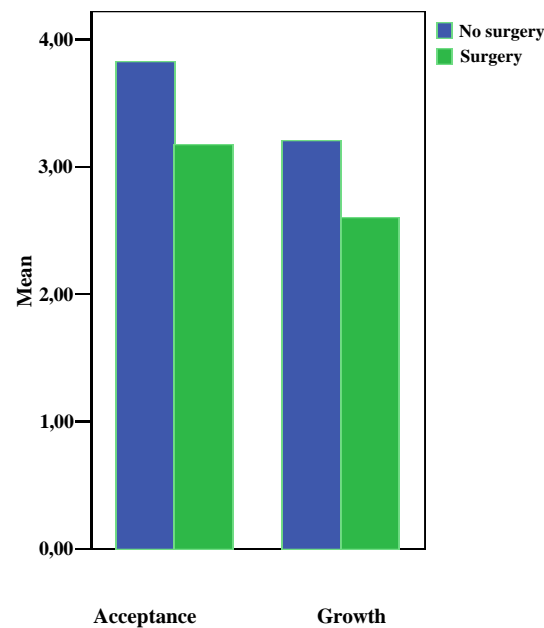


Figure 22. Mean Acceptance of Life Imperfection and Personal Growth at the One Year Post-Surgery Assessment in Patients Who Underwent Another Surgery ( $n = 20$ ) and Patients Who Did not ( $n = 116$ ).

So far, assessing the need to incorporate control variables (i.e., covariates) into the main analyses concerning the four types of benefits found in cancer, showed significant but modest correlations that did not exceed .25 between positive changes in family relationship, sex ( $r = -.21, p < .05; n = 136$ ), and marital status ( $r = .25, p < .005; n = 110$ ); and between undergoing another surgery and both acceptance of life imperfection ( $r = -.21, p < .05; n = 136$ ), and personal growth ( $r = -.18, p < .05; n = 136$ ). Because the use of covariates presumes comparable associations across cells, and because the effect of small associations on the outcomes of the analyses is minimum (Antoni et al., 2001; Elashoff, 1969), these variables will not be used as covariates in further analyses of the aforementioned four types of meaning found in cancer.

#### 5.4.6. Interrelations among Meaning Measures

**Concurrent and Longitudinal Correlation.** With regard to concurrent correlations between the meaning scale and the benefit finding scale (i.e., the total score) both measured at one year post-surgery (t5), zero-order correlations (*Pearson*), showed a strong association between them ( $r = .62, p < .001; n = 136$ ) indicating that both scales assess robustly related general concepts. Examining associations between the meaning scale and the newly built four subscales measuring acceptance of life imperfection, personal growth, positive changes in family relationship, and increased sensitivity to other people, at the same point in time (see Table 22), showed significant correlations ranging between ( $r$ )= .37 and .54 ( $p < .001; n = 136$ ).

Concerning longitudinal correlations between meaning measured by the 7-item meaning scale at t1, t2, t3, t4, the total benefit finding score, and scores on the four benefit finding subscales measured at the last assessment (t5; see Table 15) showed significant associations ranging between ( $r$ )= .23 and .49 ( $p < .05$ ). these findings indicate that the meaning scale and the four subscales tab different facets of meaning found in cancer.

Table 15  
*Correlations between the 7-item Meaning Scale “Appreciation of Life” Measured at First Four Assessments, The Total Score, and The Four Subscales of Benefit Finding Measured at t5.*

Benefit Finding (n = 136)	Appreciation t1 (n = 111)	Appreciation t2 (n = 122)	Appreciation t3 (n = 122)	Appreciation t4 (n = 134)
Benefit finding (total score of the 17-item scale)	.41***	.49***	.49***	.49***
Acceptance	.32**	.39***	.37***	.37***
Growth	.29**	.40***	.44***	.47***
Family	.23*	.29**	.28**	.25**
Sensitivity to others	.27*	.34***	.37***	.37***

Note. \* $p < .05$ , \*\* $p < .01$ , \*\*\* $p < .001$ .

#### 5.4.7. Meaning, Personal, and Social Resources: Concurrent Associations

**Social Resources.** Associations between appreciation of life reported in all measurement points in time and indicators of social integration, that is, received social support reported in all waves (t1 – t5), and the presence of a number of social resources showed significant associations.

Successive concurrent correlations (*Pearson*) indicated that at the initial assessment received support was moderately related to appreciation of life; ( $r = .29, p < .001; n = 337$ ); at 7-day follow-up they correlated significantly with each other ( $r = .24, p < .001; n = 312$ ); at one-month follow-up the association between them turned to be lower than the previous two assessments ( $r = .21, p < .005; n = 226$ ); at 6-month follow-up a slight increase in the relationship between these indicators emerged ( $r = .24, p < .005; n = 194$ ); and in the last assessment (t5) the level of association between received support and appreciation of life slightly decreased ( $r = .22, p < .05; n = 134$ ; see Appendix B).

These findings suggest an existence of reciprocal effects between these parameters; it could be that the presence of support fosters meaning found in cancer through an increased appreciation of life, or perceiving benefits through an increased appreciation of life stimulates and motivates more support from the social network

Examining associations between received support measured at t5, the total score benefit finding, and the four subscales measured at one year post-surgery assessment (t5) showed significant correlations with the total score ( $r = .32, p < .001; n = 133$ ), with acceptance of life imperfection ( $r = .27, p < .005; n = 133$ ), with personal growth ( $r = .18, p < .05; n = 133$ ), with positive changes in family relationship ( $r = .36, p < .001; n = 133$ ), and with an increased sensitivity to other people ( $r = .42, p < .001; n = 133$ ).

With regard to the presence of a number of resources of support measured at t1, this indicator was significantly and positively related to appreciation of life measured at t1 ( $r = .18, p < .005; n = 345$ ), to positive changes in family relationship ( $r = .20, p < .05, n = 111$ ), and to an increased sensitivity to other people ( $r = .21, p < .05, n = 111$ ) measured at t5. However, number of resources was marginally significantly related to the total score of benefit finding ( $r = .18, p = .06, n = 111$ ).

These associations suggest that the effect of received support and the availability of a number of resources (.g., a partner, friend, other patients) on types of benefits that are related to positive changes in interpersonal relationships (i.e., the network) is stronger than its effect on perceived personal changes (i.e., personal growth, acceptance of life imperfection, and an increased appreciation of life).

**Personal Resources.** To investigate associations between report of appreciation of life assessed by means of the 7-item meaning scale in all waves and self-efficacy beliefs, Zero-order correlations (*Pearson*) were used. Results showed significant associations between self-efficacy and appreciation of life measured at t3 ( $r = .22, p < .005; n = 234$ ), and at t4 ( $r = .23, p < .005; n = 174$ ). Marginally significant association also emerged at t5 ( $r = .17, p = .06; n = 123$ ). These associations suggested that high self-efficacious patients reported higher levels of appreciation of life at these measurement points in time. No significant correlations between self-efficacy and appreciation of life measured at t1 and t2 were found.

To examine further associations between appreciation of life measured in all wave, and self-efficacy, a median-split procedure was used to divide patients into two groups; high self-efficacy ( $n = 42$ ) and low self-efficacy groups ( $n = 52$ ). A repeated measures ANOVA was utilized with the five measurement points serving as the time factor, and the new dichotomized self-efficacy as the independent variable. Results indicated both significant time effect ( $F(4, 368) = 4.46, p < .005; \zeta^2 = .05$ ) and time by self-efficacy interaction ( $F(4, 368) = 2.37, p = .05; \zeta^2 = .03$ ). Investigating the contrasts indicated that the time by self-efficacy interaction was significant between the initial assessment (t1) and both one-month follow-up (t3;  $F(1, 92) = 5.33, p = .05; \zeta^2 = .06$ ), and 6-month-follow-up assessments (t3;  $F(1, 92) = 4.83, p = .05; \zeta^2 = .05$ ). These findings attest to the strong influence of personal agency in the development of this type of meaning found in cancer (see Figure 23).

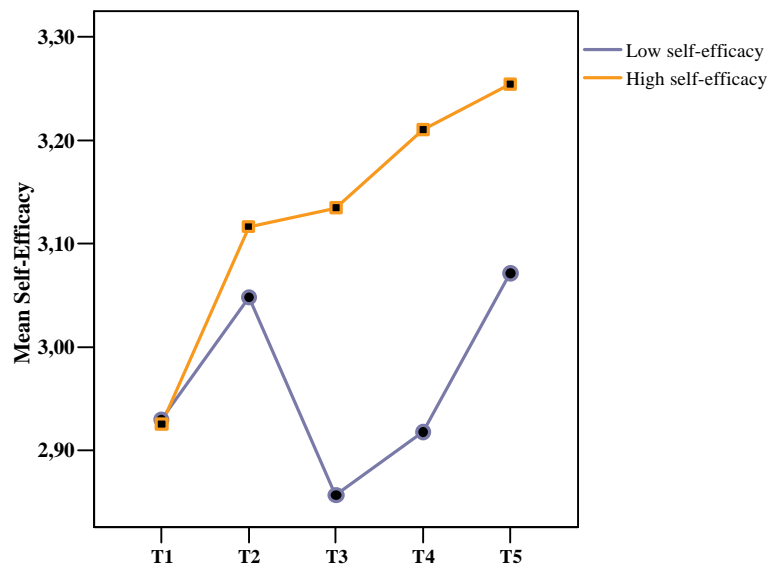


Figure 23. The 7-Item Meaning Scale “Appreciation of life” in High Self-Efficacy ( $n = 42$ ) and Low Self-Efficacy Groups ( $n = 52$ ) at All Measurement Points in Time.

Concerning other benefits found in cancer, self-efficacy beliefs was significantly associated with the benefit finding total score ( $r = .22$ ,  $p < .05$ ;  $n = 123$ ) indicating that high self-efficacious patients reported higher level of benefits found in cancer. Looking at associations between self-efficacy beliefs and the four subscales; acceptance of life imperfection, personal growth, positive changes in family relationship, an increased appreciation of life, different patterns of associations appeared. Self-efficacy was significantly associated with both personal growth ( $r = .27$ ,  $p < .005$ ;  $n = 123$ ), and an increased sensitivity to other people ( $r = .19$ ,  $p < .05$ ;  $n = 123$ ), and it was modestly related to acceptance of life imperfection ( $r = .15$ ,  $p = .06$ ;  $n = 123$ ). Self-efficacy was not related to positive changes in family relationship ( $p > .10$ ).

Further examination of associations between the four subscales of benefit finding, and self-efficacy using MANOVA with the dichotomised self-efficacy serving as the independent variable indicated that the multivariate effect on the four subscales barely missed the significant level ( $p = .12$ ), however, the univariate effect on both personal growth ( $F(1, 123) = 3.95$ ,  $p < .05$ ,  $\eta^2 = .03$ ), and an increased sensitivity to

other people ( $F(1, 123) = 4.61, p < .05, \eta^2 = .04$ ) were found suggesting that high self-efficacious patients tend to report higher levels of personal growth and increased sensitivity to others compared to low self-efficacious patients (see Figure 24). ANOVA measures with the total score of benefit finding as the dependent variable and the dichotomized self-efficacy as the independent variable indicated no significant differences ( $p > .10$ ).

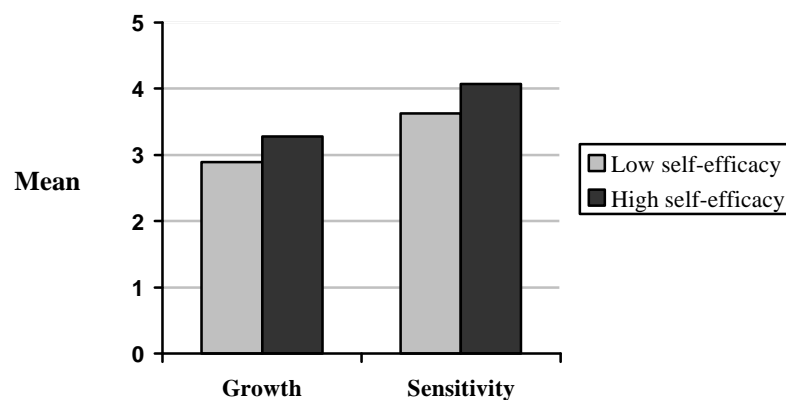


Figure 24. Means for Personal Growth and Increased Sensitivity to Others in High ( $n = 61$ ) and Low ( $n = 62$ ) Self-Efficacy Groups ( $n = 52$ ) at t5.

These results answered the question whether personal resources, measured by self-efficacy, is associated with all types of meaning and benefits measured in this study. The lack of significant relations between self-efficacy, and positive changes in family relationship indicated that this type of meaning found in cancer may be more associated with different factors other than personal resources (e.g., social resources).

#### 5.4.8. Finding Meaning and Coping: Concurrent Correlations

**Active coping.** Looking at possible correlations (*Pearson*) between appreciation of life, measured by the 7-item meaning scale, and active coping strategies used by patients, across all measurement points in time showed concurrent significant associations ranging between ( $r$ ) = .51 and .56 ( $p < .001$ ) indicating that those who used active coping strategies were more likely to report an increased appreciation of life in response to having cancer, or it could be that perceiving meaning in cancer enhance the use of active coping over time.

Examining relationships between active coping reported at t5, the total score of benefit finding, and the four subscales, i.e., acceptance of life imperfection, personal growth, positive changes in family relationship, and an increased sensitivity to other people, positive and significant associations also emerged. Although active coping was markedly related to the total score of benefit finding ( $r = .41, p < .001; n = 136$ ), it showed different patterns of associations with the four subscales. It correlated ( $r$ ) .30 with acceptance of life imperfection, .46 with personal growth, .25 with positive changes in family relationship, and .31 with an increased sensitivity to others ( $p < .001$ ). These patterns of associations suggest that the use of active coping is more relevant to the perception of some types of benefits more than others (see Appendix B).

**Accommodation.** Cross-sectional correlations (*Pearson*) between accommodation and appreciation of life measured at all assessments also showed significant associations ranging from ( $r$ ) = .27 to .44 ( $p < .001$ ) indicating that more use of accommodatory coping is associated with higher levels of perceived appreciation of life in all waves (see Appendix B). At t5 accommodation continued to have significant relationships with the total score of benefit finding ( $r = .24, p < .01; n = 136$ ), as well as, three of the four subscales including acceptance of life imperfection ( $r = .40, p < .001; n = 136$ ), personal growth ( $r = .18, p < .05; n = 136$ ), and an increased sensitivity to other people ( $r = .22, p < .01; n = 136$ ). Accommodation at t5 was not associated with positive changes in family relationship, although this finding was not expected, it highlights the important role of accommodation for the enhancement of certain types of meaning (e.g., growth) more than others (e.g., positive changes in family relationships).

**Avoidant coping.** Interestingly, concurrent correlations (*Pearson*) revealed that avoidant coping was positively and significantly related to appreciation of life across all measurement points in time (t1 – t5), with ( $r$ ) ranging from .18 to .35 ( $p < .05$ ). These associations suggest that more use of avoidant coping is associated with higher level of appreciation of life precipitated by having cancer (see Appendix B). Unexpectedly, avoidant coping, measured at t5, continued to have significant and positive correlations with the total score of benefit finding ( $r = .19, p < .05; n = 136$ ), with an increased sensitivity to others ( $r = .25, p < .005; n = 136$ ), and with personal

growth ( $r = .23, p < .01; n = 136$ ). Although avoidant coping was not significantly related to acceptance of life imperfection, it showed marginal association with positive changes in family relationship ( $r = .15, p = .07; n = 136$ ).

To sum up these findings, as predicted active coping and accommodation turned out to have significant associations with all types of meaning and benefits found in cancer except for positive changes in family relationship that was not related to accommodation. Thus the related hypotheses were mostly confirmed. With regard to the question whether avoidant coping is related to different types of meaning found in cancer, results revealed, unexpectedly, significant associations disconfirming the related hypotheses.

#### **5.4.9. Resources, Finding Meaning, and Coping: Mediation and Pattern of Associations over Time**

Because this study aims at examining the mediating role of coping in the relationship between personal, social resources, and different types of meaning found in cancer; as it also aims at investigating patterns of association between these parameters over time, it was decided to limit the sample examined here to participants who completed all the five assessments to reduce the effect of individual differences on these parameters (i.e., group five:  $n = 96$ ). Thus the same subjects were followed over time and relationships between their reported resources, coping and meaning were investigated with the help of path analysis. From this sample 11 patients did not provide data on some of the related scales, accordingly data from 85 patients will be included in this analyses.

Path analysis is an extension of the regression model, used to test the fit of the correlation matrix against *causal* models designed by the researcher. This type of analysis is used in this study to examine three path models<sup>1</sup> within which associations between the aforementioned parameters (i.e., observed variable), measured within different time-lag follow-up, are depicted. Path analysis is selected instead of multiple regression as it takes in to account non-linearities, correlated independents, measurement error, correlated error terms, among others (Garson, 2004).

<sup>1</sup>A path model is a diagram relating independent, intermediary, and dependent variable. Single arrows indicate causation between exogenous or intermediary variables and the dependent (s). Arrows also connect the error terms with their respective endogenous variables. Double arrows indicate correlations between pairs of exogenous variables (Garson, 2004).



### ***Does Coping Mediate the Relationship between Resources and Meaning?***

It is hypothesized that coping strategies, in particular active coping and accommodation, mediate the relationships between patients' resources (i.e., self-efficacy and social support) and meaning found in cancer.

***The Direct Model.*** To examine this hypothesis, a model was designed in which self-efficacy beliefs, as a general personality dimension, and support received at the 3-day pre-surgery assessment are predicted to affect meaning reported at 1 month post-surgery. In turns, social support is predicted to be positively associated with the number of resources, that is, the presence of a number of resources should indicate receiving high social support from the network. Path analyses was employed to test this model. Results showed that the model fit the data quite well (see Table 16). In addition analyses indicated that self-efficacy is a significant predictor of meaning ( $\beta = .23, p < .05$ ), whereas a marginally significant association between received support and meaning was found ( $\beta = .18, p = .09$ ). The amount of variance of meaning explained for in the path analyses was about 9%. Received support, however, was associated with the number of resources ( $\beta = .21, p = .05$ ) indicating that higher level of support received at this point in time (t1) is associated with the presence of a number of support resources (see Figure 25).

***The Mediation Model.*** Testing the mediational model in which the effect of self-efficacy and support measured at t1 on meaning measured at t3 is predicted to be mediated by active and accommodatory coping strategies showed also a satisfactory fit statistics (see Table 16). Active coping significantly mediated the relationship between self-efficacy and meaning ( $\beta = .25, p < .05$ ), and the direct path between self-efficacy and meaning was no more significant ( $\beta = .07, p > .10$ ; see Figure 25). With regard to accommodation, it was significantly associated with self-efficacy indicating that personal resources also enhance accommodation with cancer at t2 ( $\beta = .36, p < .05$ ). No association between avoidant coping, personal and social resources, and meaning were found. On the other hand, received social support was not significantly associated with the three coping strategies, however, number of resources was significantly related to active coping indicating that the perceived availability of resources of support at t1 enhance active coping at t2. Results, thus,

partly confirmed the hypothesized mediation role of coping in the relationships between personal and social resources and meaning.

Table 16

*Fit Indices for the Direct and Mediation Models: Patients Resources (t1), Coping (t2), and Meaning measured as Appreciation of Life (t3).*

	X <sup>2</sup>	df	p	CMIN/DF	RMR	GFI
Direct model	3.55	3	.32	1.182	.017	.98
Mediation model	11.80	8	.16	1.475	.046	.96

Note.  $n = 96$ . CMIN/DF = Relative chi-square, SRMR = Standardized Root Mean Residual; GFI = Goodness-of-fit Index.

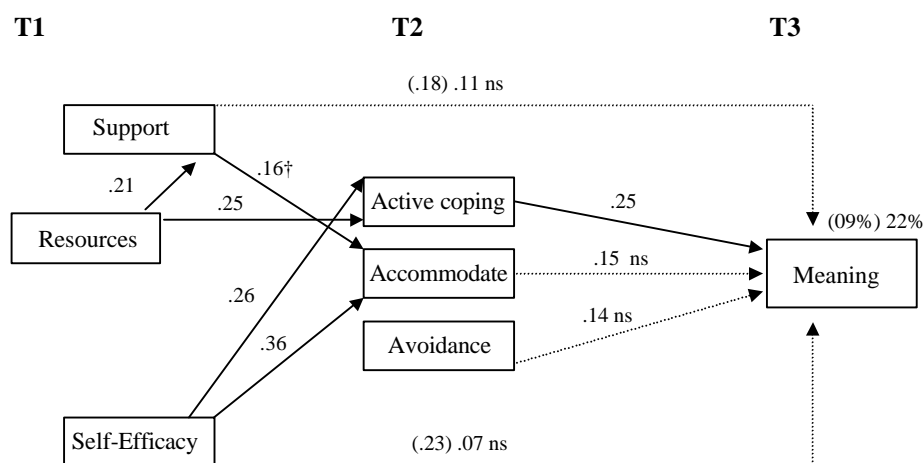


Figure 25. Standardized Path Model for the Relationships between Resources (t1), Coping (t2), and Meaning Assessed as Appreciation of Life (t3).

### ***Resources, Coping, and Meaning: Consistent Pattern of Associations?***

To examine whether the resulted patterns of associations between resources, coping, and meaning found in the first direct and mediational models are consistent over time, another direct and mediational model was designed. According to these models, coping measured at 1 month post-surgery is expected to mediate the relationship between self-efficacy, support measured at 7 days post-surgery, and meaning measured at 6 months post-surgery.

**The Direct Model.** Testing the direct model (See Figure 26) indicated a significant direct effect for self-efficacy on meaning reported at 6 months post-surgery ( $\beta = .29$ ,  $p < .05$ ), no direct effect for social support reported at 7 days post-surgery on meaning was found, however, support received was marginally associated with the number of support resources ( $\beta = .19$ ,  $p = .08$ ) confirming the previously found results.

**The Mediation Model.** Testing the mediational model in which coping reported at 1 month post-surgery is predicted to mediate the relationship between resources and meaning measured at 6 months post-surgery showed that active coping continued to be the only significant mediator of the relationship between self-efficacy and meaning ( $\beta = .39$ ,  $p < .001$ ), and the direct path between self-efficacy and meaning was no more significant. Accommodation was significantly associated with self-efficacy ( $\beta = .31$ ,  $p < .005$ ), whereas no significant associations between avoidant coping, resources, and meaning were found (See Figure 26). Results so far attest to the prevalence of a certain pattern of associations between resources, coping, and meaning found in cancer. Table 17 shows the fit indices for the two model.

Table 17  
*Fit Indices for the Direct and Mediation Models: Patients Resources (t2), Coping (t3), and Meaning Measured as Appreciation of Life (t4)*

	X <sup>2</sup>	df	p	CMIN/DF	RMS	GFI
Direct model	3.75	3	.289	1.251	.018	.979
Mediation model	12.13	11	.355	1.102	.042	.963

Note.  $n = 96$ . CMIN/DF = Relative chi-square, SRMR = Standardized Root Mean Residual; GFI = Goodness-of-fit Index.

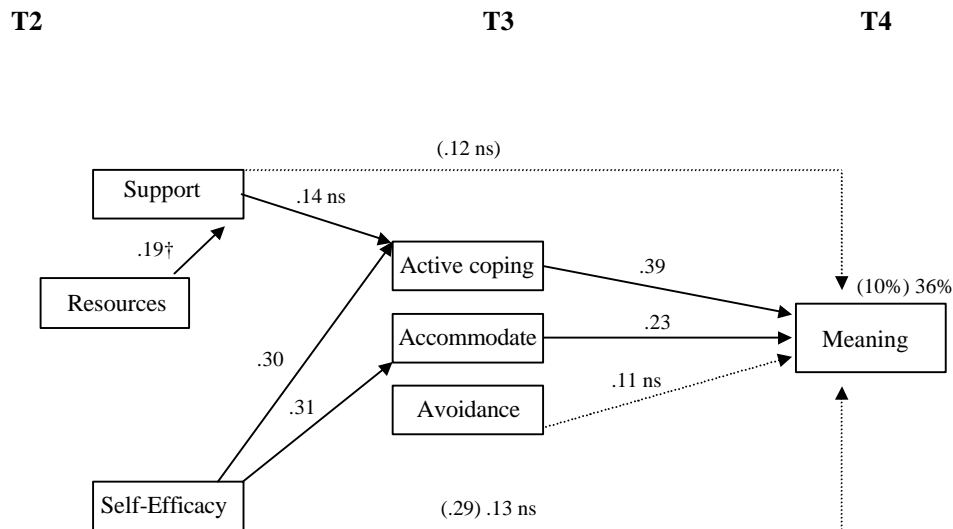


Figure 26. Standardized Path Model for the Relationships between Resources (t2), Coping (t3), and Meaning Assessed as Appreciation of Life (t4).

### ***Resources, Coping, and Meaning: Confirmed Consistency of Pattern of Associations.***

Although, the previously mentioned direct and mediation models attest to the presence of a certain pattern of associations between resources, coping, and meaning found in cancer, however, it was decided to examine a third model within different time-lag to see whether these associations continue to exist. According to this model active coping measured at 6 months post-surgery is predicted to mediate the relationship between self-efficacy and social support measured at 1 month post-surgery and meaning assessed at one year post-surgery (see Figure 27). Because the direct model was saturated, there were zero degrees of freedom and the estimated coefficients obtained were identical to the sample values (Arbuckle & Wothke, 1999). The path analyses, however, showed satisfactory fit indices when the mediating role of coping was controlled in the second model (see Table 18). Whereas the direct model continued to reveal a direct and significant effect of self-efficacy beliefs on meaning reported at 12 months post-surgery, the mediational model indicated that the effect of self-efficacy on meaning was completely mediated by active coping ( $\beta = .35$ ,  $p < .001$ ) and explained about 28% of the variance of meaning. No direct significant effect of support on meaning reported 11 months

later, and no marked mediational effect for accommodation and avoidant coping were found, although accommodation was associated with both self-efficacy ( $\beta = .42, p < .001$ ), and social support ( $\beta = .24, p < .01$ ) suggesting that high self-efficacious patients and those received high social support at one month post-surgery accommodate themselves better to cancer-related stressors than other patients. In line with the previously mentioned mediational model, avoidant coping was neither related to self-efficacy nor to social support. Furthermore, social support measured at t3, however, was not associated with the number of resources.

Results so far showed that the relationship between self-efficacy and meaning is mediated by active coping, although the strength of this mediational effect (i.e., complete or partial effect) varied across the three models suggesting both an effect of the extended time-lag between the related assessments and changes in these parameters over time. Accordingly, these results confirmed the previously found results and attest to the presence of certain patterns of associations between personal resources, active coping, and meaning found in cancer.

Table 18  
*Fit Indices for the Mediational Model: Patients Resources (t3), Coping (t4), and Meaning Measured as Appreciation of Life (t5)*

	$X^2$	$df$	$p$	CMIN/DF	RMR	GFI
Mediational model	2.25	2	.32	1.13	.02	.99

Note.  $n = 96$ . CMIN/DF = Relative chi-square, SRMR = Standardized Root Mean Residual; GFI = Goodness-of-fit Index.

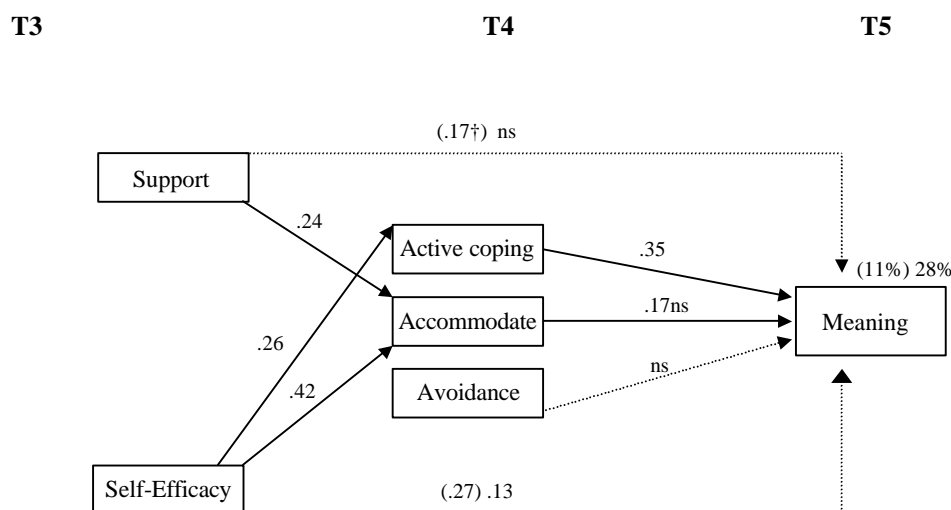


Figure 27. Standardized Path Model for the Relationships between Resources (t3), Coping (t4), and Meaning Assessed as Appreciation of Life (t5).

### ***Does Coping Mediate the Relationship between Resources and Benefit Finding?***

#### ***Benefit Finding: the 17-item Scale.***

Former concurrent and longitudinal correlational analyses between resources, coping, the total score, and the four subscales of the benefit finding ascertained relationships between these variables (see sections 5.1.4.5 and 5.1.4.6; and Appendix B). To scrutinize further associations between, resources and the total score and the four subscales of benefit finding, and whether coping mediate these relationships, path analysis was used.

First, the role of coping for the relationship between benefit finding (i.e., the total score) and personal and social resources was examined. Results indicated that both the direct and mediational model fit the data quite well (see Table 19). As can be seen in Figure 28, self-efficacy ( $\beta = .29, p < .01$ ) and received support ( $\beta = .25, p < .05$ ) measured at 1 month post-surgery have significant effect on benefit finding and accounted for 15% of the variance. Examining the mediational model showed that active coping was a significant but a partial mediator for the relationship between self-efficacy and benefit finding ( $\beta_{self\text{-}efficacy\text{-}benefit\text{ finding}} = .25, p < .05; \beta_{active\text{ coping}\text{-}benefit\text{ finding}} = .23, p < .05$ ). With regard to the association between received support, active coping, and benefit finding, the direct path between received support and benefit finding remained significant ( $\beta = .24; p < .05$ ), and active coping did mediate this relationship. On the other hand support was related to accommodation ( $\beta = .26; p < .05$ ) suggesting that support received at 1 month post-surgery enhanced accommodating to cancer 5 months later. Avoidance was neither related to resources nor to benefit finding.

Table 19

*Fit Indices for the Direct and Mediational Models: Patients Resources (t3), Coping (t4), and the 17-Item Benefit Finding Scale (t5)*

	X <sup>2</sup>	df	p	CMIN/DF	RMR	GFI
Direct model	5.15	3	.16	1.715	.07	.97
Mediational model	7.106	6	.311	1.101	.03	.97

*Note.*  $n = 85$ . CMIN/DF = Relative chi-square, SRMR = Standardized Root Mean Residual; GFI = Goodness-of-fit Index.

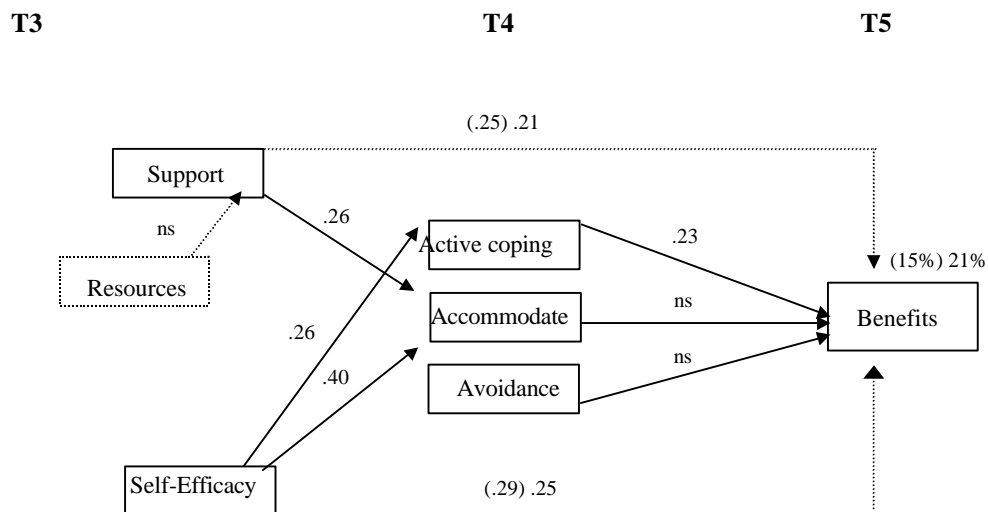


Figure 28. Standardized Path Model for the Relationships between Resources (t3), Coping (t4), and Meaning Assessed as Benefit Finding (t5).

### ***Does Coping Mediate the Relationships between Resources and the four subscales of Benefit Finding?***

**The Direct Model.** Using path analyses, associations between the four subscales of benefit finding measured at t5, personal and social resources measured at t3, and coping strategies used by patients assessed at t4 are investigated. Examining the direct model in which self-efficacy beliefs and social support reported at t3 are predicted to affect the four types of benefits (i.e., acceptance of life imperfection, personal growth, positive changes in family relationship, and an increased sensitivity to other people) showed that self-efficacy was strongly associated with personal growth ( $\beta = .39, p < .001$ ), and moderately associated with both acceptance of life imperfection ( $\beta = .20, p < .05$ ) and an increased sensitivity to others ( $\beta = .23, p < .05$ ). The path analyses also showed a significant relationship between received social support and positive changes in family relationship indicating that those who received high social support at t4 are likely to report an improved family relationship

6 months later ( $\beta = .23, p < .01$ ). In addition marginally significant association between support and an increased sensitive was also found ( $\beta = .14, p = .096$ ).

**The Mediation Model.** Taking a look at the mediational model, active coping partially mediated the relationship between self-efficacy and growth ( $\beta_{self\text{-}efficacy\text{-}active\text{ coping}} = .26, p < .05$ ;  $\beta_{active\text{ coping-growth}} = .26, p < .01$ ). The direct path between self-efficacy and growth remained significant ( $\beta = .32, p < .001$ ) and both explained about 24% of the variance of personal growth. Active coping was also found to be a complete mediator of the relationship between self-efficacy and increased sensitivity ( $\beta_{active\text{ coping-sensitivity}} = .21, p < .05$ ;  $\beta_{self\text{-}efficacy-sensitivity} = .14, p > .10$ ). With regard to the association between self-efficacy and acceptance of life imperfection, accommodation completely mediated this relationship ( $\beta_{accommodation\text{-}acceptance} = .28, p < .005$ ;  $\beta_{self\text{-}efficacy-acceptance} = .08, p > .10$ ).

Concerning associations between received support, coping, and the four types of benefits, the mediational model revealed no significant mediational roles of the three coping strategies, although received support was markedly related to accommodation ( $\beta = .25, p < .01$ ). In addition received support continued to affect directly positive changes in family relationship ( $\beta = .26, p < .01$ ). Figure 29 and Table 20 show the fit indices and standardized weights for both the direct and mediational models.

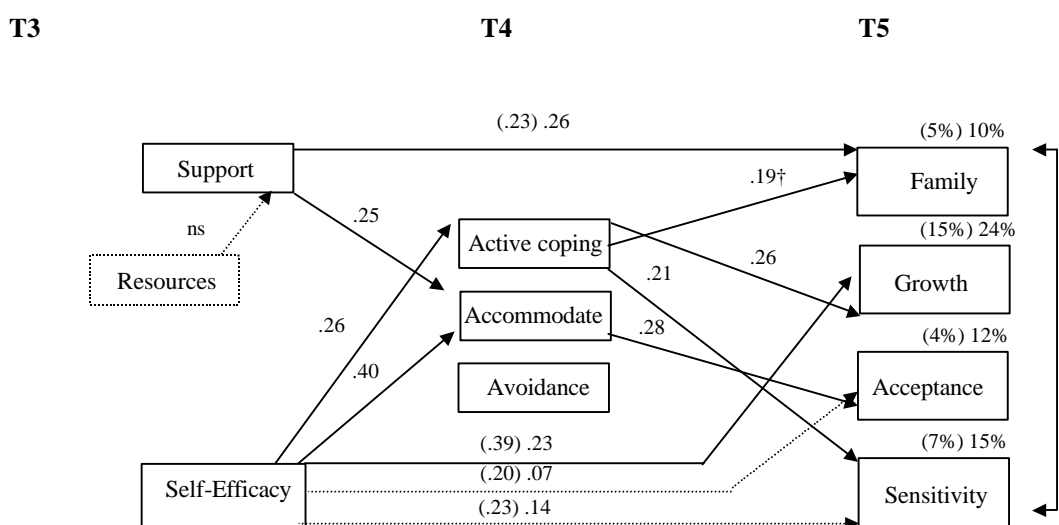


Figure 29. Standardized Path Model for the Relationships between Resources (t3), Coping (t4), and the four Subscales of Benefit Finding (t5).



Table 20

*Fit Indices for the Direct and Mediation Models: Patients Resources (t3), Coping (t4), and the Four Facets of the Benefit Finding scale (t5)*

	X <sup>2</sup>	df	p	CMIN/DF	RMR	GFI
Direct model	4.01	4	.405	1.002	.05	.98
Mediation model	13.91	13	.38	1.07	.04	.97

*Note.*  $n = 85$ . CMIN/DF = Relative chi-square, SRMR = Standardized Root Mean Residual; GFI = Goodness-of-fit Index.

To sum up these results, whereas self-efficacy was found to be critical for perceiving meaning through an increased acceptance of life imperfection, personal growth, and an increased sensitivity to others, receiving social support was critical for perceiving positive changes in family relationship. Active coping was found to be a significant mediator of the relationships between personal growth, an increased sensitivity to other people, and self-efficacy beliefs. On the other hand, accommodation significantly mediated the relationships between self-efficacy and acceptance of life imperfection. No mediation effect for these coping strategies were found in the relationship between received support and positive changes in family relationship confirming previously reported results.

#### **5.14.10. Finding Meaning and Adjustment: Concurrent and Longitudinal Associations**

*Negative Affect.* To examine the questions regarding the relationships between meaning found in cancer and other indicators of well-being including negative affect, quality of life, pain, fatigue, and impairment attributed to illness, zero-order correlation was used to assess concurrent associations between these parameters. Results showed a significant but modest association between appreciation of life and negative affect both reported at t1 ( $r = .20, p < .05; n = 341$ ); and marginally significant associations at both t2 ( $r = .11, p = .06; n = 311$ ) and t3 ( $r = .12, p = .09; n = 220$ ), no other significant concurrent associations were found.

Looking at associations between negative affect, the total score of benefit finding, and the four subscales reported at t5 indicated no significant associations other than with acceptance of life imperfection ( $r = -.20, p < .05; n = 109$ )

**Quality of Life.** With regard to quality of life, *product moment* correlation showed cross-sectional significant relationships between quality of life and appreciation of life assessed at 7 days post-surgery (t2;  $r = .14, p < .05; n = 306$ ); and 6 months post-surgery (t4;  $r = .14, p < .05; n = 188$ ). Although these results indicated significant associations, however, they don't identify the direction of this association, i.e., whether having a better quality of life directly after surgery (t2) motivates patients to perceive higher level of appreciation of life at this measurement point in time, or having a high level of appreciation of life enhances patients quality of life. Investigating cross-sectional associations between quality of life, the total score of benefit finding, and the four subscales reported at t5 showed no significant correlations.

Longitudinal correlations between the quality of life measured at the four measurement points in time (t1 - t4), the total score of benefit finding, and the four subscales revealed marginally significant correlations between quality of life reported at t1 and personal growth ( $r = .18, p = .07; n = 110$ ), quality of life reported at t2 and positive changes in family relationship ( $r = .17, p = .07; n = 120$ ), quality of life reported at t3 and both the total score of benefit finding ( $r = .18, p = .06; n = 117$ ) and acceptance of life imperfection ( $r = .18, p = .07; n = 117$ ), and quality of life reported at t4 and personal growth ( $r = .15, p = .08; n = 129$ ). These associations pointed to the positive effect of quality of life on later reports of benefits and gains found in cancer.

**Pain.** cross-sectional correlations between appreciation of life and reports of pain indicated no significant associations. Inspections of longitudinal correlations revealed one significant relationship between pain reported at the 3-day pre-surgery (t1) and appreciation of life reported at 7-day post-surgery assessment (t2;  $r = .14, p < .05; n = 241$ ) indicating that higher level of pain are associated with later reports of an increased appreciation of life. Examining the total score of benefit finding, the

four subscales, and reports of pain measured at t5 showed no significant associations, however, inspections of longitudinal relationships indicated a marked correlation between report of pain at t2 and positive changes in family relationship measured at t5 ( $r = -.19, p < .05; n = 121$ ) suggesting that patients reported lower level of pain are more likely to report positive changes in interpersonal relationship 11 months later.

***Fatigue.*** Zero-order correlations between fatigue and appreciation of life reported across all measurement points in time were not significant. Inspecting longitudinal and concurrent associations between fatigue reported at all assessments, the total score of benefit finding, and the four subscales measured at t5 showed a negative and marginally significant correlation between fatigue reported at t2 and positive changes in family relationship reported at t5 ( $r = -.17, p = .06; n = 121$ ).

***Impairment Attributed to Illness.*** No concurrent significant associations between perceived impairment due to illness and appreciation of life were found. Examining concurrent and longitudinal associations between perceived impairment reported at all assessments (t1 – t5), the total score of the benefit finding scale, and the four subscales indicated one significant relationship between impairment reported at t1 and personal growth reported at t5 ( $r = -.25, p = .06; n = 113$ ).

To sum up these results, although a significant correlation between negative affect and meaning was found at the initial assessments (t1) pointing to the possibility that meaning emerges from distress, this association was not strong suggesting the interplay of other factors in the initiation of meaning found in cancer. In addition, later reports of other types of meaning found at t5 was associated with lower levels of negative affect, pain, fatigue, and higher level of quality of life reported in earlier assessments (t1 – t4). These finding suggested that a certain level of distress may be necessary for the *initiation* of meaning found in cancer, however, for the *development* of meaning over time certain levels of adjustment may also be essential.

#### 5.4.11. Differential Effect for Meaning on Adjustment

To examine further relationships between adjustment and meaning, a series of ANCOVA measures were used to test whether differential levels of meaning affect adjustment after adjusting for differences in patients' prior levels of adjustment.

To run these analyses, all indicators of meaning; that is, appreciation of life, the total score of the benefit finding scale, and the four subscales reported at t5 (i.e., acceptance of life imperfection, personal growth, positive changes in family relationship, and increased sensitivity for others) were dichotomised using a median split procedure and served as independent variables in the aforementioned analyses.

**Quality of Life.** Exploring whether perceiving high level of appreciation of life at t5 produce higher levels of quality of life at t5 after adjusting for initial differences in quality of life showed both a significant effect of quality of life reported at t5 ( $F(1, 100) = 7.41, p < .005, \zeta^2 = .07$ ) and appreciation of life on quality of life reported at t5 ( $F(1, 100) = 7.04, p < .01, \zeta^2 = .07$ ). Results indicated that changes in quality of life is associated with finding more meaning in cancer through an increased appreciation of life (see figure 30). ANCOVA measures also showed no violation of homogeneity assumption (*Levene's test* ( $p > .05$ )). Examining associations between the other dichotomized indicators of benefit finding on quality of life at t5, controlling for the initial level of quality of life, showed no significant differences ( $p > .10$ ).

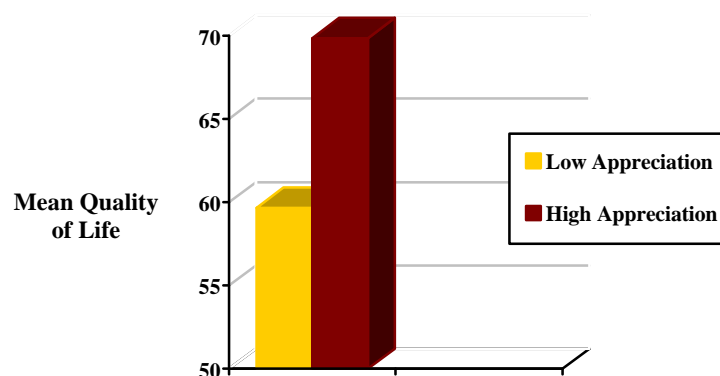


Figure 30. Means for Quality of Life at t5 after Adjusting for Initial Reports of Quality of Life at t1 in High ( $n = 50$ ) and Low ( $n = 51$ ) Appreciation of Life Groups.

***Pain, Fatigue, and Impairment Attributed to Illness.*** Regarding these parameters, ANCOVA measures revealed no significant effect except for the dichotomized benefit finding total score on the reports of fatigue measured at t5 ( $F(1, 107) = 7.03$ ,  $p < .01$ ,  $\zeta^2 = .06$ ) controlling for the initial reports of fatigue at t1 ( $F(1, 107) = 22.57$ ,  $p < .01$ ,  $\zeta^2 = .17$ ). Results indicated that higher levels of benefit found in cancer are associated with lower levels of fatigue reported at 12 months post-surgery. No violation of the homogeneity assumption was detected (*Levene's test* ( $p$ )  $> .05$ ). Means of fatigue for the two groups of are depicted in Figure 31.

To conclude these results, although associations between meaning, benefit finding, and indicators of adjustment are confirmed, however, no inference of the direction ,i.e., causation, of variables can be made (see section 5.1.4.8).

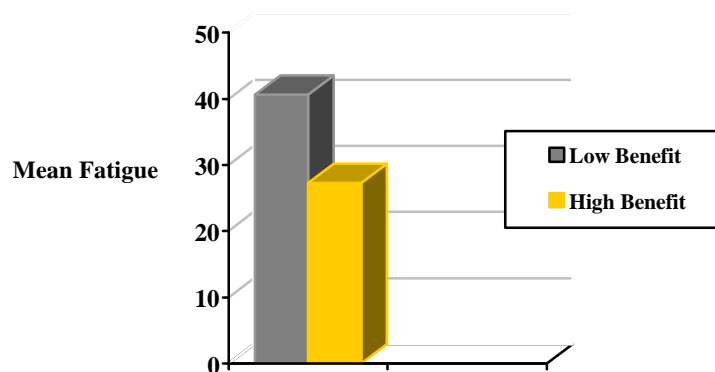


Figure 31. Means for Fatigue at t5 after Adjusting for Initial Reports of Fatigue Measured at t1 in High ( $n = 54$ ) and Low ( $n = 56$ ) Benefit Finding Groups.

Table 21

*Hypotheses and Results*

<b>Hypotheses</b>	<b>Results</b>
Within-one-month diagnosed patients are predicted to report higher level of negative affect at t1 compared to post-one-month diagnosed patients.	Partly confirmed
High levels of pain, fatigue, and impairment attributed to illness, and low levels of quality of life are expected to be reported around the surgery, and under conditions that patients experience cancer recurrence.	Partly confirmed
Reports of negative affect, pain, fatigue, and impairment attributed to illness should decrease significantly overtime as patients adjust themselves to living with cancer. Consequently, level of quality of life is expected to increase markedly in post-surgery assessments.	Partly confirmed
Patients are predicted to report higher levels of social support after the initial cancer diagnosis (t1), around the surgery and under conditions that patients experience recurrence.	Partly confirmed
In addition to that, the presence of more than one resource is expected to be positively associated with the level of support received.	Partly confirmed
High self-efficacious patients will report receiving higher level of support and more support resources compared with low self-efficacious patients.	Not confirmed
Avoidant coping strategies used by patients are expected to be high in newly diagnosed patients (i.e., within-one-month diagnosed patients) and patients with cancer recurrence compared to other patients,	Not confirmed
and to decrease significantly in all post-surgery assessments in all patients.	Confirmed
On the other hand, a marked increase in active coping and accommodation are predicted in all post-surgery assessments.	Confirmed
Personal resources measured by self-efficacy beliefs are predicted to be associated with the use of active and accommodatory coping strategies rather than with avoidant coping strategies across all waves.	Confirmed
Social resources measured by social support and the presence of multiple support resources are expected to be related to the use of active and accommodatory coping strategies rather than with avoidant coping strategies in all measurement points in time.	Partly confirmed
Report of an increased appreciation of life in response of being diagnosed with cancer should be low at the first measurement point in time (t1).	Not confirmed
Finding meaning in cancer, through increased appreciation of life, is predicted to develop over time, that is, significant increase on reports of meaning over the five measurement points is expected.	Confirmed
All types of meaning found in cancer are expected to be associated with age.	Partly confirmed
Women should be more likely to find meaning and to report more benefits in cancer than men do.	Partly confirmed
Married patients or patients with partners and those having children should find more meaning in cancer than other patients	Partly confirmed
Finding meaning in cancer is expected to relate to indicators of severity of cancer disease. That is, time elapsed since the initial diagnosis, palliative type of surgery, recurrence, indicators of stage of disease	Partly confirmed

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(e.g., the presence of metastasis), comorbidity, and multimorbidity.

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Personal resources measured by self-efficacy beliefs are expected to be associated with all types of meaning measured in this study, i.e., with an increased appreciation of life, an increased acceptance of life imperfection, personal growth, positive changes in family relationships, and an increased sensitivity to other people.	Partly confirmed
Received social support and the presence of a number of resources of support are predicted to be associated with all types of meaning and benefits measured in this study.	Partly confirmed
Active and accommodatory coping strategies used by patients are expected to be associated with all types of meaning found in cancer.	Partly confirmed
No association between meaning found in cancer and avoidant coping strategies used by patients should be found.	Partly confirmed
Active coping and accommodation are predicted to mediate the relationship between self-efficacy beliefs and all types of meaning and benefits measured in this study. On the other hand, avoidant coping is not expected to play a role as a mediator in these relationships.	Partly confirmed
Active coping and accommodation rather than avoidant coping strategies are predicted to mediate the relationship between received social support and all types of meaning and benefits found in cancer.	Partly confirmed
Patterns of associations between patients' personal and social resources, different types of coping, and meaning found in cancer are expected to change over time due to changes in patients' resources and coping strategies across different measurement points in time.	Partly confirmed
Around the cancer surgery, and under conditions that patients experience the initial diagnosis of cancer or cancer recurrence finding meaning should be positively associated with levels of negative affect, pain, fatigue and impairment attributed to illness, and negatively associated with quality of life reported at the these stages.	Partly confirmed
Finding meaning in cancer should be negatively associated with negative affect, pain, fatigue and impairment attributed to illness and positively associated with quality of life at the late assessments (t3, t4, and t5).	Partly confirmed

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