Perceived social support and depressive symptoms in Chinese patients with ovarian cancer and the mediating role of resilience

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Abstract

**Background**: Patients with ovarian cancer (OC) often suffer from depressive symptoms, but there is little research on coping style such as perceived social support and resilience. The aim of the present study was to explore whether resilience plays a mediating role between perceived social support and depressive symptoms.

**Methods**: A cross-sectional study was performed between August 2018 and March 2019. Perceived social support, resilience, and depressive symptoms were measured with the Multi-dimensional Scale of Perceived Social Support (MSPSS), the Center for Epidemiologic Studies-Depression (CES-D) scale and the Connor-Davidson Resilience Scale (CD-RISC). Hierarchical linear regression analyses were used to assess the mediating role of resilience between these variables.

**Results**: Of 230 consecutive patients identified, a total of 217 completed questionnaires. After controlling for covariates, perceived social support was negatively correlated with depressive symptoms (β = -0.482, p < 0.01) and explained 22.8% of the variance. In addition, after controlling for covariates and perceived social support, resilience was also negatively associated with depressive symptoms (β = -0.492, p < 0.01) and explained 18.1% of the variance. Bootstrapping test confirmed that the BCa 95% CI for resilience excludes 0 in Table 4 (BCa95% CI: -0.342, -0.143), therefore resilience partially mediated the associations of perceived social support with depressive symptoms.

**Conclusions**: Results revealed that resilience could mediate the association between social support and depressive symptoms, and concluded that it was critical to focus on social support as well as resilience in the management strategy of OC.

**Keywords**: ovarian cancer, depression, resilience, perceived social support
Background

Ovarian cancer (OC) is the leading cause of gynecological cancer death. It is estimated that about 21,750 women will be newly diagnosed with ovarian cancer, and about 13,940 women will die from the disease in 2020 in the United States[1]. Most women are diagnosed with advanced disease and they have to undergo intensive treatment including cytoreductive surgery and post-operative combined chemotherapy. They suffer from the loss of reproductive organs, decreased sexual function and limited functional ability, but many of them will still develop many episodes of relapse and shortened progression-free survivals. Not surprisingly, these patients are at high risk of experiencing depressive symptoms and reduced quality of life[2, 3]. It is reported that the clinical depression rate is 5.9% of 798 women with invasive ovarian cancer in Australian[4]. In Czech Republic, the rate is as high as 83.3% in survivors of metastatic OC[5]. In China, the frequency of depressive symptoms ranges from 31.5% to 47% among OC survivors[6, 7].

Evidence suggests that external social support buffers depressive symptoms among cancer patients[8, 9]. Social support exists in many ways, including physical, emotional, and structural assistance or help from friends, family, and colleagues. It is reported that cancer patients have a significantly higher level of perceived social support than the general population[10]. Previous studies have demonstrated the importance of social support for maintaining good mental state of patients with OC[8, 11, 12].

Resilience is a personality trait and is also considered as a self-regulating approach to distress. Individuals considered resilient have better coping skills, rebound in difficult situations, and ultimately overcome the risk of developing into depressive symptoms. Previous studies have reported that enhanced psychological resilience is an important predictor of reduced depression and improved quality of life for cancer patients[13, 14].

Although social support and resilience have protective role in patients with cancer, there is lack of research on the relationships between the two coping styles and
depressive symptoms. It is reported that resilience can mediates the relationship between social support and depressive symptoms in lung cancer[15], but the relation has not been investigated in OC to our knowledge. Therefore, the present study aimed to explore the associations between these variables and whether resilience plays a mediating role in OC patients.

**Methods**

Participants and procedures

A cross-sectional study was conducted from August 2018 to March 2019 in the first hospital of China Medical University. Inclusion criteria were as follows: over 18 years old, diagnosed with primary epithelial ovarian cancer or fallopian tube cancer, knowing their diagnoses. Patients with other types of cancers and cognitive impairment were excluded. Written informed consent was provided to all patients prior to the survey. Data were obtained from original medical records and structured questionnaires. The study was approved by the Ethics Committee for Human Experimentation of the institution.

Measurement of depressive symptoms

Depressive symptoms were measured with the Center for Epidemiologic Studies Depression Scale (CES-D)[16]. It comprises 20 items and for each item, scores range from 0 to 3. The cutoff score of 16 has been used to indicate a level of depressive symptoms. In this scale, the Cronbach’s alpha was 0.936.

Measurement of perceived social support

Perceived social support was assessed using the Multi-dimensional Scale of Perceived Social Support (MSPSS)[17]. It consists of 12 items and for each item, scores range from 1 to 7. A higher score indicates a better perceived level of social support. In this scale, the Cronbach’s alpha was 0.963.

Measurement of resilience

Resilience was investigated with the Connor-Davidson Resilience Scale (CD-RISC)[18]. It comprises 25 items and for each item, scores range from 0 to 4.
Higher scores suggested higher levels of resilience. In this scale, the Cronbach’ alpha was 0.955.

Statistical analysis

SPSS 22.0 was used for statistical analysis of all data. P <0.5 was considered statistically significant (two-tailed). Differences between continuous variables were calculated using t-tests, while categorical variables using one-way ANOVA analysis. Pearson’s correlation analysis was conducted to identify the relation between studied variables. Hierarchical linear regression analyses were used to assess the mediating role of resilience. There are three blocks in this model. In block 1, age, new diagnosis and treatment methods were added to the model as covariates. Then, perceived social support and resilience were entered in block 2 and 3, respectively. Bootstrapping test was used to estimate whether the mediating role was statistically significant. Five thousand bootstrap samples were adopted in present study. If the bias-corrected and accelerated 95% confidence interval (BCa 95% CI) excluded 0, the mediation was considered significant.

Results

Sample Characteristics

A total of 230 participants were enrolled in the survey and finally 217 patients completed the questionnaires. The effective response rate was 94.3%. Sample characteristics were shown in Table 1. Demographic and clinical variables included age at diagnosis, marital status, education level, income, tumor stage, whether new diagnosis and current treatment method. The average age was 55.3 ± 9.6 years. The majority were aged 46-60 years (n=115, 53.0%), had a partner (n=194, 89.4%) and received junior high school or below education(n=125, 57.6%).The largest group (n=81, 37.3%) reported a monthly income above 3000. Most patients were newly diagnosed (n=163, 75.3%) and received a combined treatment currently (n=129, 59.4%). Of these variables, only new diagnosis and treatment method were related to depressive symptoms (P=0.004 and P<0.001). Mean score of CES-D was 19.1 ± 10.6, with a prevalence 50.7%.
As presented in Table 2, the relations between the variables were calculated using Pearson correlation coefficients. Perceived social support and resilience were negatively related to depression symptoms ($r=-0.519$, $p<0.01$ and $r=-0.609$, $p<0.01$), while resilience is positively related to perceived social support ($r=0.474$, $p<0.01$).
Multiple mediation models

Hierarchical linear regression results of depressive symptoms were shown in Table 3. After controlling for covariates, perceived social support was negatively correlated with depressive symptoms ($\beta = -0.482, p < 0.01$) and explained 22.8% of the variance. In addition, after controlling for covariates and perceived social support, resilience was also negatively associated with depressive symptoms ($\beta = -0.492, p < 0.01$) and explained 18.1% of the variance. As the regression coefficient of perceived social support decreased from $-0.482 (p < 0.01)$ to $-0.248 (p < 0.01)$ after adding resilience, it was believed that resilience might play a partial mediating role. Bootstrapping test confirmed that the BCa 95% CI for resilience excludes 0 in Table 4 (BCa95% CI: -0.342, -0.143), therefore resilience partially mediated the associations of perceived social support with depressive symptoms.

### Table 3 Hierarchical regression results of depressive symptoms

| Variables               | Block 1 | Block 2 | Block 3 |
|-------------------------|---------|---------|---------|
| Age                     | -0.066  | -0.051  | -0.015  |
| New diagnosis           | 0.155*  | 0.124*  | 0.136** |
| Treatment method        |         |         |         |
| Dummy_1                 | 0.170*  | 0.139*  | 0.047   |
| Dummy_2                 | 0.254** | 0.205** | 0.204** |
| Dummy_3                 | 0.355** | 0.288** | 0.276** |
| Social support          | -0.482**| -0.428**|         |
| Resilience              |         |         |         |
| F                       | 5.431** | 18.180**| 32.475**|
| Adjusted $R^2$          | 0.093   | 0.323   | 0.505   |
| $\Delta R^2$            | 0.114   | 0.228   | 0.181   |

**Notes:** New diagnosis, no versus yes; Dummy_1, chemotherapy versus no; Dummy_2, surgery versus no; Dummy_3, combined treatment versus no. *$p<0.05$; **$p<0.01$.
Table 4 Mediating role of resilience on the associations of social support with depressive symptoms

| Mediator | a     | b     | c     | c’    | a*b  (BCa95% CI) |
|----------|-------|-------|-------|-------|-----------------|
| Resilience | 0.475 | -0.492 | -0.482 | -0.248 | -0.234 (-0.342, -0.143) |

Notes: a: the association of social support with resilience; b: the association of resilience with depressive symptoms; c: the association of social support with depressive symptoms; c’: the association of social support with depressive symptoms after adding resilience as a mediator; a*b: the product of a and b; BCa95% CI: the bias-corrected and accelerated 95% confidence interval.

Control variables: age, new diagnosis, treatment method

Discussion

This study investigated the relations among perceived social support, resilience and depressive symptoms and whether resilience acted as a mediator. The strength and novelty of this study was the first demonstration of the mediating role of resilience between perceived social support and depressive symptoms in OC patients.

Among the limited studies focusing on ovarian cancer, the prevalence of depressive symptoms varies widely by regions, populations as well as measure methods. In this study, the prevalence was 50.7%, which is higher than that among Chinese prostate cancer survivors (22%) [19], American women with breast cancer (11.25%) [20], and similar to that among OC patients in a meta-analysis (54.90%) [21]. In this study, most of patients were middle-aged between 46 and 60 years at diagnosis, who could have led a leading and active life. After diagnosed, they suffered from not only physical scars and body appearance, but also lots of negative effects of the disease and the subsequent treatments. All above reasons explained the high prevalence of this psychological disorder.

In addition, this study found that only new diagnosis and current treatment method were related to depressive symptoms. Similarly, a meta-analysis suggested that in treatment journey of OC, depression was higher before the initiation of treatment and during treatment, and decreasing after the cessation of treatment [22]. It may be
because OC patients were unacceptable of the diagnosis, and their attentions shifted to subsequent treatments gradually and accepted the fact over time.

This study illustrated the importance of perceived social support in mental health of patients with OC, explaining a great variance of depression, consistent with previous reports[8, 9, 11, 23]. It is reported that social support was one of the main determinants of mental morbidity in OC patients[11]. However, it was slightly conflicted with another study suggesting that emotional social support seeking was predictive of decreasing depression, while not significant in instrumental social support seeking[9]. These findings pointed out that social support should be considered as an important factor in the treatment strategies of OC.

Our results also highlight the role of resilience in depressive symptoms of OC. Similar results have been demonstrated in previous studies of other cancer entities[24-27]. Tadayon M et al indicated a significant association of psychological hardiness and resilience with depression among breast cancer patients[27]. Another study found resilience can act as a buffer against depression in cancer patients[28]. Resilient patients always have fewer complaints and act active and dynamic to combat dilemmas and surrounding interference. Therefore, psychological intervention to improve resilience should be taken as a consideration to reduce depressive symptoms.

The most important part of this study confirmed that resilience mediates social support and depressive symptoms. Moreover, resilience has been proven to play a mediating role in multiple relationships among different cancers[24, 29, 30]. In prostate cancer survivors, psychological resilience was found to significantly mediate the depressive effects of urinary incontinence[30]. Li M et al illustrated that resilience partially mediated the correlation of psychological stress with depression and anxiety in bladder and renal cancer patients[24]. In addition, it was pointed out that resilience played an intermediary role between posttraumatic growth and self-perceived burden in patients with colorectal cancer[31]. Therefore, in clinical
practice, while improving social support, strengthening the cultivation of patient resilience is also worthy of attention.

Some limitations in the present study should be pointed out. First, the nature of this study is a cross-sectional study. Thus, the exact relationship of the observed variables cannot be derived. Second, depression is related to many factors and this study only focused on social support and resilience. Third, the amount of this study is not large. Future longitudinal large sample studies that focus on coping styles of depressive symptoms over time may bring benefits for determining the relationships involved in this study.

Conclusion

Overall, the results of this study revealed that resilience could mediate the association between social support and depressive symptoms, and concluded that it was critical to focus on social support as well as resilience in addressing depressive symptoms among women diagnosed with OC.

Abbreviations

OC: Ovarian cancer; CES-D: The Center for Epidemiologic Studies Depression Scale; MSPSS: Multi-dimensional Scale of Perceived Social Support; CD-RISC: Connor-Davidson Resilience Scale; ANOVA: Analysis of Variance; SD: Standard Deviation; BCa: bias-corrected and accelerated; CI: Confidence Interval

Acknowledgements

We would like to thank all the medical staffs and patients in our study and those who contributed to the clinical evaluation of the subjects.

Authors’ contributions

XYP wrote the manuscript as the first author. Professor YZ conceived and designed the study as the corresponding author. XYP, HYD and LD collected the data and analyzed the results. HYD, LD and YZ revised the manuscript. All authors have read and approved the manuscript.

Funding

No funding was solicited or received for this manuscript.

Availability of data and materials

Data can be gained from the corresponding author.

Ethics approval and consent to participate

This work was approved by the Ethical Committee for Human Trials of the China Medical University, China. All participants provided written informed consent before participating in the study.

Consent for publication

Not applicable.
Competing interests
The authors declare that they have no competing interests.

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