

\*\*\* POSTPRINT: Article published in *Quality of Life Review*.

The final publication is available at [www.springerlink.com](http://www.springerlink.com)

DOI 10.1007/s11136-012-0204-9 \*\*\*

**Prospective individual and social predictors of changes in adjustment for patients  
attending a regional cancer service**

Heather J. Green<sup>1</sup>, Megan Ferguson<sup>2</sup>, David H. K. Shum<sup>1</sup>, & Suzanne K. Chambers<sup>1, 2, 3</sup>

<sup>1</sup> Behavioural Basis of Health Program, Griffith Health Institute and School of Applied  
Psychology, Griffith University, Australia

<sup>2</sup>Cancer Council Queensland, Brisbane, Australia

<sup>3</sup>Health and Wellness Institute, Edith Cowan University, Perth, Australia

Running head: INDIVIDUAL AND SOCIAL PREDICTORS IN CANCER

Word count: 3,999 (excluding abstract, tables, figures and references)

Correspondence should be addressed to: Dr Heather Green, School of Psychology, Gold  
Coast campus, Griffith University Qld 4222, Australia

Email: [H.Green@griffith.edu.au](mailto:H.Green@griffith.edu.au); Phone +61 7 5552 9086; Fax: +61 7 5552 8291

### Abstract

**Purpose.** This study applied the Social Cognitive Processing (SCP) model to examine whether positive (social support) and negative (social constraints) aspects of the social environment influenced emotional distress, quality of life (QoL), wellbeing and benefit finding after cancer. **Methods.** Participants were 439 adults at a median of 66 weeks post-diagnosis and 79% of them had completed cancer treatments. Outcome measures and predictors were assessed twice, 6 months apart, and their relationships were analyzed using hierarchical multiple regressions. **Results.** Participants reported improved physical QoL at re-test. Correlations showed that better outcomes for depression, anxiety, QoL, and wellbeing were associated with higher social support and lower social constraints. In addition, benefit finding correlated with social support but not social constraints. After other predictors were taken into account, lower initial social constraints were modestly associated with improved mental QoL at re-test. Higher social constraints scores also predicted development of clinically significant depression and anxiety. **Conclusions.** Results provided some support for the SCP model's prediction that both positive and negative aspects of social environment can contribute to adjustment in people with cancer. Although several findings supported the model, a heterogeneous sample and small effect sizes indicate that replication and further study is needed.

**KEYWORDS:** Cancer, Quality of Life, Psychological Factors, Social Support, Longitudinal Studies

**ABBREVIATIONS:** SCP=Social Cognitive Processing, T1=Time 1, T2=Time 2, HADS=Hospital Anxiety and Depression Scale, SF-36=Medical Outcomes Study Short Form 36 items version 2, ENRICHED= Enhancing Recovery in Coronary Heart Disease, QoL=Quality of Life, ANOVA=Analysis of Variance

**Prospective individual and social predictors of changes in adjustment for patients  
attending a regional cancer service**

Cancer is a major life stress. Anxiety and depression occur frequently among people with cancer [1]. Both risk and resilience factors can be identified that predict adjustment [2-4]. Given that responding to psychosocial needs is viewed as integral to cancer treatment [5], a better understanding of such predictive factors can help cancer services to more effectively identify and respond to psychosocial needs.

Stress and coping models of adjustment, such as Lazarus and Folkman's transactional model of stress [6; 7], have been supported by findings that individual differences in cognitive processes are associated with adjustment to cancer [8]. Updates of this model place increased emphasis on positive as well as negative emotion in adjustment [6; 9]. More broadly, the concept of post-traumatic growth is expanding understanding of how stressful experiences can generate positive as well as negative outcomes [10-12].

Social factors are also important. Partners, family and friends can provide important support but are sometimes more distressed than the person with cancer [13; 14]. The Social Cognitive Processing (SCP) model of cancer, developed by Lepore and colleagues, describes potential influences of this social environment on adjustment [15; 16]. This model suggests that adjustment is facilitated by a supportive social environment but impeded by an unsupportive or critical social network [15]. The model operationalizes an unsupportive environment as perceived "social constraints", defined as responses by significant others that the individual sees as discouraging or limiting discussion that the person would like to have about their illness experiences [16]. Higher perceived social support is expected to be associated with improved adjustment and higher perceived social constraints with reduced adjustment. A further aspect of the SCP model is the suggestion that social variables may

affect adjustment by buffering detrimental effects of individual psychological processes.

Significant individual processes that the model posits may be buffered by an optimal social environment are intrusion and avoidance, both of which are thought to represent incomplete cognitive processing [15].

Consistent with the SCP model, social support is generally found to be beneficial for adjustment, particularly when perceived quality of support is measured [1; 17]. Conversely, perceived social constraints have been found to associate with poorer adjustment to cancer in both patients [18] and their partners [19]. Social constraints have also been associated with individual characteristics related to cancer adjustment, such as elevated social constraints in patients who report lower optimism [20]. However, research on the SCP model in relation to adjustment in cancer patients has been limited [16] and the present study sought to address this gap.

The current study examined whether social environment factors, as described in the SCP model of adjustment [15; 16], would add to demographic, medical and psychological factors in predicting subsequent changes in adjustment. Patients who were attending a regional cancer centre in Queensland, Australia were evaluated prospectively. Outcomes included both negatively framed experiences (viz., depression and anxiety) and positively framed experiences (viz., physical quality of life, mental quality of life, wellbeing, and benefit finding). It was expected that perceptions of the social environment, including both social support and social constraints, would be able to predict changes in adjustment after demographic, medical, and individual psychological variables had been taken into account.

## **Method**

### **Participants and Recruitment**

Eligible participants were consecutive patients who attended a specific regional tertiary cancer treatment centre over a 30-month period and within 6 months prior to the

study. Other inclusion criteria were a minimum age of 20 years and diagnosis of a solid tumor or hematological cancer. Patients with prostate cancer were not recruited, due to a concurrent local prostate cancer study. Participants were approached through a mailed invitation from their treating doctor. There were 439 participants at Time 1 (T1, 61% participation) and 396 at Time 2 (T2, 6 months later; 90% retention).

### **Procedures and Materials**

The study was approved by the Townsville Health Service District Human Research Ethics Committee (protocol 33/06). After informed consent, participants completed a computer-assisted telephone interview to collect demographic and medical information. Participants then returned written self-report measures by post. Demographic variables were age, sex, marital status, education, country of origin, private health insurance status, and work status. Medical variables were tumor type, treatments, and time since diagnosis.

### **Outcome Variables**

**Anxiety and Depression.** The 14-item Hospital Anxiety and Depression Scale (HADS) measured anxiety (7 items) and depression (7 items) within the past week [21]. A score of  $\geq 7$  on either subscale indicates clinically significant symptoms [22]. A review of this scale's use for people with medical illnesses found high reliability (Cronbach's alpha  $>.82$  for each subscale) and validity [23].

**Quality of Life.** The Medical Outcomes Study Short Form-36 (SF-36v2) was used to compute summary Physical Component and Mental Component scores for quality of life (QoL) [24]. Australian scale versions and norms with previously demonstrated reliability and validity were used [25].

**Personal Wellbeing.** The 7-item Personal Wellbeing Index was used to measure global life satisfaction [26]. The measure's authors reported Cronbach's alpha of .70-.85 and good convergent validity.

**Benefit Finding.** A 17-item measure of possible benefits experienced due to cancer was administered. Previous research has demonstrated excellent internal reliability, stability, and validity for use by people with cancer [27].

### **Psychosocial Predictors**

**Dispositional Optimism.** The generalized tendency to have positive outcome expectancies (optimism) was measured with the Life Orientation Test – Revised [28]. Responses to the 6 optimism items were summed, with responses between 0 (*strongly disagree*) to 4 (*strongly agree*). The scale authors reported Cronbach's alpha of .78, 4-month test-retest reliability of .68, and demonstrated convergent and discriminant validity.

**Cancer Specific Stress.** Intrusion and avoidance were measured via the Impact of Events Scale [29]. Participants reported frequency of each item within the last 7 days using scores of 0, 1, 3 and 5 for responses *not at all*, *rarely*, *sometimes* and *often* respectively. The 7 intrusion and 8 avoidance items were each summed separately. The subscales have previously demonstrated satisfactory reliability and validity as measures of cognitive processes associated with stress [30].

**Social Support.** The 7-item ENRICHD Social Support Instrument was used, due to its previously demonstrated internal reliability, test-retest reliability, and validity for measuring social support in patients with serious illness [31].

**Social Constraints.** The 15-item social constraints scale assessed the degree of negative social interactions experienced by participants over the past month [20]. Participants responded in relation to their partner or spouse if they had a partner, and in relation to another person they were close to, such as a close friend or relative, if unpartnered. The present study demonstrated excellent internal consistency for this scale (Cronbach's alpha .94).

## **Data Analysis**

T1 and T2 scores for predictors and outcome variables were compared using repeated measures *t*-tests. Potential predictors for multiple regression were assessed through correlations with outcome measures. Only predictors that correlated significantly with at least one outcome variable were retained for hierarchical multiple regression. In this method, blocks of predictors were added sequentially to a regression model, rather than entering all predictors simultaneously as in standard multiple regression [32]. At the first step, demographic predictors were entered, followed by medical and then psychological predictors. Order of entry was planned a priori to control for static variables before entering dynamic variables and to enter social environment at the final step to test whether it was related to outcomes after other predictors were taken into account [32]. Regressions were computed for each outcome, with T1-T2 change in the outcome as the criterion variable. To control for the tendency of repeated measurements to become less extreme at retest, a second set of hierarchical multiple regressions was conducted in which T1 score on the outcome measure was added as Step 1 and subsequent blocks were the same as for Steps 1-4 in the previous set of regressions. Predictors of clinically relevant change (as indicated by shifts into or out of clinically significant ranges for symptoms of depression and anxiety) were examined via chi-square and one-way ANOVA tests for dichotomous and continuous predictors respectively. Analyses used a .05 alpha level unless otherwise stated. Bonferroni corrections were used for planned comparisons within clinical relevance analyses.

## **Results**

### **Data Screening and Preliminary Analyses**

Scales were computed if at least half the items were answered, consistent with other psycho-oncology studies [33]. Approximately 3.4% of participants who completed T1 interviews had missing scores for all self-report measures. A further 3.4% did not provide

sufficient data to compute the SF-36. As noted in the Participants section, 10% of participants had missing T2 data. Because *t*-tests demonstrated that cases with missing data did not differ systematically from cases with complete data on demographic, predictor or outcome variables, analyses used all available cases.

Several measures demonstrated skewness. This was corrected by transformations: square root (avoidance, intrusion, depression); reflect and square root (physical QoL, mental QoL, wellbeing, benefit finding); reflect and log (social support); and inverse (social constraints). Unless otherwise indicated, results used these transformed variables. Change scores were calculated from untransformed variables.

### **Demographic and Clinical Data**

Details of participant characteristics have been published previously [2-4; 34; 35]. At T1, participants were aged 22-89 years ( $M=59.2$ ,  $SD=12.0$ ) with a median of 66 weeks post-diagnosis (range 11-1,057). Other T1 data showed 79% had completed treatment; 59% were female; 84% were born in Australia; 43% had completed either university, high school, or a trade/technical qualification; 54% had no private health insurance; 42% were retired; and 70% were currently married or in a de facto relationship. Ethnic background was most frequently identified as United Kingdom or Ireland (UK, 69%), followed by Europe (13%), UK and Europe (12%), and Indigenous Australian (3%). Less than 1% identified their ethnicity as Pacific Islander, Asian, or Unsure respectively. The most frequent tumor type was breast cancer (33%). Other tumor types were hematological (16%), gastrointestinal (14%), skin (10%), head and neck (9%), respiratory or thoracic (7%), genitourinary (7%) and “other” (5%).

### **Descriptive Statistics**

Descriptive statistics for psychosocial predictor and outcome variables are shown in Table 1. Physical QoL significantly improved from T1 to T2. For the other variables, means



and standard deviations stayed stable from T1 to T2, indicating that participants did not change significantly in a consistent direction.

### **Correlations**

Correlations between T1 predictors and outcome measures are shown in Table 2. Living with a partner correlated with lower depression and anxiety and better mental QoL and wellbeing. Having private health insurance was associated with lower T1 depression, better T2 mental QoL, and increased benefit finding. Older age and retirement showed similar correlations: Each of these variables was correlated with less anxiety and better wellbeing, but also with worse physical QoL. Female gender correlated with increased benefit finding but also with higher T2 anxiety. Interestingly, having more than 10 years of education was associated with lower T2 wellbeing and lower benefit finding.

Among medical variables, time since diagnosis and radiotherapy were not associated with outcome. Surgery was associated with better physical QoL. Having finished treatment by T1 was associated with lower depression, better physical QoL and higher wellbeing at T1, but all these correlations were non-significant at T2. Chemotherapy was associated with worse anxiety and mental QoL at both time points, and with higher depression, worse physical QoL and lower wellbeing at T1 only.

Psychological and social predictors showed similar patterns of correlations across depression, anxiety, physical QoL, mental QoL, and wellbeing. Better outcomes on these measures were associated with higher optimism, lower intrusion, lower avoidance, higher social support, and lower social constraints. Benefit finding was also associated with higher T1 optimism and higher social support. However, in contrast to associations for other outcomes, higher T1 intrusion and avoidance were each associated with higher benefit finding.

### Models of Change in Outcome Measures

**Change in Adjustment.** Table 3 summarizes results of hierarchical multiple regressions for changes in outcomes between T1 and T2. The overall regression models were significant for explaining change in depression, anxiety, and mental QoL respectively. For all outcomes, changes in  $R^2$  were not significant for Step 1 (demographics) or Step 2 (medical variables), indicating that these groups of variables were not associated with a significant increment in variance of change scores. In contrast, psychological variables in Step 3 were associated with a statistically significant increase in change variance accounted for in depression ( $R^2_{\text{change}}=.03, p<.01$ ), anxiety ( $.05, p<.001$ ), and mental QoL ( $.04, p<.01$ ). For change in depression, although psychological predictors were significant as a block, none of the individual variables was associated with a statistically significant independent contribution. For both anxiety and mental QoL, the beta weights demonstrated that higher T1 optimism was significantly associated with worse T2 function, that is, increased anxiety ( $\beta=.13$ ) and worse mental QoL ( $\beta= -.14$ ).

Social predictors significantly added to prediction of changes in depression ( $R^2_{\text{change}}=.02, p<.05$ ). Beta weights showed that lower social support at T1 (a higher score on the transformed variable) was associated with decreased depression at T2 ( $\beta= -.15$ ). Anxiety showed a similar trend, with a significant beta weight for social support ( $\beta= -.14$ ) although the overall increment in anxiety change accounted for by social predictors was not significant. For mental QoL, the social predictor block did not account for a significant increment in variance, but there was a significant beta for social constraints ( $\beta=.14$ ) in the full regression model. This indicated that lower social constraints at T1 were associated with improved mental QoL at T2.

Table 3 demonstrates several other significant beta weights, which are difficult to interpret because either the regression step, the overall regression model, or both, were not

statistically significant. Most of these associations were consistent with bivariate correlations and indicated that being retired was associated with decreased depression; having private health insurance was associated with decreased anxiety; and living with a partner was associated with improved wellbeing. In contrast to correlations, having finished treatment by T1 was associated with decreased wellbeing at T2.

**Change after T1 Adjustment Controlled.** These regression results are summarized in Table 4. Step 1 was significant for all regressions and indicated that higher T1 score was associated with a likelihood that the T2 score would be decreased. This is to be expected as more extreme scores have a tendency to become less extreme when measurement is repeated. Subsequent steps showed that there was a significant increment in change variance accounted for in anxiety by the block of demographic predictors ( $R^2_{\text{change}}=.03, p<.05$ ), although none of the individual predictors reached significance. Furthermore, psychological predictors added a significant increment in variance for anxiety (.02,  $p<.05$ ). Beta weights indicated that higher intrusion at T1 was associated with increased anxiety at T2 ( $\beta=.20$ ), even when T1 anxiety had already been taken into account. For mental QoL, psychological predictors added a significant increment in change variance (.02,  $p<.05$ ), but none of the predictors made an independent contribution. There was a further significant change in  $R^2$  (.03,  $p<.001$ ) associated with social predictors of change in mental QoL. Having lower T1 social constraints was associated with improved mental QoL at T2 ( $\beta=.22$ ).

Change in wellbeing showed a significant increment in variance associated with demographic predictors (.05,  $p<.01$ ). Older age and living with a partner were associated with improved T2 wellbeing. Psychological (.02,  $p<.05$ ) and social predictors (.02,  $p<.05$ ) also each added significantly to variance accounted for in changes in wellbeing; however, the individual predictors within these blocks did not have significant beta weights.

### **Changes in Clinically Relevant Symptoms**

Participants with HADS scores at both time points were classified in the “non-clinical” range at both assessments (depression 77%; anxiety 56%), “recovered” from T1 to T2 (depression 7%; anxiety 9%), “stable clinical” at both T1 and T2 (depression 10%; anxiety 27%), or “deteriorated” from non-clinical to clinical range (depression 6%; anxiety 8%). Table 5 compares predictor variables among these groups. For participants who were not clinically depressed at T1, reporting lower T1 social constraints predicted reduced likelihood of developing depression by T2. Similarly, participants who were not clinically anxious at T1 were less likely to report clinically significant T2 anxiety if they were retired, were older, or had lower T1 intrusion, avoidance, or social constraints. For individuals with clinically significant depression at T1, recovery from depression by T2 was more likely if the person was still awaiting treatments at T1. No other T1 predictor differed significantly between people who would maintain clinical levels of depression or anxiety and those who would recover by T2.

### **Discussion**

This study evaluated key aspects of the SCP model of adjustment to cancer by prospectively assessing emotional distress, QoL, wellbeing and benefit finding. There was partial support for the hypothesis that social environment would be associated with changes in adjustment after controlling for other predictors. Physical QoL improved significantly but other outcomes did not change in a consistent direction. Better outcomes for depression, anxiety, QoL, and wellbeing correlated with higher social support and lower social constraints. The directions of association were consistent with previous psycho-oncology research [16; 17; 36; 37]. After other predictors were accounted for, lower initial social constraints predicted a modest improvement in mental QoL. This suggested that the

perceived quality of the person's social environment contributed to changes in their mental health.

Also consistent with the SCP model was the finding that, when potential predictors were evaluated together, participants' evaluations of the quality of social relationships (social support and social constraints) explained additional variance in changes in adjustment after accounting for the presence or absence of a partner. Even for wellbeing, where living with a partner made a significant independent contribution to change variance, the block of social predictors was associated with a further significant increment in variance. This finding regarding the contribution of quality of the social environment may help to explain why interventions to enhance couple or carer relationships can assist adjustment to cancer [38].

In multiple regression, lower initial social support (i.e., a higher score on the transformed variable) was associated with decreased depression and anxiety at re-test. This unexpected association with change scores, in the opposite direction from correlations between social support and distress at both time points, was not significant once initial levels of depression and anxiety were taken into account. This suggests that the reversed direction of association was due to regression to the mean. This counterintuitive association between social support and changes in distress was not corroborated by changes of clinical category for HADS scores. In contrast, protective effects of lower social constraints were aligned in both multiple regression (for mental QoL) and changes of HADS category: Higher initial social constraints were predictive of developing later depression and anxiety in participants who were not clinically depressed or anxious initially. Higher avoidance and intrusion also predicted a shift from non-clinical to clinical levels of anxiety, whereas retirement and older age appeared to protect against developing anxiety. The only significant T1 predictor of whether participants would recover from clinically significant depression was that recovery was higher among participants who were awaiting treatment at T1. No other predictors

indicated which participants would recover from clinically significant distress. These results highlight the need to check for distress at multiple time points for people with cancer and to assess multiple aspects of distress, not solely depression [39].

Benefit finding showed a different pattern of relationships from other outcomes. The association between higher social support and higher benefit finding was consistent with other outcome measures and with previous research [10]. However, unlike other outcomes, benefit finding was not correlated with social constraints. If anything, the trend was in the opposite direction, indicating that those with higher social constraints also tended to report more benefits from having cancer. This has been reported previously from a cross-sectional analysis of the T1 benefit-finding data from this sample [35]. Psychological predictors also differed in their relationships with benefit finding compared with other outcomes: higher intrusions and avoidance were associated with *increased* benefit finding. These intriguing findings hint that individuals who experience more intrapersonal distress (in terms of intrusions and avoidance) and more interpersonal distress (in terms of social constraints) may also perceive the cancer experience to be more strongly associated with personal growth or improvement in interpersonal relationships, compared to other individuals with lower levels of intra- and interpersonal distress. It may also be the case that increased cognitive processing of cancer (such as intrusive thoughts or internal processing due to feeling socially constrained in being able to talk it through with others) may facilitate benefit finding, even though these processes may also be associated with other more detrimental outcomes.

Notably, these findings are from a large, longitudinal sample recruited from consecutive patients at a cancer centre who were unselected in terms of whether they were seeking psychosocial assistance. Converging evidence from a range of analyses suggested that not only the availability but also the quality of social environment variables contributed to adjustment. It would be helpful for future research to test whether social support and social

constraints have similar prospective associations with adjustment in other samples. Testing whether perceived social support and social constraints improve with clinical interventions such as including significant others in consultations with patients, training patients in relevant communication skills, or taking a couples-based approach to treatment for adjustment to cancer would also be beneficial. Such intervention studies should assess the extent to which change in these social variables is associated with other treatment outcomes. Clinically, these results suggest that unusually high reluctance to communicate about cancer with significant others may be a risk factor for developing depression.

A number of limitations are noted. Not all outcomes showed significant increments in change associated with social environment. Both overall variance accounted for and incremental variance associated with social environment were relatively small. Nevertheless, all but one of the total adjusted  $R^2$  values for significant regressions were greater than the .04 cutoff that has been suggested as a “recommended minimum practical effect” (RMPE), with .25 representing a “moderate effect” [40]. Using the criterion of RMPE for  $\beta=.20$  [40], the social constraints effect on change in mental QoL in Table 4 would be considered to be potentially of practical significance, but other social environment variables did not meet this threshold in multivariate analyses. However, effect size guidelines are not absolute, and  $\beta$  values can change depending on other predictors in regression. Change scores were largely symmetrically distributed with a clustering of change scores close to zero, as well as a number of individuals in the “tails” of change distributions due to individuals who experienced greater change in outcomes in either direction. When many cases show change scores close to zero, overall variance accounted for in change scores is likely to be small. However, the ability to detect statistically significant effects of social environment at a group level, even when many individuals did not change in outcomes, is likely to indicate that social environment had a clinically meaningful effect for some individuals, possibly by either

mitigating or exacerbating effects of other factors on outcome. This interpretation is further supported by the prediction of clinically meaningful shifts in HADS scores by social constraints.

An additional limitation was the potential for inflated Type I error due to the use of multiple analyses. These results should therefore be interpreted with caution and need to be replicated. The heterogeneous sample, drawn mainly from those who had completed treatment before T1, is likely to have made it more difficult to detect relationships among the variables of interest. However, the heterogeneity increases generalizability of the findings. The participation rate was comparable to other psycho-oncology studies [41; 42] but needs to be considered when generalizing results. As reported previously for this dataset, non-participants were more likely than participants to be older and male [4]. Most had completed active cancer treatments before T1. Therefore, generalizability of these results is likely to be most applicable to women who are relatively younger among adult cancer patients and who have completed cancer treatments.

In conclusion, this study provided modest support for the SCP model in that both positive and negative aspects of the social environment were prospectively associated with changes in adjustment for people treated at a cancer center. Small effect sizes, heterogeneity, and limited representation of varying treatment stages need to be considered in interpreting these results; replication and further study is required.

### **Acknowledgements**

This project was funded by the Cancer Council Queensland. We gratefully acknowledge the support of the Townsville Hospital and Ms Alison Beeden in the undertaking of this research.



### References

1. Zabora, J., Brintzenhofesoc, K., Curbow, B., Hooker, C., & Piantadosi, S. (2001). The prevalence of psychological distress by cancer site. *Psycho-Oncology*, 10(1), 19-28.
2. McDowell, M. E., Occhipinti, S., Ferguson, M., & Chambers, S. K. (2011). Prospective predictors of psychosocial support service use after cancer. *Psycho-Oncology*, 20(7), 788-791.
3. McDowell, M. E., Occhipinti, S., Ferguson, M., Dunn, J., & Chambers, S. K. (2010). Predictors of change in unmet supportive care needs in cancer. *Psycho-Oncology*, 19(5), 508-516.
4. Steginga, S. K., Campbell, A., Ferguson, M., Beeden, A., Walls, M., Cairns, W., et al. (2008). Socio-demographic, psychosocial and attitudinal predictors of help seeking after cancer diagnosis. *Psycho-Oncology*, 17(10), 997-1005.
5. Bultz, B. D., & Carlson, L. E. (2006). Emotional distress: the sixth vital sign—future directions in cancer care. *Psycho-Oncology*, 15(2), 93-95.
6. Folkman, S. (1997). Positive psychological states and coping with severe stress. *Social Science and Medicine*, 45(8), 1207-1221.
7. Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal and coping*. New York: Springer Publishing.
8. Franks, H. M., & Roesch, S. C. (2006). Appraisals and coping in people living with cancer: a meta-analysis. *Psycho-Oncology*, 15(12), 1027-1037.
9. Folkman, S., & Greer, S. (2000). Promoting psychological well-being in the face of serious illness: When theory, research and practice inform each other. *Psycho-Oncology*, 9(1), 11-19.
10. Bozo, O., Gundogdu, E., & Buyukasik-Colak, C. (2009). The moderating role of different sources of perceived social support on the dispositional optimism-posttraumatic growth relationship in postoperative breast cancer patients. *Journal of Health Psychology*, 14(7), 1009-1020.
11. Kinsinger, D. P., Penedo, F. J., Antoni, M. H., Dahn, J. R., Lechner, S., & Schneiderman, N. (2006). Psychosocial and sociodemographic correlates of benefit-finding in men treated for localized prostate cancer. *Psycho-Oncology*, 15(11), 954-961.
12. Weaver, K., Llabre, M., Lechner, S., Penedo, F., & Antoni, M. (2008). Comparing unidimensional and multidimensional models of benefit finding in breast and prostate cancer. *Quality of Life Research*, 17(5), 771-781.
13. Couper, J., Bloch, S., Love, A., Macvean, M., Duchesne, G. M., & Kissane, D. (2006). Psychosocial adjustment of female partners of men with prostate cancer: a review of the literature. *Psycho-Oncology*, 15(11), 937-953.
14. Northouse, L. L., Mood, D., Templin, T., Mellon, S., & George, T. (2000). Couples' patterns of adjustment to colon cancer. *Social Science and Medicine*, 50(2), 271-284.
15. Lepore, S. J. (2001). A social-cognitive processing model of emotional adjustment to cancer. . In A. Baum & B. L. Andersen (Eds.), *Psychosocial interventions for cancer* (pp. 99-116). Washington, DC: American Psychological Association.
16. Lepore, S. J., & Revenson, T. A. (2007). Social constraints on disclosure and adjustment to cancer. *Social and Personality Psychology Compass*, 1(1), 313-333.
17. Carpenter, K., Fowler, J., Maxwell, G., & Andersen, B. (2010). Direct and buffering effects of social support among gynecologic cancer survivors. *Annals of Behavioral Medicine*, 39(1), 79-90.
18. Halbert, C. H., Wrenn, G., Weathers, B., Delmoor, E., Ten Have, T., & Coyne, J. C. (2010). Sociocultural determinants of men's reactions to prostate cancer diagnosis. *Psycho-Oncology*, 19(5), 553-560.

19. Sheridan, M. A., Sherman, M. L., Pierce, T., & Compas, B. E. (2010). Social support, social constraint, and affect in spouses of women with breast cancer: The role of cognitive processing. *Journal of Social and Personal Relationships*, 27(1), 5-22.
20. Lepore, S. J., & Ituarte, P. H. G. (1999). Optimism about cancer enhances mood by reducing negative social relations. *Cancer Research, Therapy and Control*, 8, 165-174.
21. Zigmond, A. S., & Snaith, R. P. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatrica Scandinavica*, 67(6), 361-370.
22. Snaith, R. P., & Zigmond, A. S. (1994). *The Hospital Anxiety and Depression Scale Manual*. Windsor: NFER:Nelson.
23. Bjelland, I., Dahl, A. A., Haug, T. T., & Neckelmann, D. (2002). The validity of the Hospital Anxiety and Depression Scale: An updated literature review. *Journal of Psychosomatic Research*, 52(2), 69-77.
24. Quality Metric Incorporated (1992, 2003). SF-36: SF-36v2 Health Survey (IQOLA SF-36v2 Standard, English (Australia), 7/03). Lincoln, RI: Health Assessment Lab, Medical Outcomes Trust and Quality Metric Incorporated.
25. Hawthorne, G., Osborne, R., Taylor, A., & Sansoni, J. (2007). The SF36 Version 2: critical analyses of population weights, scoring algorithms and population norms. *Quality of Life Research*, 16(4), 661-673.
26. International Wellbeing Group (2006). *Personal Wellbeing Index* (4th ed.). Melbourne: Australian Centre on Quality of Life, Deakin University.
27. Antoni, M. H., Lehman, J. M., Kilbourn, K. M., Boyers, A. E., Culver, J. L., Alferi, S. M., et al. (2001). Cognitive-behavioral stress management intervention decreases the prevalence of depression and enhances benefit finding among women under treatment for early-stage breast cancer. *Health Psychology*, 20(1), 20-32.
28. Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the Life Orientation Test. *Journal of Personality & Social Psychology*, 67(6), 1063-1078.
29. Horowitz, M., Wilner, N., & Alvarez, W. (1979). Impact of Event Scale: a measure of subjective stress. *Psychosomatic Medicine*, 41(3), 209-218.
30. Joseph, S. (2000). Psychometric evaluation of Horowitz's Impact of Event Scale: A review. *Journal of Traumatic Stress*, 13(1), 101-113.
31. Vaglio, J., Conard, M., Poston, W. S., O'Keefe, J., Haddock, C. K., House, J., et al. (2004). Testing the performance of the ENRICH Social Support Instrument in cardiac patients. *Health & Quality of Life Outcomes*, 2(1), 24.
32. Petrocelli, J. V. (2003). Hierarchical multiple regression in counseling research: Common problems and possible remedies. *Measurement and Evaluation in Counseling and Development*, 36(1), 9-22.
33. Green, H. J., Wells, D. J. N., & Laakso, L. (2011). Coping in men with prostate cancer and their partners: a quantitative and qualitative study. *European Journal of Cancer Care*, 20(2), 237-247.
34. Gordon, L. G., Ferguson, M., Chambers, S. K., & Dunn, J. (2009). Fuel, beds, meals and meds: Out-of-pocket expenses for patients with cancer in rural Queensland. *Cancer Forum*, 33(3), 204-210.
35. Dunn, J., Occhipinti, S., Campbell, A., Ferguson, M., & Chambers, S. K. (2011). Benefit finding after cancer. *Journal of Health Psychology*, 16(1), 169-177.
36. Gottlieb, B. H., & Wachala, E. D. (Writer) (2007). *Cancer support groups: a critical review of empirical studies*: John Wiley & Sons, Ltd.
37. Cordova, M. J., Cunningham, L. L. C., Carlson, C. R., & Andrykowski, M. A. (2001). Social constraints, cognitive processing, and adjustment to breast cancer. *Journal of Consulting & Clinical Psychology*, 69(4), 706-711.

38. Scott, J. L., Halford, W. K., & Ward, B. G. (2004). United we stand? The effects of a couple-coping intervention on adjustment to early stage breast or gynecological cancer. *Journal of Consulting and Clinical Psychology*, 72(6), 1122-1135.
39. Bidstrup, P. E., Johansen, C., & Mitchell, A. J. (2011). Screening for cancer-related distress: Summary of evidence from tools to programmes. *Acta Oncologica*, 50(2), 194-204.
40. Ferguson, C. J. (2009). An effect size primer: A guide for clinicians and researchers. *Professional Psychology: Research & Practice*, 40(5), 532-538.
41. Kuenzler, A., Hodgkinson, K., Zindel, A., Bargetzi, M., & Znoj, H. J. (2011). Who cares, who bears, who benefits? Female spouses vicariously carry the burden after cancer diagnosis. *Psychology and Health*, 26(3), 337-352.
42. Le Marchand, L., Wilkens, L. R., Kolonel, L. N., Hankin, J. H., & Lyu, L.-C. (1997). Associations of sedentary lifestyle, obesity, smoking, alcohol use, and diabetes with the risk of colorectal cancer. *Cancer Research*, 57(21), 4787-4794.

Table 1.

Descriptive Statistics for Predictors and Outcome Variables

Measure	Time 1	Time 2	<i>N</i>	<i>t</i>
	<i>Mean (SD)</i>	<i>Mean (SD)</i>		
Optimism	15.0 ( 4.1)	14.9 ( 4.0)	383	0.13
Intrusion	8.4 ( 8.5)	8.2 ( 8.4)	383	0.57
Avoidance	9.7 (10.0)	10.0 (10.3)	383	-0.70
Social support	20.8 ( 4.8)	20.7 ( 4.6)	383	0.82
Social constraints	25.0 (10.4)	24.5 (10.0)	382	1.30
Depression	4.2 ( 3.5)	4.1 ( 3.4)	383	0.40
Anxiety	6.2 ( 4.1)	6.0 ( 4.1)	383	0.74
Physical QoL	43.9 (11.6)	45.0 (11.9)	370	-2.70**
Mental QoL	45.8 (11.6)	46.2 (11.6)	370	-0.69
Wellbeing	50.6 (13.2)	50.7 (13.2)	383	-0.11
Benefit finding	56.7 (15.4)	56.3 (15.8)	383	0.69

---

\*\*  $p < .01$

*Note.* These analyses used untransformed data from participants who responded at both Time 1 and Time 2.

Table 2.  
Correlations Between Predictors and Criterion Variables

T1 Predictors	Adjustment											
	Depression		Anxiety		Physical QoL		Mental QoL		Wellbeing		Benefit finding	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
<i>Demographic</i>												
Age	.01	.03	-.18***	-.21***	.22***	.22***	-.07	-.07	-.15**	-.20***	.07	-.01
Female	-.06	-.09	.09	.13*	-.07	-.06	.07	-.05	.01	-.02	-.16**	-.14**
Living with partner	-.10*	-.11*	-.09	-.11*	-.04	-.05	-.10*	-.12*	-.20***	-.26***	-.05	-.04
Educated >10 years	-.03	.02	.01	.01	-.01	.01	.01	.03	.09	.11*	.13**	.14**
Born in Australia	-.01	.01	.03	-.01	.02	.00	-.07	-.03	-.08	-.04	-.02	.01
Retired	.01	-.05	-.13**	-.20***	.14**	.19***	-.07	-.10	-.17***	-.18***	.08	.04
Private health insurance	-.13**	-.09	-.01	-.04	-.04	-.02	-.04	-.12*	-.04	-.09	-.15**	-.11*
<i>Medical</i>												
Time since diagnosis	-.04	-.04	-.05	-.06	-.02	-.00	-.08	-.04	-.02	-.03	-.03	.04
Chemotherapy	.12*	.08	.15**	.12*	.13*	.06	.11*	.11*	.13**	.10	-.08	-.09
Radiotherapy	-.05	-.05	-.00	.00	-.05	-.04	-.02	-.07	-.07	-.10	-.02	.00
Surgery	-.06	-.08	.05	.07	-.14**	-.10*	-.01	.02	.02	-.01	-.04	-.06
Finished treatment by T1	-.10*	-.02	-.07	-.05	-.22***	-.10	-.05	.01	-.16***	-.10	.02	.04
<i>Psychological</i>												
Optimism	-.42***	-.37***	-.47***	-.34***	-.12*	-.11*	-.38***	-.28***	-.38***	-.38***	-.11*	-.07
Intrusion	.47***	.37***	.67***	.57***	.20***	.14**	.55***	.43***	.42***	.39***	-.14**	-.15**
Avoidance	.48***	.34***	.64***	.52***	.21**	.14**	.53***	.42***	.42***	.37***	-.15**	-.13**
<i>Social</i>												
Social support	.41***	.34***	.39***	.27***	.15**	.15**	.37***	.30***	.49***	.49***	.21***	.21***
Social constraints	-.38***	-.35***	-.49***	-.43***	-.21***	-.11*	-.43**	-.42**	-.46***	-.41***	.09	.10

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

*Note.* After transformations, higher scores on all 6 outcome variables indicated worse function. Higher optimism, intrusion and avoidance are indicated by higher scores. After transformations, a higher score on the social support variable indicated less social support, and a higher score on the social constraints variable indicated lower social constraints. Pairwise deletion of cases with missing values led to a range of  $N$  from 400-424 (T1 predictors and outcomes) and 375-384 (T1 predictors and T2 outcomes).

Table 3.

Hierarchical Regression Analysis of the Relationships between T1 Predictors and Changes in Adjustment

T1 Predictor	Depression			Anxiety			Physical QoL			Mental QoL			Wellbeing			Benefit finding		
	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$
<i>Demographic</i>	.02	.02		.02	.02		.01	.01		.01	.01		.02	.02		.01	.01	
Age			.12			.04			.04			-.04			.12			.14
Female			-.03			.09			-.06			.11			.03			-.01
Living with partner			-.05			-.04			.02			.03			.12*			.03
Educated >10 years			.03			.02			-.02			.03			-.01			-.01
Retired			-.19*			-.11			-.09			.05			-.08			-.03
Private health insurance			.03			-.13*			-.06			.09			.04			-.07
<i>Medical</i>	.01	.03		.00	.02		.01	.03		.01	.01		.02	.04		.01	.02	
Chemotherapy			-.01			-.03			-.08			-.05			.01			.09
Surgery			-.01			.00			-.06			-.05			.08			.03
Finish treatment by T1			.10			.05			-.09			-.06			-.14*			.02
<i>Psychological</i>	.03**	.07*		.05***	.07**		.01	.03		.04**	.05		.01	.05		.01	.03	
Optimism			.07			.13*			.06			-.14*			-.04			-.04
Intrusion			-.03			.03			.03			.15			-.07			.15
Avoidance			-.10			-.13			.02			-.03			.12			-.13
<i>Social</i>	.02*	.08**		.01	.09**		.01	.05		.01	.07*		.00	.05		.00	.03	
Social support			-.15*			-.14*			-.06			.09			.06			.01
Social constraints			-.06			-.01			-.13*			.14*			.02			.02
Total $R^2$ (adjusted)	.05**			.05**			.01			.03*			.01			.00		
Total F	F(14,355)=2.24**			F(14,355)=2.40**			F(14,342)=1.15			F(14,342)=1.74*			F(14,355)=1.27			F(14,355)=0.81		

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

*Note.* For depression and anxiety, higher change scores indicated increased distress at T2 compared with T1. For other outcome variables, higher change scores indicated improved outcomes at T2 compared to T1. Higher optimism, intrusion and avoidance are indicated by higher scores. After transformations, a higher score on the social support variable indicated less social support, and a higher score on the social constraints variable indicated lower social constraints.  $N = 357$  for physical and mental QoL and  $N = 370$  for the other four outcome variables.

Table 4.

Hierarchical Regression Analysis of the Effects of T1 Predictors and T1 Outcomes on Changes on Adjustment

T1 Predictor	Depression			Anxiety			Physical QoL			Mental QoL			Wellbeing			Benefit finding		
	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$	$\Delta R^2$	$R^2$	$\beta$
<i>T1 score</i>	.16***	.16***	-.44***	.15***	.15***	-.55***	.09***	.09***	-.31***	.19***	.19***	-.58***	.12***	.12***	-.56***	.13***	.13***	-.40***
<i>Demographic</i>	.02	.18***		.03*	.18***		.02	.10***		.02	.20***		.05**	.17***		.01	.14***	
Age			.13			-.01			-.04			-.04			.15*			.15*
Female			-.06			.09			-.05			.10*			.07			.01
Living with partner			-.06			-.04			.03			.05			.18***			.00
Educated >10 years			.02			.02			-.02			.02			-.03			-.06
Retired			-.15*			-.07			-.10			.01			-.06			-.05
Private health insurance			.02			-.08			-.06			.07			.02			-.01
<i>Medical</i>	.01	.18***		.00	.18***		.01	.11***		.01	.21***		.01	.18***		.01	.15***	
Chemotherapy			.01			.01			-.10			-.07			-.01			.09
Surgery			-.05			.03			-.04			-.03			.07			.06
Finish treatment by T1			.09			.03			-.04			-.08			-.07			-.01
<i>Psychological</i>	.00	.19***		.02*	.20***		.00	.11***		.02*	.23***		.02*	.20***		.01	.16***	
Optimism			-.05			-.01			.06			-.02			.09			-.00
Intrusion			.05			.20*			-.02			-.01			-.08			.15
Avoidance			-.04			-.02			.02			-.10			.02			-.06
<i>Social</i>	.01	.19***		.01	.21***		.01	.12***		.03***	.26***		.02*	.22***		.01	.17***	
Social support			-.06			-.07			-.08			.02			-.09			-.09
Social constraints			-.10			-.08			-.10			.22***			.11			-.03
Total $R^2$ (adjusted)		.16***			.17***			.08***			.23***			.18***			.13***	
Total F		F(15,354)=5.70***			F(15,354)=6.17***			F(15,341)=3.15***			F(15,341)=8.10***			F(15,354)=6.55***			F(15,354)=4.71***	

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

*Note.* For depression and anxiety, higher change scores indicated increased distress at T2 compared with T1. For other outcome variables, higher change scores indicated improved outcomes at T2 compared to T1. Higher optimism, intrusion and avoidance are indicated by higher scores. After transformations, a higher score on the social support variable indicated less social support, and a higher score on the social constraints variable indicated lower social constraints.  $N = 357$  for physical and mental QoL and  $N = 370$  for the other four outcome variables.

Table 5.

Tests for Associations Between Predictors and Four Temporal Patterns for Symptoms of Depression and Anxiety

T1 Predictor	Depression T1/T2					Anxiety T1/T2				
	No/No "Non-clinical"	No/Yes "Deteriorated"	Yes/Yes "Stable clinical"	Yes/No "Recovered"	Omnibus Test	No/No "Non-clinical"	No/Yes "Deteriorated"	Yes/Yes "Stable clinical"	Yes/No "Recovered"	Omnibus Test
	<i>n</i> =294	<i>n</i> =24	<i>n</i> =40	<i>n</i> =25		<i>n</i> =215	<i>n</i> =32	<i>n</i> =103	<i>n</i> =33	
<i>Dichotomous</i>	%	%	%	%	$\chi^2$ (3)	%	%	%	%	$\chi^2$ (3)
Female	62	63	58	52	1.09	56	69	66	64	3.97
Living with partner	74	54	58	60	9.48*	74	78	59	70	8.73*
Educated >10 years	44	42	49	28	2.96	44	41	44	39	0.39
Retired	44	25	35	44	4.12	49	22 <sup>a</sup>	33	42	12.88**
Private health insurance	49	46	33	28	6.98	47	44	40	58	3.42
Chemotherapy	60	71	63	80	4.48	57	69	72	63	7.23
Surgery	79	67	80	68	3.60	77	81	80	75	0.89
Finish treatment by T1	81	88	88	60 <sup>a</sup>	8.82*	82	84	76	81	1.92
<i>Continuous</i>	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i>	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>M</i> ( <i>SD</i> )	<i>F</i>
Age	59.2 (11.8)	58.6 (11.3)	57.7 (14.3)	57.1 (13.2)	0.39	60.9 (11.8)	54.6 ( 9.4) <sup>a</sup>	56.1 (12.0)	58.3 (14.1)	5.31***
Optimism	15.7 ( 3.8)	14.4 ( 4.3)	11.7 ( 3.9)	11.9 ( 4.0)	18.87***	16.3 ( 3.6)	15.0 ( 4.6)	12.4 ( 3.7)	14.3 ( 3.9)	25.80***
Intrusion	6.4 ( 6.8)	9.5 ( 7.6)	16.8 (10.6)	17.3 ( 8.9)	25.76***	4.1 ( 4.7)	8.7 ( 6.9) <sup>a</sup>	15.8 ( 9.3)	12.8 ( 8.1)	65.41***
Avoidance	7.7 ( 8.7)	10.9 ( 9.8)	19.5 (11.1)	16.7 ( 9.7)	21.09***	5.1 ( 6.3)	9.4 ( 9.2) <sup>a</sup>	17.7 (10.6)	15.0 (10.1)	52.17***
Social support	21.6 ( 4.2)	19.2 ( 5.5)	17.8 ( 5.1)	17.9 ( 6.2)	12.13***	21.9 ( 4.2)	20.7 ( 4.8)	18.8 ( 5.0)	20.0 ( 5.6)	13.04***
Social constraints	23.2 ( 9.0)	29.5 (12.1) <sup>a</sup>	31.7 (11.8)	30.8 (13.3)	12.06***	21.1 ( 7.3)	26.4 (10.0) <sup>a</sup>	31.5 (11.6)	28.5 (12.1)	32.62***

\* $p < .05$  \*\* $p < .01$  \*\*\* $p < .001$ <sup>a</sup>Significantly different from the comparison group with the same Time 1 clinical category

*Note.* Analyses used transformed variables for intrusion, avoidance, social support and social constraints but the raw score means and standard deviations are reported for ease of interpretation. The range of *N* was 374-383 for individual analyses.