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Psychosocial Moderators of Presurgical Stress Management for Men Undergoing Radical Prostatectomy

Chelsea D. Gilts, MA

Department of Clinical Psychology, University of Houston, Houston, Texas

Patricia A. Parker, PhD

Department of Behavioral Science, The University of Texas MD Anderson Cancer Center, Houston, Texas

Curtis A. Pettaway, MD

Department of Urology, The University of Texas MD Anderson Cancer Center, Houston, Texas

Lorenzo Cohen, PhD

Integrative Medicine Program, Department of General Oncology, The University of Texas MD Anderson Cancer Center, Houston, Texas

Abstract

Objective—It is important to identify factors that predict who will benefit the most from psychosocial interventions in cancer populations.

Methods—This study examines the moderating effect of baseline social support (Social Support, SS; Dyadic Adjustment DA), distress (Brief Symptom Inventory, BSI; Impact of Event Scale, IES), and coping style (Brief COPE) on quality of life outcomes (SF-36 Physical Component Summary scores (PCS)) 1 year post surgery derived from a presurgical cognitive behavioral stress management program (SM; $n = 23$), supportive attention (SA; $n = 37$), or standard care (SC; $n = 29$).

Results—Moderation analyses indicated that men who reported low baseline social support (SS) and were in SM had increased PCS one year after surgery compared to men with low SS in the SC group ($\beta = -0.39, p < .01$), with SA having a non-significant intermediate effect. Men who reported high distress (BSI) at baseline and were in the SA group had increased PCS one year after surgery compared to those in the SC group ($\beta = 24.80, p = .01$), with SM having a non-significant intermediate effect. Mediation analyses suggested that neither SM nor SA improved QOL simply by increasing social support or decreasing general distress.

Conclusions—Distressed individuals may benefit more from unstructured discussion of distress whereas those low in social support may benefit more from a structured approach to learning coping skills.

Keywords

stress management; prostate; moderation; QOL

INTRODUCTION

The efficacy of psychosocial interventions for cancer populations has received considerable attention in the literature over the past several decades (see Dale, 2010 and Spiegel, 2002 for reviews). Though the majority of studies investigating the benefits of managing stress occur following surgery, the period just prior to surgery can be a time of high stress for patients and may be critical to recovery (Manyande, 1992; Schneider et al., 2010). Presurgical stress management training has been shown to have positive physical and psychological benefits for prostate cancer patients (Parker et al., 2009; Cohen et al., 2011), open-heart surgery patients (Kshetry et al., 2006), abdominal surgery patients (Manyande, 1995) and breast cancer patients (Larson et al., 2000). Thus, well-timed, brief psychosocial interventions incorporated into the medical setting may be a feasible, cost effective approach to improving quality of life (QOL).

Targeting Interventions: Considering Moderation

Though the majority of studies have found some benefit to psychosocial interventions for adult cancer populations, results are far from conclusive and continue to be a source of controversy among researchers (Stefanek et al., 2006). Many researchers point to sample heterogeneity as a primary reason for outcome ambiguity (Sheard & Maguire, 1999; Stanton, 2005). Though demographic or initial medical factors do not appear to play a major role in predicting treatment efficacy (Penedo, 2007; Spiegel, 2007), pre-treatment psychosocial factors may affect long term QOL following intervention (Helgeson et al., 2006; Schneider et al., 2010).

While the direct association between psychosocial resources and QOL for persons diagnosed with cancer has been repeatedly demonstrated (Carver et al., 2006; Kanski et al., 2006), there needs to be further research on the association between psychosocial resources and intervention effectiveness (Jacobson, 2007). There is evidence to suggest that psychosocially vulnerable patients, including those with high distress (Andersen et al., 2004; Carmack Taylor et al., 2007; Schneider et al., 2010) or low social support (Antoni et al., 2001; Scheier et al., 2007), may experience greater benefit from psychosocial interventions. A few studies, however, support the opposite conclusion that better psychosocially adjusted patients benefit more from interventions (Doorenbos et al., 2006; Hosaka et al., 2000) or are at least provided some prophylactic benefit (Kissane et al., 2007). It is also possible that there is a curvilinear relationship between psychosocial vulnerability and QOL following treatment, with very vulnerable and very well-adjusted patients being relatively unaffected by treatment (Lechner et al., 2006).

Due to the growing population of men diagnosed with cancer (CDC Cancer Statistics Working Group, 2010), the increasing popularity of psychosocial interventions for cancer patients, and the ever present need to optimize cost effectiveness of treatment, it has become crucial to examine potential moderators of treatment efficacy.

Mechanisms of Change: Considering Mediation

Exploring whom interventions most benefit begs the question of the intervention's mechanism of action. Although rarely the focus of clinical trials, it is likely that stress management (SM) interventions have a long term impact on psychosocial resources including marital adjustment, social support (Andersen et al., 2004), mood (Stanton et al., 2002), and coping skills (Manyande et al., 1995) which in turn impact QOL. Additionally, presurgical interventions are associated with more adaptive cortisol and adrenaline functioning (Bohnen et al., 1991; Steptoe, 1993) and improved immune functioning (Cohen et al., 2011; Witek-Janusek et al., 2008), which in turn can improve long term QOL (Carlson

et al., 2003). There is a need for further clarification on the process by which SM interventions impact long term QOL, as this information can aid in improving intervention design as well as furthering the understanding of patient characteristics associated with benefits from SM.

The Present Study

Based on previous literature, the present study examined the association between perceived social support, relationship adjustment, general distress, intrusive thoughts and avoidance behaviors, and coping style with QOL following surgery and with response to the psychosocial interventions (SM or Supportive Attention (SA)). First, it was hypothesized that baseline psychosocial factors would correlate with long-term QOL, regardless of intervention type. Additionally, it was hypothesized that each of the five baseline psychosocial factors would moderate the effect of the intervention on QOL 1 year after surgery. The association between low baseline psychosocial resources and worse QOL that was expected to be seen in the Standard Care (SC) and SA control groups was expected to be significantly decreased for individuals in the SM group. Finally, it was hypothesized that moderators of the intervention would also mediate intervention effect, indicating the intervention leads to improvements in the mediators, which in turn leads to improved QOL 1 year after surgery. Previously published findings from this dataset demonstrated that men in the SM group reported significantly reduced negative mood state (Profile of Mood States (POMS)) prior to surgery compared to men in SC and SA groups. Men in the SM group also had significantly higher QOL compared to men in SC group 1 year following surgery (Parker et al., 2009). The effect of SM on immune function has also been demonstrated in this dataset (Cohen et al., 2011). Though short term mood and immune outcomes were significantly impacted by the intervention, only QOL was found to be altered at 1 year follow up. Mediation and moderation of the acute intervention effects on mood and immune outcomes will be explored in a future paper. Research indicates that it can take up to a year following radical prostatectomy to have full recovery, and that further recovery beyond this point is minimal (Keller, Janetschek, & Abukora, 2005). Thus, data collected 12 months post-surgery was the focus of the present study exploring the possible moderating and mediating role of psychosocial resources on long term QOL.

METHOD

Participants

Participants were men with early-stage prostate cancer who were undergoing radical prostatectomy at 1 of 3 hospitals within the Texas Medical Center. Patients were included if they were 18 years of age or older, undergoing radical prostatectomy, English speaking, and able to come to the medical center four times prior to their surgery or live within 100 miles of the Texas Medical Center. Patients were excluded if they had any other surgeries in the preceding year, a major illness likely to limit survival to less than two years, medical conditions likely to affect outcome measures such as an autoimmune disease, endocrine abnormalities, chronic pain problems, or a current or past drug and alcohol dependence, had any major psychiatric diagnoses, were undergoing psychiatric or psychological counseling, or had severe cognitive dysfunction, detected by a score of < 6 on the Mini-Mental State Exam (Folstein et al., 1975).

There were a total of 89 participants (SM = 23, SA = 37, SC = 29) who participated in their randomly assigned intervention and completed all measures at baseline and 1 year post surgery.

Procedures

Details of the study procedures have been reported elsewhere (Parker et al., 2009; Cohen et al., 2011). Briefly, after obtaining informed consent, self-report data was collected from patients at baseline before randomization, after intervention delivery but before surgery, the morning of surgery, 48 hours post-surgery, and 6 weeks and 6 and 12 months post-surgery. Blood samples for immune function analyses were provided at baseline and 48 hours after surgery.

A clinical psychologist provided patients in the SM and the SA groups their respective interventions on the same schedule. The presurgical SM intervention consisted of two 90-minute individual sessions and participants were given a corresponding Stress Management Guide. The sessions were cognitive-behavioral in nature, with a major focus on relaxation skills. The rationale for stress management was presented, focusing on decreasing stress, worry, and pain. After briefly discussing the patient's typical coping strategies and assessment of any prior use of relaxation techniques, the patient was introduced to relaxation training. Patients in the SM group had brief booster sessions with the clinical psychologist on the morning of surgery (before the assessment) and 48 hours after surgery to reinforce the use of relaxation strategies and the problem-focused coping strategies.

Patients in the SA group met with the same clinical psychologists for two 90-minute sessions and participated in a semi-structured interview focused on their psychosocial and medical history. These sessions were designed to provide empathy, encouragement, and extra attention from the medical community, but not to provide any active skills. Patients in the SA group also had brief booster sessions with the clinical psychologist on the morning of surgery (before the assessment) and 48 hours after surgery, during which empathy, but no specific relaxation strategies, was provided.

This study was approved by the Institutional Review Board of all participating hospitals.

Measures

The Interpersonal Support Evaluation List (SS; Cohen et al., 1985) was used to measure perceived level of social support. Patients rated the perceived availability of emotional/informational support, tangible support, positive interactions, and affectional support. Items were summed into a total score. Internal consistency for this measure is high, ranging from 0.91 to 0.96, and it has demonstrated good predictive validity of the associations between social support and health (Sherbourne & Stewart, 1991). In this study sample, the internal reliability was high (Cronbach's $\alpha = 0.94$).

Patients' relationship with their partner was assessed using the 32-item Dyadic Adjustment Scale (DA; Spanier, 1976). Though some studies have indicated four subscales of the DA (consensus, satisfaction, cohesion, and affectional expression), more recent analyses yield a single factor of marital satisfaction. Good internal consistency has been demonstrated for this measure (0.96) (Kazak, Jarmas, & Snitzer, 1988), and was found in this study sample (Cronbach's $\alpha = 0.95$).

Psychological distress was assessed using the 52-item Brief Symptom Inventory (BSI) Global Severity Index (BSIGSI) (Derogatis, 1975). The BSIGSI is well-established with internal consistency estimates of 0.81 to 0.85, and satisfactory estimates of construct validity (Derogatis & Melisaratos, 1983). In this study sample, the internal reliability was high (Cronbach's $\alpha = 0.93$).

The Impact of Event Scale (IES) is a 15-item, self-report scale that assesses intrusive thoughts (intrusively experienced ideas or feelings) and avoidance behaviors (avoidance of

certain feelings or situations) (Horowitz, Wilner, & Alvarez, 1979). Patients rated the items in relation to their cancer, and the scales were combined into a total score with higher scores indicating more cancer-related intrusive thoughts and avoidance behaviors. It has adequate internal reliability (0.82–0.86) and validity (Sundin & Horowitz, 2002), which was also demonstrated in this study sample (Cronbach's $\alpha = 0.90$).

Coping style was assessed using the 20 item Brief Coping Operations Preference Enquiry (Brief-COPE) (Carver, 1997). The Brief-COPE measures a set of conceptually distinct coping subscales that include active coping, use of social support, turning to religion, positive reframing of the situation, and avoidant coping. Perczek and colleagues conducted a factor analysis on Brief-COPE responses of 172 men being tested for prostate cancer and determined that the subscales active coping, planning, acceptance, and positive reframing loaded onto one factor labeled “engagement coping,” and the subscales denial and behavioral disengagement loaded onto another distinct factor labeled “avoidant coping.” Due to the high demographic similarities between the sample of Perczek et al and the present sample, this two-factor structure was used in the present study. To confirm the fit of this two-factor structure for the current sample, we conducted a confirmatory factor analysis using the PROC CALIS procedure in SAS (Covariance Analysis of Linear Structural Equations), which tests the appropriateness of structural equation models using covariance structural analysis. Three fit statistics indicated acceptable fit, with values equal or greater than 0.90 (Bentler Comparative Fit Index = 0.970, Bentler-Bonett Non-Normed Index = 0.944, and Bentler-Bonett NFI = 0.900) confirming a good fit for the two-factor B-COPE (Hu & Bentler, 1999). Internal reliability for engagement type coping (Cronbach's $\alpha = 0.81$) and avoidant coping (Cronbach's $\alpha = 0.67$) were acceptable and comparable to that found by Perczek and colleagues (2002).

The Medical Outcomes Study 36-item Short Form Health Survey (SF-36; Ware & Sherbourne, 1992), was used to assess general health-related QOL. It assesses QOL in several domains including physical functioning, bodily pain, general health perceptions, vitality, social functioning, role-emotional, and mental health. In this study sample, the internal reliability for each of these subscales was acceptable (0.79–.90). There are two component scores derived from the subscales that measure mental health (MCS) and physical functioning (PCS). The focus of this paper is on the PCS as it was the only outcome for which there were group differences 1 year after surgery.

Analyses

Descriptive statistics were computed. We examined whether there were any differences in demographic (age, ethnicity, marital status, education) and clinical (Prostate Specific Antigen (PSA) at baseline, stage of disease) characteristics in the three groups using analysis of variance or chi-square tests and whether there were differences in the psychosocial measures at baseline. To determine the association between baseline psychosocial factors and QOL across groups, Pearson partial correlations were conducted between each baseline psychosocial adjustment measure and QOL at 1 year controlling for covariates (age, ethnicity, baseline PSA, and stage of disease). Moderation analyses were performed by regressing the QOL score at 1 year on each measure of baseline psychosocial adjustment, group assignment, the group by baseline psychosocial adjustment score, the respective baseline QOL measure, and covariates (age, ethnicity, baseline PSA, and stage of disease) using general linear model regression analyses. General linear model analyses include all patients in the analyses who completed the QOL measure at baseline and 1 year. We used the PROC GLM procedure in SAS V9.2 to run these analyses. Quadratic terms were added to PROC GLM to examine any curvilinear associations between psychosocial variables and QOL. None of the quadratic terms were significant indicating that the associations followed a linear trend. The group effect was treated as a classification variable using class statement

in the PROC GLM procedure and the standard care group was the reference group. As these were a priori analyses, we used an alpha of .05 to determine significance. Where the interaction between group assignment and baseline psychosocial adjustment score was significant, *t* tests were used for post hoc group comparisons, and the Bonferroni correction was used to determine significance (alpha = .0167; Maxwell & Delaney, 2004). Mediation of intervention effect on QOL at 1 year by each psychosocial adjustment score at each time point (5 days prior to and 6 and 12 months following surgery) was explored using the PROC GLM procedure following the criteria outlined by Baron and Kenny (1986). Using G*Power (Faul et al., 2007), it was determined that given 3 groups and a total of 89 participants, we will be able to declare as statistically significant a medium effect size (Cohen's $f^2 > 0.15$) assuming 80% power and a two-sided significance level of 0.05. Cohen's f^2 is a common measure of effect size in tests of moderation (Aiken & West, 2001), and Cohen (1988) suggested that f^2 effect sizes of 0.02, 0.15, and 0.35 are termed small, medium, and large, respectively.

RESULTS

Sample Characteristics

Measurements were obtained for 56% of the sample at 1 year ($n = 89$). There was no difference in follow-up rates between the intervention groups ($p > .20$) and no significant differences in demographic, medical, psychosocial, or PCS scores at any time point between those who dropped out of the study by 1 year follow up and those who did not (all p 's $> .29$).

The demographic and medical characteristics are summarized in Table 1. The three groups were similar on all medical characteristics (including baseline medical comorbidities) and demographic variables. There were no statistically significant differences among the groups on any of the psychosocial variables at baseline (all p 's $< .20$). Two individuals were determined to be outliers based on Grubb's test for detecting outliers, one due to high BSIGSI and SS scores and one due to a high avoidance copings score, and were dropped from analyses (Barnett and Lewis, 1994).

Baseline Predictors of QOL

Descriptive information on all potential predictors can be found in Table 2. Across intervention groups, a Pearson partial correlation procedure was used to determine the association between baseline psychosocial factors and QOL as measured by the PCS at 1 year controlling for age, ethnicity, stage of disease, baseline PSA and baseline PCS (see Table 3). Baseline perceived social support (SS; $r = 0.23$, $p = .04$) and dyadic adjustment (DA; $r = 0.23$, $p = .04$) were both moderately positively correlated with PCS scores 1 year after surgery. Baseline overall distress (BSIGSI; $r = -0.20$, $p = .07$) and intrusive thoughts and avoidance behaviors related to the upcoming surgery (IES; $r = -0.23$, $p = .04$) were negatively associated with PCS scores 1 year after surgery. Neither engagement coping (ENG; $r = 0.11$, $p = .33$) nor avoidance coping (AVD; $r = -0.08$, $p = .47$) were significantly associated with PCS scores 1 year after surgery.

Psychosocial Factors as Moderators of Intervention Effect

A general liner model in SAS was used to test a model of group and each baseline psychosocial measure predicting PCS at 1 year by entering the interaction between group and the psychosocial measure and controlling for age, ethnicity, stage of disease, baseline PSA, baseline PCS, group, and the respective psychosocial measure. Results of moderation analyses can be seen in Table 4.

There was a significant interaction between baseline SS and group in predicting PCS ($F_{(2,86)} = 4.00, p = .02$), representing a small-to-medium effect size ($f^2 = .102$). Men who reported low baseline SS and were in SM had increased PCS 1 year after surgery compared to men with low SS in the SC group ($\beta = -0.39, p < .01$), with SA having a non-significant intermediate effect. Figure 1 shows that the negative effect of low SS is buffered for those in the SM group. In other words, the lower the perceived SS at baseline, the greater an individual benefited from SM compared to men in the SC group.

There was a significant interaction between baseline BSIGSI scores and group in predicting PCS ($F_{(2,86)} = 3.29, p = .04$), representing a small-to-medium effect size. Men who reported high BSIGSI scores at baseline and were in the SA group had increased PCS scores 1 year after surgery compared to those in the SC group ($\beta = 24.80, p = .01$). In other words, the higher the distress as measured by the BSIGSI at baseline, the greater an individual benefited from SA compared to men in the SC group, with the SM group having an intermediate non-significant effect. Figure 2 shows that the negative effect of high baseline distress as measured by the BSIGSI is buffered for those in the SA group. IES scores followed a similar but non-significant trend ($p = .10$; graphical data not shown).

Contrary to hypothesis, there was no interaction between group and baseline dyadic adjustment scores ($F_{(2,86)} = 1.05, p = .36$), or engagement ($F_{(2,86)} = 0.23, p = .79$) or avoidant ($F_{(2,86)} = 1.80, p = .17$) coping style in predicting PCS levels 1 year after surgery.

Psychosocial Factors as Mediators of Intervention Effect

Baron and Kenny's (1986) method was used to determine whether post-intervention psychosocial improvements mediated the interventions' effects on QOL. First, an association between intervention group and PCS at 1 year was established ($F_{(2,81)} = 3.67, p = .03$). Specifically, those in SM reported higher PCS scores 1 year after surgery compared to those in SC ($\beta = 6.23, p < .01$). Patients in SA demonstrated an intermediate but nonsignificant effect on PCS scores. Next, an association between group and all possible mediators (SS, DA, BSIGSI, IES, ENG, and AVD) at 5 days prior to surgery as well as 6 and 12 months following surgery was tested, controlling for age, ethnicity, stage of disease, baseline PSA, and baseline measures of each mediator. There were no statistically significant associations between group and SS, DA, BSI, or coping measures at any time point. There was a significant association between intervention group and IES after the intervention 5 days before surgery, with those in SA ($M = 11.22, SD = 11.79$) reporting lower IES scores than those in SC ($M = 17.13, SD = 13.13$) or SM ($M = 15.74, SD = 12.38$). However, change in presurgical IES did not significantly predict PCS ($F_{(2, 87)} = 2.62, p = .11$), so the last step of Barron and Kenny's (1986) mediation testing method was not met.

DISCUSSION

Results are consistent with previous research indicating an association between presurgical psychosocial factors and post-surgical QOL in cancer patients, regardless of intervention. Men who reported high levels of social support and low levels of distress as measured by the BSIGSI at baseline tended to have high levels of QOL one year after surgery. It appears that, regardless of intervention, presurgical support and distress are strongly associated with QOL after surgery, even after taking presurgical QOL into account. Interestingly, coping styles were not associated with QOL after surgery. A meta-analysis by Penley, Tomaka, and Wiebe (2002) indicates a consistent and relatively large effect size for maladaptive coping strategies predicting poorer QOL, but a small to nonexistent effect size for adaptive coping strategies predicting improvement in QOL. Baumeister and colleagues outline similar findings on the relationship between coping and QOL in their presentation of the "bad is stronger than good" phenomenon (2001). Thus, while the lack of association between

engagement coping styles and QOL is in line with previous research, the lack of association between avoidance coping styles and post-surgical QOL may be due to the limited range of avoidant coping styles reported in this sample. The low avoidant coping endorsement may be in part explained by the high educational attainment in the sample. Several studies have demonstrated a negative association between avoidant coping styles and level of education (Green, Wells, & Laakso, 2011; Zhang et al., 2008). There is no association between educational level and coping style in the current sample, but this could be due to the restricted range of education levels.

The primary aim of this study was to identify psychosocial factors that moderate patients' responses to brief presurgical intervention, with the idea that future intervention programs may "triage" cancer patients into the most appropriate intervention based on their current psychosocial state to maximize limited resources and to improve QOL benefits for patients. The results are consistent with previous research demonstrating psychosocial interventions most benefited the psychosocially vulnerable. Specifically, the SM intervention was significantly more beneficial for those low in perceived social support than was SC, demonstrating that SM buffered the negative effects of low social support on QOL. This suggests that men who are low in perceived social support and face an upcoming surgery may be benefited most by a structured, skills-based intervention. In particular, relaxation training, imaginal exposure of the day of surgery, and a discussion of skills for eliciting social support may be important intervention components for those low in perceived social support. Future component analysis studies can help identify the essential elements of CBT-based stress management interventions for cancer patients low in perceived social support. Importantly, participants high in perceived SS at baseline did not demonstrate significant QOL benefit in any intervention. It appears that there is a QOL "ceiling" that those initially high in SS experience following surgery. Thus, involving patients low in SS in a presurgical CBT-based intervention may be the most effective use of limited resources.

It appears that men reporting high baseline overall distress according to the Brief Symptom Inventory's Global Severity Index do not respond to interventions in the same manner as those low in perceived social support. Whereas those low in social support benefited more from a structured approach to learning coping skills, highly distressed individuals benefited more from unstructured attention. The SA program was most beneficial for those high in pre-surgical distress, as measured by the BSI-GSI, with SA buffering the negative association between pre-surgical distress and QOL 1 year after surgery that is seen for the men undergoing standard care. Scores on the Impact of Events Scale, which assessed intrusive thoughts and avoidance behaviors related to their cancer and upcoming surgery, followed a similar, though non-significant trend.

A discussion with the clinical psychologists who administered the SA sessions indicated that though intervention time was used to discuss fears and concerns related to the upcoming surgery, many men also used the time to share information about their lives, families, and current projects. It may be that men who were particularly distressed benefited from the opportunity to tell their story, integrating their cancer experience with the rest of their lives. A large body of research on expressive writing supports the notion that individuals experiencing a major stressor benefit from the opportunity to form a narrative that works to integrate stressful events into their life story. For example, de Moor et al (2002) found that patients undergoing treatment for renal cell carcinoma who wrote in an unstructured manner about their diagnosis experienced better sleep quality and less daytime dysfunction than patients who wrote about neutral topics. This rationale is of course speculative, as SA in this study was delivered in two brief sessions (total of 180 minutes) that did not directly address narrative formulation, whereas most studies on expressive writing involve four sessions lasting 20 minutes each (total of 80 minutes) explicitly focused on narrative formulation.

Time to work on a “narrative” involving cancer treatment may be particularly important for individuals with high presurgical anxiety. Future research comparing professional attention (i.e., educational sessions) to life narrative creation may help to identify the essential elements of this intervention for cancer patients high in general distress. Additionally, it is possible that the reduced structure of SA allowed for greater expression of “non-specific factors” (e.g., empathy, warmth, and therapist-patient relationship) demonstrated to have clear impact on treatment outcomes in the psychotherapy literature (Lambert & Barley, 2001).

Contrary to hypothesis, relationship adjustment, coping style, and intrusive thoughts and avoidance behaviors related to their cancer were not significant predictors of intervention response. The null finding for relationship adjustment as an intervention moderator may be due to the relatively high dyadic adjustment score reported by this sample ($M = 111.84$, $SD = 19.33$) compared to Spanier's (1976) normative sample ($M=101.5$, $SD = 28.3$). Only 17 individuals (20% of the sample) reported DA scores below the mean of Spanier's distressed sample ($M = 97$, $SD = 17.8$). Similarly, limited endorsement of avoidance coping styles may explain why it was not a significant predictor of intervention response. As mentioned above, previous research suggests avoidance coping exerts a stronger and more consistent effect on QOL compared to engagement coping (Baumeister et al., 2001; Penley et al., 2002). The present sample reported low avoidance coping, which may explain why coping did not moderate intervention effect. Lastly, these men reported relatively low intrusive thoughts and avoidance behaviors related to their cancer, with a range of scores from 0 to 53, and a mean of 13.31 ($SD = 11.92$). In sum, the positive mental health reported by the participants and well as the relatively small sample size may explain why these hypothesized psychosocial factors were not detected as significant moderators of intervention effect.

Contrary to hypothesis, the factors that moderated the interventions (social support and distress) did not mediate the intervention's effect on QOL. It does not appear that stress management improved QOL simply by increasing social support or that supportive attention improved QOL simply by decreasing general distress. Rather, both interventions had a unique effect on QOL that is not accounted for by changes in perceived social support, marital adjustment, general distress, intrusive thoughts or avoidant behaviors. The interventions appear to affect QOL through different or more complex means than were tested in the present study.

It should be noted that the reason this paper focused on SF-36 PCS and not MCS was because PCS scores were the only outcome for which there were group differences 1 year after surgery. Reasons for this may be related to the high levels of mental health participants reported at study entry compared with normative data. There were no statistically significant changes in MCS scores over time, which may suggest a “ceiling effect.”

There are several limitations to recognize in this study. First, the majority of participants were white, non-Hispanic, married and highly educated. Thus, future research is needed to test the generalizability of these findings to more diverse populations. Additionally, there is a relatively limited range of distress and avoidant coping mechanisms reported by these men, which may be related to sampling limitation. Thirty-two out of the 42 men who refused to participate in the study, from whom we did not collect any data, indicated they were too busy to participate. It is possible that these men were experiencing more distress prior to the surgery due to a busy or stressful schedule, meaning the most distressed men may not have been involved in the study. The presence of this research problem is difficult to assess, but future studies could emphasize the brevity of the intervention as well as the potential to help manage the stress that surgery may add to an already stressful life. It should also be noted that a measure to assess the amount of “buy-in” to the treatment was not included in the

present study. This may be an important factor in determining for whom a treatment works best as well as helping guide the development of future interventions to increase patient compliance.

Due to the relatively small sample size, replication is required to confirm the findings of this study. More research is needed to determine other intervention response predictors as well as to investigate what intervention components are most effective. These results suggest that providing interventions tailored for specific psychosocial vulnerabilities may be appropriate in cancer populations. Future research can assess the feasibility and effectiveness of targeted interventions as well as the means by which interventions exert their beneficial effects.

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Fig. 1. Baseline perceived social support moderates the effect of intervention on PCS at 1 year. The slope of SM significantly differs from SC ($p < .01$). There is no significant difference between SA and SM or SC.

Fig. 2.

Baseline overall distress moderates the effect of intervention on PCS at 1 year

The slope of SA significantly differs from SC ($p = .01$). There is no significant difference between SM and SA or SC.

Table 1

Demographic Information

Characteristic	Standard Care		Supportive Attention		Stress Management	
	No.	%	No.	%	No.	%
Mean Age	60.8 (6.4)		60.4 (8.0)		60.7 (8.0)	
Ethnicity						
White	26	90	27	73	19	83
African American	2	7	7	19	3	13
Married	24	83	33	89	20	91
Divorced	5	17	3	8	1	5
Education						
High School	8	27	4	11	2	10
Some College	2	7	9	24	7	32
College Grad	11	38	15	40	11	50
Graduate Degree	6	21	9	24	1	5
Mean Prostate	7.9 (9.75)		6.4(3.9)		6.8(3.7)	
Specific Antigen						
Stage of Disease						
I	7	23	5	14	5	9
II	19	65	27	75	17	74
III	3	10	4	10	3	13
Type of Surgery						
Non-nerve sparing	8	28	10	29	4	17
Nerve Sparing	19	68	21	62	16	70
Nerve Graft	1	3	3	9	3	13

Table 2

Psychosocial Predictor Descriptive Statistics at Baseline and 1 Year Post-Surgery

Predictor	Standard Care (n = 29)	Supportive Attention (n = 37)	Stress Management (n = 23)
	M (SD)	M (SD)	M (SD)
SS			
Baseline	91.43 (17.25)	92.95 (13.76)	92.98 (15.82)
1y	94.27 (16.63)	96.89 (13.88)	95.82 (16.68)
DA			
Baseline	113.60 (18.80)	109.11 (19.59)	113.48 (20.33)
1y	113.27 (17.52)	106.43 (19.98)	113.33 (16.30)
IES			
Baseline	15.10 (13.56)	12.79 (11.76)	11.87 (10.07)
1y	7.57 (9.94)	4.84 (8.45)	6.65 (8.49)
BSIGSI			
Baseline	0.22(0.23)	0.17 (0.18)	0.20 (0.19)
1y	0.20 (0.27)	0.16 (0.19)	0.19 (0.23)
ENG			
Baseline	14.21 (5.13)	15.23 (5.50)	16.22 (4.88)
1y	9.76 (5.11)	10.71 (4.69)	10.87 (5.91)
AVD			
Baseline	1.00 (1.51)	0.38(0.72)	0.22 (0.60)
1y	0.43 (1.12)	0.46 (1.19)	0.22 (0.60)

There were no statistically significant differences among the groups on any of the psychosocial variables at baseline.

Table 3

Baseline Psychosocial Predictors Correlated with PCS at 1-year

Predictor	Pearson's Correlation	<i>p</i> -value
SS	0.23	.04
DA	0.23	.04
BSIGSI	−0.20	.07
IES	−0.23	.04
ENG	0.11	.33
AVD	−0.08	.47

Correlations controlled for age, ethnicity, stage of disease, baseline prostate-specific antigen (PSA), and baseline moderator.

Table 4

ANOVA and Pairwise Comparisons of Baseline Psychosocial Factors Moderating Treatment Effect on PCS at 1 Year

Predictor	Interaction		SM v. SC		SA v. SC		SM v. SA	
	$F_{(2,86)}$	P		p		P		p
SS	4.00	.02	−0.39	.01	−0.15	.23	−0.24	.09
DA	1.05	.36	−0.15	.17	−0.03	.75	−0.12	.27
BSIGSI	3.29	.04	14.76	.18	24.80	.01	−10.04	.37
IES	2.34	.10	0.27	.19	0.32	.04	−0.05	.81
ENG	0.23	.79	0.30	.53	0.21	.60	0.09	.83
AVD	1.80	.17	−3.16	.29	3.60	.17	−6.76	.07

All analyses controlled for age, ethnicity, stage of disease, baseline prostate-specific antigen (PSA), and baseline moderator.