Social support, anxiety, and depression in patients with prostate cancer: complete mediation of self-efficacy

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Abstract
Background Social support and self-efficacy are important factors to improve negative emotions such as depression and anxiety in patients with prostate cancer after surgery; however, little is known about the relationship between them. The objective of the study was to comprehensively explore the relationship between social support, self-efficacy, and anxiety and depression.

Method A cross-sectional design and a convenience sampling method were used to recruit patients with prostate cancer from a comprehensive hospital in Zhejiang Province. Structured scales were used for data collection, including the Social Support Rating Scale, Strategies Used by People to Promote Health, and the hospital anxiety and depression scale.

Results The result showed that anxiety and depression were negatively correlated with self-efficacy ($r = -0.434, P < 0.01$) and social support ($r = -0.212, P < 0.01$), while self-efficacy and social support were positively correlated ($r = 0.356, P < 0.01$). A structural equation model showed that the effect value of social support on self-efficacy was ($\beta = 0.386, p < 0.01$) and the effect value of self-efficacy on negative emotions was ($\beta = -0.497, p < 0.01$). Self-efficacy fully mediated the effect between social support and negative emotions with a 100% mediation rate.

Conclusion Social support and self-efficacy did contribute to the improvement of depression and anxiety in patients with radical prostatectomy, and they were associated with a full mediating effect of self-efficacy. Providing social support that matches the coping needs of the stressor can maximize the role of social support. Therefore, it is necessary to identify the patient’s stressor and coping needs in advance, which will help us to provide matching social support, so as to alleviate patients’ bad emotions more effectively and improve their prognosis.

Keywords Social support · Anxiety · Depression · Self-efficacy · Mediating role

Introduction

Prostate cancer mainly affects older men, a population further at risk for complications and decreased functional reserves of multiple organ systems [1]. Those who survive the disease may face adverse treatments effects that negatively influence their quality of life and mental health [2], such as decreased physical function, fatigue, urinary incontinence, and sexual dysfunction. An estimated 27% of patients with prostate cancer experience anxiety, while 17% are diagnosed with depression [3]. They are often linked to fear of disease prognosis and low androgen maintenance levels due to treatment [4]. In China, the incidence of depression in prostate cancer ranges from 13 to 53%. A systematic review showed that depression and anxiety were associated with an increased risk of cancer death in patients with prostate cancer. Symptoms of depression and anxiety were associated with higher cancer-specific mortality but not with increased cancer incidence [5].

Patients with clinically localized prostate cancer are living longer because of advances in treatment technology. Thus, more emphasis should be placed on their health-related quality of life [6] of which mental health
is an essential component. Effective measures to alleviate depression and anxiety may help improve cancer survival and atopic mortality rates, and healthcare professionals are increasingly focusing on exploring the mechanisms underpinning patients’ anxiety and depression.

Social and family support plays a vital role in alleviating depression and anxiety associated with cancer [7, 8], and mental health challenges are closely related to perceived and actual levels of support. Lack of social support decreases patients’ sense of self-worth and confidence, altering their worldviews, social behaviors, illness perceptions, and coping styles. The buffer model of social support considers that strong social support can counter the negative impact of stressful events, ultimately maintaining physical and mental health [9]. A study of 947 colorectal cancer patients showed that those with optimal social support had fewer symptoms of anxiety and depression 1 year after surgery compared with patients lacking support [10]. These results were supported by Talia et al. [11]. Therefore, social support, as an external resource available to individuals, can reduce psychological distress, relieve tension, and improve social adjustment, thereby improving cancer survival rates.

Self-efficacy refers to the perception of controllability of self-management tasks and the effectiveness of using skills under challenging circumstances [12]. Bandura’s self-efficacy theory [13] suggests that self-efficacy is essential in determining whether individuals develop behavior motivation. Stronger self-efficacy is more likely to result in a stronger sense of accomplishment and fewer negative emotions. A meta-analysis showed that perceived self-efficacy, strategic ability, and belief in coping with cancer were strongly negatively correlated with adverse emotions and significantly positively correlated with quality of life [14]. High levels of self-efficacy can improve quality of life, disease adaptation, psychological status, and health behaviors in patients with prostate cancer [15, 16]. Weber investigated the effect of self-efficacy on mood in men with prostate cancer. Results indicated that those with high self-efficacy were less likely to experience depressive symptoms and increased self-efficacy significantly predicted vitality (activity and vigor) [17]. These studies demonstrate the value of assessing self-efficacy early to identify patients at risk for emotional maladjustment at diagnosis. Maximizing self-efficacy and building confidence in coping effectively with cancer may improve patients’ psychological adjustment and reduce the negative impact of cancer diagnosis and treatment on emotional adjustment. Maintaining vitality levels may boost patients’ resilience as they enter the treatment phase [18]. For this reason, it is necessary to understand a patient’s sense of self-efficacy at the time of diagnosis before the impact of treatment effects comes into play.

Studies suggest that self-efficacy plays a crucial mediating role in the relationship between treatment outcomes and mental health. Research focusing on positive thinking in patients with prostate cancer showed that self-efficacy was a mediating factor affecting the relationship between treatment satisfaction, support, and positive thinking [19]. Another study [20] showed that social support and self-efficacy could indirectly predict the psychological distress of children with malignant tumors, with self-efficacy having the most significant total effect on psychological well-being. Self-efficacy and coping style had a mediating effect on mental health. The authors proposed that social support can increase self-efficacy and encourage coping during children’s treatment period, ultimately preventing or reducing their psychological distress [20]. Receiving external support directly impacts mental health, and the acceptance of support is moderated by self-efficacy [21].

This study aimed to examine the potential impact of self-efficacy on anxiety and depression outcomes in survivors of prostate cancer. Drawing on Bandura’s self-efficacy theory [13] and the buffer model of social support [22], we speculated that there would be a positive correlation between social support and self-efficacy. Prostate cancer survivors who reported higher levels of social support would show a more positive effect of self-efficacy (hypothesis 1). We also tested a self-efficacy model as a mediator of the relationship between social support and anxiety and depression (hypothesis 2).

Methods

Participants and procedures

The participants were 263 patients who were hospitalized in the Department of Urology for radical prostatectomy from October 2020 to April 2021 and were preparing to be discharged after surgery. After providing written informed consent, participants completed paper questionnaires. We explained the aims of the study to all participants and ensured the confidentiality of their responses and the anonymity of the data. All participants, except those with other serious complications or other cancers, filled out the scale when their condition was stable after surgery. Men received a gift compensation for their participation in the study. Informed consent was obtained from all individual participants included in the study. All procedures have been approved by the Ethics Committee of The First Affiliated Hospital, Zhejiang University School of Medicine. (Approved No. 2018–707).

A cross-sectional design and a convenience sampling method were used to recruit patients with prostate cancer from a hospital in Zhejiang Province. Structured scales were used for data collection, including the Social Support Rating Scale, Strategies Used by People to Promote Health, and
the hospital anxiety and depression scale. Demographic and social data from the study participants included age, education level and marital status, employment status, income, and cancer stage and types of treatment being received.

Measures

Social support

The Social Support Rating Scale (SSRS), developed by Xiao Shuiyuan [23], was used to measure three dimensions of an individual’s social relationships with a total of ten items: objective support (the actual support received), subjective support (the support the patient perceived or emotional support), and support utilization (the individual’s active use of social support). Higher subscale and total scores indicate better social support. The scale items are easy to understand and free from ambiguity, and the scale has good reliability and validity [24]. The reliability of the scale in the present study was 0.780.

Self-efficacy

Lev’s SUPPH (Strategies Used by People to Promote Health) is a cancer self-management efficacy scale developed in the USA [25]. The self-assessment scale contains 29 items and a 5-point scale, where 1 indicates “no confidence” and 5 indicates “very confident.” Higher scores indicate greater individual self-efficacy. The scale was localized into a Chinese version, “The Self-Management Efficacy Questionnaire for Cancer Patients” by Chang-Rong et al. [26]. Cronbach’s coefficient of the Chinese adaptation of the scale was 0.849–0.970, with good reliability and validity. The scale consists of three dimensions: positive attitudes, self-determination, and self-stress reduction. The reliability of this scale in the present study was 0.927.

Anxiety and depression

The Hospital Anxiety and Depression Scale (HADS) is a self-assessment scale used to screen for anxiety and depression in hospitalized patients. The scale consists of 14 items, divided into anxiety and depression subscales, each comprising seven items. Each item is scored from 0 to 3, where 0 indicates “never” and 3 indicates “all the time.” The total score of each subscale is 0–7 for asymptomatic manifestation, 8–10 for possible symptoms, and 11–21 for anxiety or depressive symptoms. The scale has good reliability and validity, and the reliability of the scale in the present study was 0.864.

Data analysis

Data analysis was performed using SPSS version 24.0 (Armonk, NY: IBM Corp.) The inference methods for the statistical analysis corresponding to the research hypotheses were as follows. Pearson’s product-moment correlations (stepwise method) were used for correlation and regression, using the SPSS process for intermediary verification and bi-variate correlation to test the relationship between the study variables. The percentage of missing data was 0.9–1.2% across all study variables, and average substitution was used for missing data. A simple mediation model was used to perform the mediation test. P-values were set at 0.05 ($p < 0.05$). When tests of statistical significance are required, a ratio of at least 10:1 is recommended between the sample size and the number of parameters estimated by the model. Structural equation modeling (SEM) is less stable in small samples (60–120), and the minimum sample size depends mainly on the complexity, effect size, and degrees of freedom of the model [27]. A total of 22 parameters were estimated in this model (nine fixed parameters, five parameters for evaluation, and eight variables to be evaluated).

Results

Demographic profile of the study participants

The mean age of participants was 68.17 years ($SD = 6.25$). All patients had completed laparoscopic or robotic radical surgery, and 14 (5.3%) had received radiotherapy (Table 1).

Correlation analysis

Correlation analysis showed that self-efficacy and social support were positively correlated ($r = 0.356, p < .01$), and this result confirmed hypothesis 1, while anxiety and depression were negatively correlated with self-efficacy ($r = -0.434, p < .01$) and social support ($r = -0.212, p < .01$) (Table 2).

Mediating effect analysis

The results of the correlation analysis showed a significant correlation between anxiety and depression status, social support, and self-efficacy in prostate cancer patients (Table 3). To further explore the effects of social support and self-efficacy on anxiety and depression, SEM was used to examine the mediating role of self-efficacy between social support and anxiety and depression. SEM used social support as the independent variable, self-efficacy as the mediating variable, and anxiety and depression as the dependent variable. Figure 1 shows the model, with the model path...
and the effect of social support on self-efficacy as $\beta = 0.386$ ($p < 0.01$) and the effect of self-efficacy on anxiety and depression as $\beta = -0.497$ ($p < 0.01$). Social support does not directly and positively predict anxiety and depression but indirectly predicts anxiety and depression through self-efficacy. Overall, self-efficacy fully mediated the effect between social support and anxiety and depression with a 100% mediation rate. The effect of social support on anxiety and depression in prostate cancer patients was mainly achieved through an indirect effect mediated by self-efficacy. A value of $X^2$ (df) less than 5, indices such as NFI, TLI, and CFI above 0.90, and RMSEA less than 0.08 indicate a good model fit [28, 29]. The fit indices of the model in this study were $X^2$ (df) = 2.333, $p = 0.017$, NFI = 0.974, TLI = 0.972, CFI = 0.985, and RMSEA = 0.071. This indicates that the model can fit the data well. This result which confirmed hypothesis 2.

### Discussion

The present study found a positive correlation between self-efficacy and social support (hypothesis 1 supported) and a negative correlation between anxiety and depression, and self-efficacy and social support in patients with prostate cancer. Our findings are consistent with Omran et al. [30]. Omran’s findings showed that self-efficacy was significantly associated with depression. In other words, high self-efficacy reduced depression, leading to a higher perception of quality of life. Conversely, when self-efficacy is lacking, negative thoughts and behaviors increase. In Omran’s study, social support played a fully mediating role on anxiety and depression by affecting self-efficacy. In contrast, Mehnert [31]

### Table 1 Demographic and clinical characteristics of the sample (n = 263)

| Characteristic                              | Frequency (%) |
|--------------------------------------------|---------------|
| Age                                        | 68.17 (6.25)  |
| Educational level                          |               |
| Middle school or lower                     | 136 (51.7%)   |
| High school                                | 83 (31.6%)    |
| College                                    | 44 (16.8%)    |
| Marital status                             |               |
| Married                                    | 237 (90.1%)   |
| Single/separated/divorced/widowed          | 26 (9.9%)     |
| Stage                                      |               |
| I                                          | 28 (10.6%)    |
| II                                         | 123 (46.8%)   |
| III                                        | 89 (33.8%)    |
| IV                                         | 23 (8.7%)     |
| Smoking                                    | 144 (54.8%)   |
| Alcohol                                    | 90 (34.2%)    |
| Surgery approach                           |               |
| Open radical prostatectomy                 | 12 (4.6%)     |
| Laparoscopic radical prostatectomy         | 96 (36.5%)    |
| Robot-assisted radical prostatectomy       | 155 (58.9%)   |

### Table 2 Sample correlations and descriptive statistics for main study variables

|           | 1  | 2  | 3  | 4  | 5  | 6  | 7  | 8  | mean | SD  |
|-----------|----|----|----|----|----|----|----|----|------|-----|
| 1 anxiety | -  |    |    |    |    |    |    |    | 14.057 | 4.11 |
| 2 depression | 0.729** | - |    |    |    |    |    |    | 14.255 | 4.04 |
| 3 positive attitude | -0.379** | -0.403** | - |    |    |    |    |    | 45.806 | 11.87 |
| 4 self decision-making | -0.267** | -0.346** | 0.724** | - |    |    |    |    | 8.84 | 3.02 |
| 5 Self-decompression | -0.362** | -0.351** | 0.738** | 0.613** | - |    |    |    | 29.475 | 8.29 |
| 6 Negative emotions | 0.931** | 0.929** | -0.421** | -0.329** | -0.383** | - |    |    | 28.312 | 7.58 |
| 7 Self-efficacy | -0.393** | -0.414** | 0.955** | 0.790** | 0.895** | -0.434** | - |    | 84.125 | 21.13 |
| 8 social support | -0.230** | -0.164** | 0.330** | 0.381** | 0.297** | -0.212** | 0.356** | - | 35.798 | 6.69 |

### Table 3 Samples regression weights

|                               | Estimate | SE   | CR  | $P$   |
|-------------------------------|----------|------|-----|-------|
| Self-efficacy                 |          |      |     |       |
| Social support                | 0.63     | 0.1  | 6.318 | ***  |
| Negative emotions             |          |      |     |       |
| Self-efficacy                 | -0.154   | 0.023 | -6.682 | ***  |
| Positive attitude             |          |      |     |       |
| Self-efficacy                 | 1        |      |     |       |
| Self decision-making          |          |      |     |       |
| Self-efficacy                 | 0.217    | 0.014 | 15.131 | ***  |
| Self-decompression            |          |      |     |       |
| Self-efficacy                 | 0.605    | 0.039 | 15.434 | ***  |
| Anxiety symptoms              |          |      |     |       |
| Negative emotions             | 1        |      |     |       |
| Depressive symptoms           |          |      |     |       |
| Negative emotions             | 1.05     | 0.119 | 8.824 | ***  |
showed that positive social support interacts with anxiety and depression in patients with prostate cancer. This may be because social support can only affect patients’ emotions when it is internalized as self-efficacy. External stimuli must be transformed into internal motivation and then fed back into one’s own emotional regulation. Self-efficacy is the result of measuring and evaluating one’s own abilities. In the case of people with cancer, to some extent, it represents a patient’s self-management of the disease, which in turn moderates patients’ behavior, effort, and ability to fight cancer.

Studies have shown the positive effect of social support on the mental health and self-efficacy of patients with prostate cancer [32, 33]. However, few studies have comprehensively explored the relationship between social support, self-efficacy, and anxiety and depression, as we did here. Our model supported hypothesis 2, showing the full mediating effect of self-efficacy on social support and anxiety and depression. Eila’s study found that 17% of patients with prostate cancer reported moderate to severe anxiety and 10.2% reported moderate to severe depression. The side effects experienced were associated with higher psychological morbidity, poorer self-efficacy, and reduced overall health status [34]. Therefore, it is crucial to improve the self-efficacy of patients with prostate cancer to improve their mental health. When self-efficacy is enhanced, an individual’s confidence in dealing with stressful events is increased, which in turn improves their psychological state. Similarly, Weber confirmed a positive correlation between social support and self-efficacy in patients with prostate cancer. Social support plays a vital role in cancer adaptation and facilitates the reconstruction of individual self-efficacy, helping patients toward a more positive trajectory in the course of the disease [35].

The limitations of this study lie in the following two aspects. First, the data analyzed were cross-sectional and self-reported. Thus, no conclusions can be drawn regarding causality. Second, the study took place in a city hospital in an economically-developed region of China and may not represent the average economic and medical level of patients with prostate cancer in China or globally. Our study focused on patients with prostate cancer, but further research is needed to determine the applicability of findings to cancer patients more generally. The specific causes of depression and anxiety in survivors of prostate cancer were also not investigated in depth in this study, and further research is needed to understand the specific mental health challenges faced by this population. Further studies should also be conducted on the effect of stressors and the effectiveness of targeted social support in improving the mental health of patients with prostate cancer.

In conclusion, the study provides a unique perspective on the relationship between social support and depression and anxiety in survivors of prostate cancer. For social support to be effective, there should be a reasonable match between the type of support provided and the patient’s coping needs. We suggest that using appropriate screening measures to identify depression and anxiety in patients with prostate cancer before surgery will facilitate better mental health programs and earlier referral of patients with specific needs. Given the full mediating role of self-efficacy and the conditions under which social support plays the leading role, we consider that effectively addressing depression and anxiety in patients with radical prostatectomy requires improved self-efficacy and targeted social support matched to individual needs.

Author contribution LJW performed data analysis work and wrote the manuscript. JL helped collecting data and YQL edited the manuscript. YZ helped modify text content and helped data entry, and WW designed all the study and helped correct the writing problems. All authors read and approved the final manuscript.

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Data availability Data and material are available to public.
Code availability Not applicable.

Declarations

Ethics approval All procedures have been approved by the Ethics Committee of The First Affiliated Hospital, Zhejiang University School of Medicine (Approved No.2018–707).

Consent to participate Informed consent was obtained from all individual participants included in the study.

Consent for publication The authors affirm that all the contents of this article agree to be published.

Conflict of interest The authors declare no competing interests.

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