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ORIGINAL RESEARCH

# Mediating Role of Dyadic Coping Between Social Support and Oral Frailty Cross-Sectional Study of Elderly Ovarian Cancer Patients in China

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**Background:** Oral frailty is a major global public health issue faced by the elderly, significantly affecting the rehabilitation of elderly patients. The relationships among the three variables—social support, dyadic coping, and oral frailty—remain unclear, especially the mediating role of dyadic coping, which has not been adequately studied and explored in the context of elderly ovarian cancer patients.

**Patients and Methods:** This cross-sectional study adopted consecutive sampling to select elderly ovarian cancer patients treated at a Grade-A Tertiary Hospital in Hangzhou, China, from January 1, 2023 to December 31, 2025. The survey was conducted using a general information questionnaire, Oral Frailty Index-8, Social Support Rating Scale, and Dyadic Coping Scale.

**Results:** This study included a total of 311 elderly ovarian cancer patients. The oral frailty score is 5.31±0.98 (57.4% prevalence), 37.82±7.98 in social support, 112.18±21.21 in dyadic coping. Logistic regression analysis revealed that non-residence with children, chronic disease history (≥3), polypharmacy, and lack of oral health education were significant predictors of oral frailty ($P<0.05$). The total social support score showed positive correlations with dyadic coping, positive dyadic coping, and negative dyadic coping. Conversely, the total oral frailty score exhibited negative correlations with all three dyadic coping dimensions. Social support showed a negative correlation with oral frailty. The mediating effect of positive dyadic coping between social support and oral frailty was-0.023, accounting for 23.8% of the total effect. The mediating effect of Negative dyadic coping was 0.01, contributing 10.8% to the total effect.

**Conclusion:** The incidence of oral frailty is higher in elderly ovarian cancer patients in China. Do not live with their children, a history of chronic diseases (≥3), use multiple medications, lack of oral health education are more prone to oral frailty. Social support maybe affect the level of oral frailty through dyadic coping. Suggesting that healthcare professionals may actively attempt to establish intervention programs based on dyadic coping levels with good social support, improve the dyadic coping levels of elderly ovarian cancer patients, may be linked to decreased risk of oral frailty.

**Keywords:** aged, ovarian cancer, dyadic coping, oral frailty, social support, mediating effect

## Background

The physiological decline in elderly patients due to aging, combined with multiple factors such as immune senescence, chronic inflammation, and psychosocial influences, can easily lead to frailty.[1] Oral frailty, as an emerging concept in the field of frailty, has gradually attracted attention from scholars both domestically and internationally. Oral frailty[2] refers to the deterioration of oral functions such as tooth loss, poor oral hygiene, and difficulty in chewing that occurs with age, which not only causes eating disorders but also affects physical and mental health and social functioning. Oral frailty can lead to other negative health outcomes in elderly patients, such as sarcopenia, malnutrition, falls, disability, and death.[3–5] Comprehensive analysis of multiple foreign studies has found that oral frailty is prevalent among community-dwelling elderly populations, with an overall incidence rate of 22.5% to 49.4%,[2,6,7] while the incidence rate in China's community elderly population ranges from 20.7% to 44.7%.[8,9] Although oral frailty has received some attention in community elderly populations both domestically and internationally, research in the field of oncology remains limited. A study

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using the Oral Frailty Index-8 (Cronbach's α coefficient of 0.693) on elderly cancer patients suggested that age, radiotherapy, oral mucositis, grip strength, poor oral health, low oral self-efficacy, and high nutritional risk are independent influencing factors for the occurrence of oral frailty in elderly cancer patients.[10] However, there have been no reports on the current status of oral frailty in this specific population of elderly ovarian cancer patients.

Ovarian cancer, a common gynecological malignancy predominantly affecting elderly women, poses a significant threat to women's health.[11] As standard first-line treatment, chemotherapy not only compromises the oral mucosal barrier and promotes pathogenic microorganism proliferation, but also suppresses immune function.[12] Li's[13] research points out that chemotherapy-induced oral mucositis, xerostomia, and altered taste perception, combined with factors such as reduced physical and mental reserves and dysphagia, collectively contribute to the progressive decline of oral function. Combined with age-related frailty in elderly patients—manifested through symptoms like dry mouth, weakened jaw muscles, impaired chewing ability, and swallowing difficulties[14]—these factors may predispose them to oral frailty (HF). Given the unique pathological and physiological changes in elderly ovarian cancer patients along with their treatment regimens, this study proposes the following hypothesis (H1): Elderly ovarian cancer patients face more severe oral frailty, with both incidence and severity rates higher than those in the general elderly female population.

According to the global population statistics forecast by the World Health Organization (WHO),[15] the number of people aged 60 will rise from 1 billion in 2020 to 1.4 billion in 2030, and is expected to further increase to 2.1 billion by 2050. The "National Medium-and Long-Term Plan for Actively Addressing Population Aging" released by China points out[16] that population aging is an important trend in China's social development. The 2022 Statistical Bulletin on the Development of Civil Affairs shows[17] that China's population aged 60 and above is approximately 280 million, accounting for 19.8% of the total population, and is expected to reach 334 million by 2050. Therefore, China has become one of the countries with severe aging,[18] and the trend of a continuous increase in the number of elderly ovarian cancer patients further highlights the importance and urgency of assessing the oral frailty level of elderly ovarian cancer patients in China and analyzing their risk factors. Early detection and intervention of oral frailty are of great significance in delaying frailty in elderly ovarian cancer patients, reducing the incidence of frailty, improving their quality of life, and alleviating the burden of social care.

Social support[19] refers to the maintenance of social identity and acquisition of emotional support, material assistance, services, and information through external interactions. Currently, social support can be categorized into three dimensions: subjective support (emotional experiences), objective support (resources meeting various needs), and utilization of support (the extent of support utilization during adversity). A robust social support system provides patients with essential psychological comfort and practical assistance, thereby enhancing self-efficacy and promoting physical and mental health development.[20] Our Previous studies have demonstrated that elderly ovarian cancer patients in China face a higher risk of social isolation. Social support can directly or indirectly influence the level of social isolation among elderly ovarian cancer patients through sedentary behavior.[21] Low levels of social support may diminish the proactive engagement of elderly ovarian cancer patients, reduce their awareness of oral health issues, and decrease oral health behaviors, ultimately leading to oral frailty. Therefore, we hypothesize that low social support levels may serve as a risk factor for oral frailty in elderly ovarian cancer patients (H2).

Previous studies have predominantly viewed cancer as a patient-centered individual coping mechanism. However, with expanding research perspectives, scholars have increasingly adopted a holistic approach known as dyadic coping. Dyadic coping[22] describes the collaborative response between patients and spouses in managing stressors, characterized by mutual support and joint decision-making, which can be categorized into positive and negative forms. The stress experienced by both partners is inherently interconnected, often manifesting as a unified response rather than isolated reactions. Research[23] indicates that positive dyadic coping between patients and spouses facilitates disease adaptation, reduces patients "negative emotions, alleviates caregivers" perceived stress, and enhances mental well-being. This dynamic ultimately promotes proactive health behaviors regarding oral frailty, encouraging patients to prioritize oral health and reduce frailty levels. Therefore, we hypothesize that dyadic coping levels positively predict oral frailty (H3). High levels of social support enhance intimacy between patients and their spouses, thereby improving their ability to cope with external challenges and stress.[24] Therefore, we hypothesize that social support levels positively predict dyadic

coping levels in elderly ovarian cancer patients (H4), with dyadic coping mediating the relationship between social support and oral frailty in these patients (H5).

Previous studies have primarily focused on exploring the relationship between social support and oral frailty in general elderly populations.[25] However, there is limited research on the current status of oral frailty levels among elderly ovarian cancer patients, as well as the correlations between social support, dyadic coping, and oral frailty under the specific context of elderly ovarian cancer patients. Therefore, this study investigates the oral frailty levels and influencing factors in elderly ovarian cancer patients, while exploring the mediating role of dyadic coping between social support and oral frailty. The aim is to enhance social support and dyadic coping levels among elderly ovarian cancer patients, may be linked to decreased risk of the onset and progression of oral frailty, thereby improving their quality of life.

# Method

## Design and Participants

This cross-sectional study adopted consecutive sampling method, and elderly ovarian cancer patients who were treated and followed up in the First Affiliated Hospital of Zhejiang University School of Medicine from January 1, 2023 to December 31, 2025 were selected as the subjects of this study for questionnaire survey. All participants provided written informed consent. This study adhered to the tenets of the Declaration of Helsinki and later amendments.

Include criteria:① Pathological diagnosis confirmed malignant ovarian tumor; ② Completed ovarian cancer cytoreductive surgery and standard chemotherapy regimen (paclitaxel + carboplatin); ③ Age 60 to 80 years inclusive; ④ Informed consent to participate in the study; ⑤ No language communication barriers; ⑥ Spouse serves as primary caregiver.

Exclusion criteria: ① Concurrent other malignancies; ② Patients with severe underlying conditions (In this study, "severe underlying diseases" referred to individuals meeting any of the following criteria: 1. Critical organ dysfunction: including NYHA cardiac function class ≥ III, eGFR <30 mL/min, or Child-Pugh liver function class ≥ B; 2. Uncontrolled systemic diseases: such as hypertension (systolic blood pressure ≥ 160 mmHg or diastolic blood pressure ≥ 100 mmHg) or diabetes (HbA1c> 9.0%) refractory to pharmacotherapy; 3. Active infections: active infections or opportunistic infections requiring intravenous antimicrobial therapy; 4. Others: severe comorbidities deemed by investigators to potentially affect trial compliance or increase subject risk).③ Patients with cognitive impairment or psychiatric disorders; ④ End-stage patients (ECOG score ≥ 3, and after evaluation by a oncology specialist, the patient is deemed no longer suitable for chemotherapy, radiotherapy, or immunotherapy, with an expected survival period ≤ 3 months. Patients received palliative care or hospice care).

## Sample Size Calculation

According to the sample size calculation method,[26] the Rule of Experience (Rapid Estimation) is used to estimate the size of structural equation modeling (SEM). This study included 13 independent variables, the robustness threshold: above 200 is accepted. We also refer to Chomeya's classification system, where a sample size of 200 is considered "fair" and 300 is deemed "good". And Finally, the sample size of this study was 311 cases.

## Survey Tools

### General Information Form

A self-designed general information questionnaire was developed based on literature analysis. Demographic data included age, educational background, place of residence, housing status, monthly income, and BMI. Disease-related data covered disease duration, comorbidities, polypharmacy, and awareness of oral health behaviors.

### Oral Frailty Index-8 (OFI-8)

The Oral Frailty Index-8 (OFI-8)[27] assesses oral frailty in elderly ovarian cancer patients. Developed by Tanaka et al, this 8-item scale evaluates five dimensions: denture use, swallowing function, oral health behaviors, chewing ability, and social participation. Scores range from 0 to 11, with a cutoff of ≥4 indicating oral frailty severity. The scale demonstrates good reliability and validity, with a Cronbach's α coefficient of 0.714.

### Social Support Rating Scale (SSRS)

The Social Support Rating Scale (SSRS) is a tool for assessing patients 'social support levels. This scale[28] comprises three dimensions: objective support, subjective support, and utilization of support, with 10 items in total. Items 1–4 and 8–10 allow selecting one option each (1, 2, 3, or 4 points), while Item 5 offers five options (A, B, C, D, E) rated from "none" to "full support" (1–4 points). Items 6 and 7 assign 0 points for "no sources" and partial points for multiple sources. Total scores are categorized as follows: ≤22 points (low level), 23–44 points (moderate level), and 45–66 points (high level). The scale demonstrates a Cronbach's α coefficient of 0.887.

### Dyadic Coping Inventory

The Dyadic Coping Inventory (DCI) uses the Chinese version of the dyadic coping inventory, translated and revised by Chinese scholars Xu et al,[29] to assess stress communication and dyadic coping under stress for patients and one or both spouses. The scale consists of 37 items, including positive dyadic coping (stress communication, supportive dyadic coping, proxy dyadic coping, joint dyadic coping), negative dyadic coping, and dyadic coping evaluation. A 5-point Likert scale is used, with "rarely", "occasionally", "often", "very often", and "extremely often" scored as 1, 2, 3, 4, and 5 points respectively. The Cronbach's α coefficient of the scale ranges from 0.823. A higher score on the positive dyadic coping dimension indicates a higher degree of mutual support between spouses, while a higher score on the negative dyadic coping dimension suggests a higher degree of negative support. Except for the dyadic coping evaluation, all other items record total scores, with items in the negative coping dimension being reverse-scored. A dyadic coping total score below 111 indicates low coping ability; scores between 111 and 145 suggest moderate coping ability; while scores above 145 indicate high coping ability.

## Data Compilation

This study employed a questionnaire survey method, with on-site interviews and telephone follow-ups conducted during outpatient visits. Prior to the survey, all research team members received standardized training. Patients were provided with clear, accessible instructions about the survey process and questionnaire guidelines, and formal participation was only permitted after obtaining their informed consent. The patient may terminate the investigation at any time. For illiterate patients, researchers assisted them in completing the questionnaires without any suggestive language. During data processing, missing entries were identified and removed. All collected data were cross-verified and entered into the system by two research team members. During the continuous sampling period, a total of 382 patients met the inclusion criteria, among whom 62 declined participation and 9 withdrew. Ultimately, 311 patients were enrolled, resulting in a response rate of 81.4% (311/382). The missing value rate for all variables in this study ranged from 1.9% to 5.1%, with no significant findings in Little's MCAR test ($\chi^2 = 10.21$, $p = 0.24$), suggesting that the missing data mechanism was likely complete random missing (MCAR). Missing values were handled using multiple imputation (MICE algorithm, generating 10 complete datasets), followed by pooled analysis. To assess the robustness of results, sensitivity analysis was also conducted using list deletion methods, with consistent key conclusions observed across both approaches.

## Statistical Method

Statistical analysis was performed using SPSS23.0 and Amos 24.0. Categorical data were presented as frequencies and percentages. Normally distributed quantitative data were described as mean ± standard deviation, while non-normally distributed data were described as median (quartiles) [M(Q1, Q3)]. For normally distributed single-factor analyses, t's test or one-way ANOVA was used for inter-group comparisons. Pearson correlation analysis was conducted to assess variable correlations (Prior to Pearson correlation analysis, normality was confirmed (Shapiro–Wilk test, $p > 0.05$ for all variables), and scatterplots indicated no obvious violation of homogeneity of variance). Based on statistical results, structural equation models were constructed, with bootstrap method employed for mediating effect testing and multi-group path analysis performed, using a sample size of 5000. Statistical significance was defined as $P<0.05$ or $P<0.01$.

# Result

## General Information

This study included 311 valid participants aged 60–80 (67.84±6.02) years. The demographic distribution was 113 downtown residents and 198 rural residents. Educational backgrounds were categorized as: 192 with primary school education or below, 96 with secondary school or vocational education, and 23 with college degree or higher. Housing arrangements were: 248 living with children and 63 not living with children. Monthly income was classified as: <2000 yuan (180), 2000–5000 yuan (124), and>5000 yuan (7). Weight status included: 49 underweight, 217 normal, 30 overweight, and 15 obese. Disease duration was: <12 months (35), 12–24 months (150), and>24 months (126). Chronic disease history was: <3 (180) and ≥3 (131). Multiple medications was: ≤4 (215) and ≥5 (96). Oral health awareness was: 162 and 139. Univariate analysis revealed statistically significant factors affecting oral frailty in elderly ovarian cancer patients (P<0.05), including age, educational level, residence, housing conditions, monthly income, disease duration, chronic disease history, multiple medications, and awareness of oral health behaviors. Specific results are presented in Table 1.

**Table 1** Comparison of General Characteristics and Statistical Differences in Oral Frailty Between Elderly Ovarian Cancer Patients (n=311)

| Project | N (%) | Oral Frailty | t | P |
|---|---|---|---|---|
| Age | | | | |
| 60-70 years | 205 (65.9%) | 4.89±0.84 | −2.189 | 0.032 |
| 71-80 years | 106 (34.1%) | 5.88±0.90 | | |
| Education | | | 7.241 | 0.001 |
| Primary school | 192 (61.7) | 5.81±0.89 | | |
| Middle school | 96 (30.9) | 4.58±0.64 | | |
| College degree | 23 (7.4) | 2.69±0.58 | | |
| Domicile | | | | |
| Downtown | 113 (36.3) | 4.71±0.96 | −2.547 | 0.027 |
| Rural area | 198 (63.7) | 5.59±0.93 | | |
| Do you live with your children? | | | | |
| Yes | 248 (79.7) | 4.18±0.74 | 2.184 | 0.038 |
| Deny | 63 (20.3) | 5.44±0.86 | | |
| BMI | | | | |
| <18.5 | 49 (15.8) | 5.94±0.66 | 2.689 | 0.067 |
| 18.5 ≤ BMI <24 | 217 (69.8) | 5.40±0.93 | | |
| 24≤BMI<28 | 30 (9.6) | 3.90±0.75 | | |
| ≥28 | 15 (4.8) | 4.15±0.72 | | |
| Monthly income (RMB) | | | | |
| <2000 | 180 (57.9) | 5.77±0.97 | 5.821 | 0.008 |
| 2000-5000 | 124 (39.9) | 4.74±0.94 | | |
| >5000 | 7 (2.2) | 2.80±0.49 | | |
| Course of disease | | | | |
| <12 m | 35 (11.3) | 5.27±0.81 | 25.122 | 0.001 |
| 12-24 m | 150 (48.2) | 4.11±0.63 | | |
| > 24m | 126 (40.5) | 6.79±0.55 | | |
| History of chronic diseases | | | | |
| <3 | 180 (57.9) | 3.88±0.64 | −10.012 | 0.001 |
| ≥3 | 131 (42.1) | 7.02±0.94 | | |
| Multiple medications | | | | |
| ≤4 types | 215 (69.1) | 4.52±0.65 | −7.281 | 0.001 |
| ≥5 types | 96 (30.9) | 7.14±0.93 | | |
| Education of oral health behaviors | | | | |
| Not have | 162 (52.1) | 7.61±0.81 | 12.119 | 0.001 |
| Have | 134 (47.9) | 3.60±0.55 | | |


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## Logistic Regression Analysis of Oral Frailty in Elderly Ovarian Cancer Patients

In the study, oral frailty (coded as 0 for non-occurrence and 1 for occurrence) was used as the dependent variable for elderly ovarian cancer patients. Statistical variables from Table 1 were designated as independent variables (see Table 2), with normal distribution verified. Logistic regression analysis revealed that non-cohabitation with children, chronic disease history (≥3), polypharmacy, and lack of awareness of oral health behaviors were significant factors affecting oral frailty in elderly ovarian cancer patients (Table 3).

## Scoring Breakdown of Social Support, Dyadic Coping, and Oral Frailty in Elderly Ovarian Cancer Patients

The total scores for social support (37.82±7.98), dyadic coping (112.18±21.21), and oral frailty (5.31±0.98) among 311 elderly ovarian cancer patients were recorded. Detailed scores for each scale and dimension are presented in Table 4.

**Table 2** Variable Assignment Table

| Datum | Assignment |
|---|---|
| Age (years) | 60-70 years = 1; 71–80 years =2 |
| Education | Primary school = 1; middle school = 2; college =3 |
| Do you live with your children? | Yes =0, No = 1 |
| Monthly income | Monthly income <2000 yuan = 1, 12,000–5000 yuan = 2,>5000 yuan =3 |
| Course of disease | <12 months = 1, 12–24 months = 2,>24 months =3 |
| Domicile | Downtown = 1; Rural =2 |
| History of chronic diseases | <3 = 1; ≥3 =2 |
| Multiple medications | ≤4 types = 0, ≥5 types =1 |
| Education about oral health behaviors | Yes = 0, No=1 |

**Table 3** Logistic Regression Analysis of Factors Influencing Oral Frailty in Elderly Ovarian Cancer Patients

| Project | β | SE | Wald$\chi$2 | P | OR | 95% CI |
|---|---|---|---|---|---|---|
| Constant | 3.528 | 0.594 | 32.128 | 0.000 | | |
| Living with children | −1.55 | 0.723 | 5.021 | 0.032 | 0.231 | 0.052~0.882 |
| History of chronic diseases (≥3) | 1.623 | 0.692 | 6.024 | 0.017 | 5.783 | 1.327~21.072 |
| Multiple medications | 3.011 | 0.821 | 14.287 | 0.000 | 24.143 | 4.202~117.990 |
| Education of oral health behaviors | −3.643 | 0.782 | 26.712 | 0.000 | 0.038 | 0.048~0.099 |

**Table 4** Social Support, Dyadic Coping, and Oral Frailty Score Profiles in Elderly Ovarian Cancer Patients

| Scales and Dimensions | Number of Entries | Least Value | Crest Value | Total Points |
|---|---|---|---|---|
| Social support | 10 | 15 | 62 | 37.82±7.98 |
| Objective support | 3 | 4 | 30 | 18.62±3.83 |
| Subjective support | 4 | 3 | 21 | 10.78±2.31 |
| Utilization of supported features | 3 | 3 | 12 | 8.27±1.62 |
| Active Dyadic Coping | 27 | 48 | 130 | 97.64±10.78 |
| PressureCommunication | 8 | 18 | 42 | 31.9±5.54 |
| Supports Dyadic Coping | 10 | 18 | 50 | 38.14±5.41 |
| Dyadic Coping Proxy | 4 | 3 | 16 | 7.76±1.42 |
| Joint Dyadic Coping | 5 | 5 | 25 | 18.73±3.20 |
| Negative Dyadic Coping | 8 | 8 | 40 | 14.12±3.25 |

(*Continued*)

**Table 4** (Continued).

| Scales and Dimensions | Number of Entries | Least Value | Crest Value | Total Points |
|---|---|---|---|---|
| Dyadic Coping Total Score | 37 | 62 | 172 | 112.18±21.21 |
| Oral Frailty | 8 | 0 | 12 | 5.31±0.98 |
| Dentures? | 1 | 0 | 2 | 1.25±0.03 |
| Function of deglutition | 1 | 0 | 2 | 0.89±0.02 |
| Oral health-related behaviors | 2 | 0 | 2 | 1.35±0.05 |
| Chewing ability | 3 | 0 | 4 | 1.44±0.29 |
| Engagement | 1 | 0 | 1 | 0.34±0.01 |

## Correlation Analysis of Social Support, Dyadic Coping, and Oral Frailty Scores in Elderly Ovarian Cancer Patients

Pearson correlation analysis revealed that the total social support score showed positive correlations with both the dyadic coping scores ($r=0.836$, $P<0.01$; $r=0.869$, $P<0.01$; $r=0.784$, $P<0.01$), as well as with the total oral frailty score ($r=-0.878$, $P<0.01$; $r=-0.865$, $P<0.01$; $r=-0.825$, $P<0.01$). Conversely, the total social support score was negatively correlated with the total oral frailty score ($r=-0.812$, $P<0.01$). Detailed results are presented in Table 5.

## Mediating Effect of Dyadic Coping on Social Support and Oral Frailty in Elderly Ovarian Cancer Patients

A structural equation model (SEM) was constructed using AMOS 24.0 to examine the mediating effect of dyadic coping on the relationship between social support and oral frailty in elderly ovarian cancer patients (see Figures 1 and 2). Maximum likelihood estimation was employed for model parameter estimation, with goodness-of-fit test results showing all metrics met the discriminant criteria, indicating good model fit[30] (Tables 6 and 7). The mediating effect was further validated using the bootstrap method, with 5000 repeated random draws of the original data and a 95% confidence interval (CI) set.

## Mediation Analysis of Active Dyadic Coping in the Relationship Between Social Support and Oral Frailty Among Elderly Ovarian Cancer Patients

According to the theoretical model assumed in advance, the fitting and verification of the data are shown in Figure 1.

All model fit indices reached ideal levels, demonstrating excellent overall model-data fit and confirming the model's appropriateness for the actual data. Table 6 shows that the positive bidimensional model's mediation effect on oral frailty, mediated by social support, was 24.1%. The bootstrap test revealed a significant mediation effect, as the confidence interval did not include 0. Additionally, the model fit indices were: $\chi^2/df = 2.886$, GFI = 0.902, AGFI = 0.948, IFI = 0.912, TLI = 0.902, RMSEA = 0.024, NFI = 0.899, and CFI = 0.911. The bootstrap results for the mediation effect are presented in Table 6.

## Mediation Analysis of Negative Dyadic Coping in the Relationship Between Social Support and Oral Frailty Among Elderly Ovarian Cancer Patients

Based on the pre-assumed theoretical model, the results of data fitting and validation are shown in Figure 2. All model fit indices reached ideal levels, demonstrating excellent overall model-data fit and confirming the model's appropriateness for actual data. Table 7 indicates that the mediating effect of negative dyadic coping between social support and oral frailty is 0.01, accounting for-10.9% of the total effect. Bootstrapped results show the confidence interval excludes 0, confirming the mediating effect's significance. Additionally, the model fit indices are: $\chi^2/df = 3.002$, GFI = 0.906, AGFI


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**Table 5** Correlation Analysis of Social Support, Dyadic Coping, and Oral Frailty Dimensions in Elderly Ovarian Cancer Patients (n=311)

| Project | Health Related Behaviors | Chewing Ability | Function of Deglution | Dentrues | Social Engagement | Oral Frailty | Subjective Support | Objective Support | Support Utilization | Social Support | Negative Dyadic Coping | Active Dyadic Coping | Dyadic Coping |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Health-related behavior | 1 | | | | | | | | | | | | |
| Chewing ability | −0.016 | 1 | | | | | | | | | | | |
| Function of deglutition | −0.035 | 0.517** | 1 | | | | | | | | | | |
| Dentures | −0.163 | 0.594** | 0.721** | 1 | | | | | | | | | |
| Social Engagement | 0.039 | 0.233** | 0.131 | 0.249** | 1 | | | | | | | | |
| Oral Frailty | 0.181** | 0.851** | 0.736** | 0.854** | 0.426** | 1 | | | | | | | |
| Subjective support | −0.169* | −0.704** | −0.717** | −0.809** | −0.318** | −0.825** | 1 | | | | | | |
| Objective support | −0.097 | −0.716** | −0.737** | −0.804** | −0.412** | −0.828** | 0.824** | 1 | | | | | |
| Support utilization | −0.078 | −0.612** | −0.729* | −0.815** | −0.301** | −0.843** | 0.736** | 0.750** | 1 | | | | |
| Social support | −0.189 | −0.764** | −0.759** | −0.822** | 0.873** | −0.812** | 0.843** | 0.835** | 0.814** | 1 | | | |
| Negative Dyadic Coping | −0.258** | −0.658** | −0.624** | −0.802** | −0.341** | −0.825** | 0.801** | 0.794** | 0.760** | 0.784** | 1 | | |
| Active Dyadic Coping | −0.179** | −0.791** | −0.794** | −0.787** | −0.287** | −0.865** | 0.879** | 0.853** | 0.835** | 0.862** | 0.834** | 1 | |
| Dyadic Coping | −0.185** | −0.780** | −0.769** | −0.868** | −0.421** | −0.878** | 0.864** | 0.893** | 0.854** | 0.836** | 0.790** | 0.887** | 1 |

**Note**: **P<0.01,*P<0.05.


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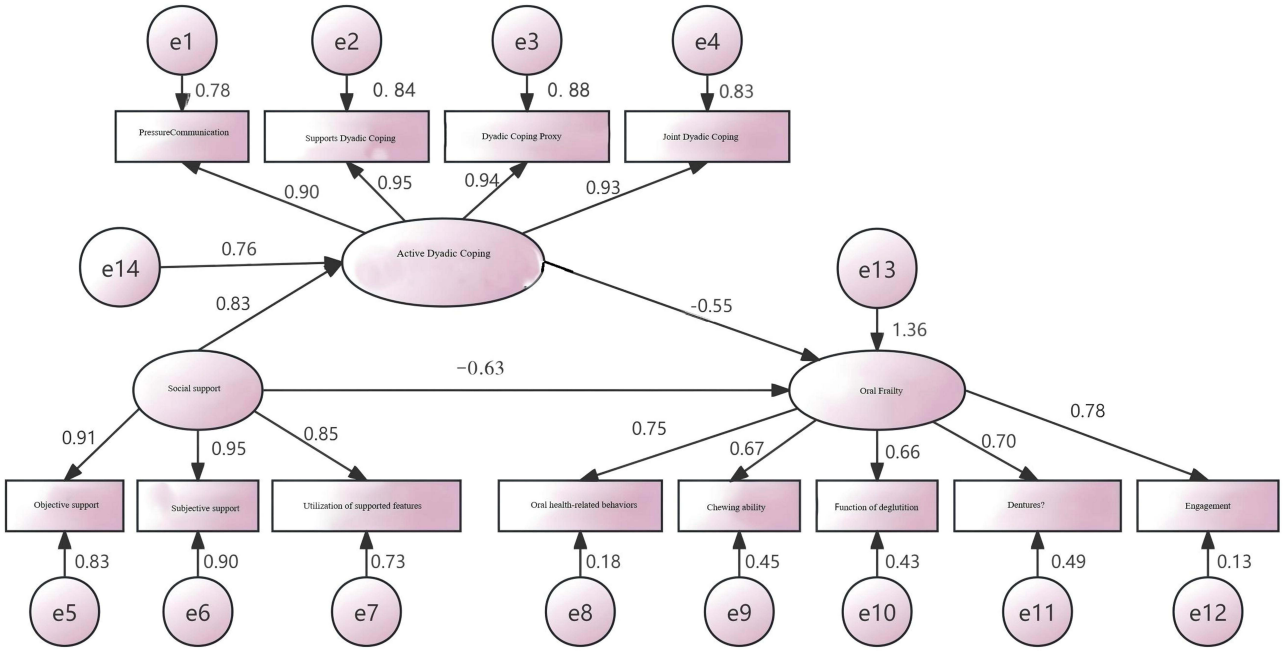


**Figure 1** Mediation model of positive dyadic coping in social support and oral frailty.

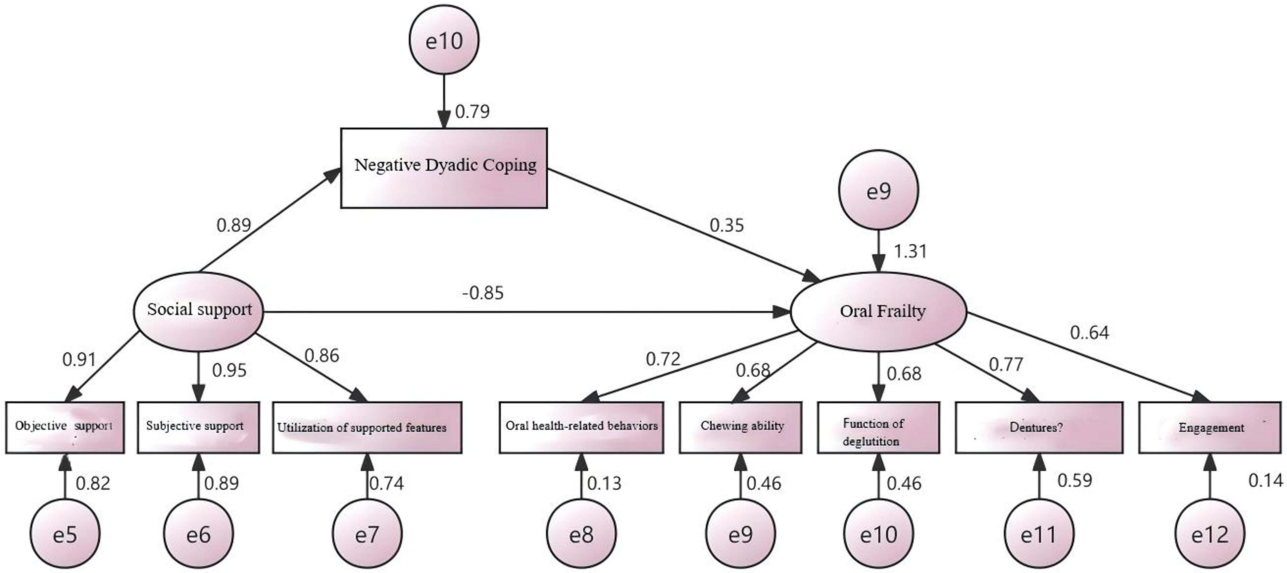


**Figure 2** Mediation model of negative dyadic coping in social support and oral frailty.

= 0.925, IFI = 0.911, TLI = 0.891, RMSEA = 0.024, NFI = 0.900, and CFI = 0.910. The bootstrap results for the mediating effect are presented in Table 7.

# Discussion

## Current Status of Oral Frailty in Elderly Ovarian Cancer Patients

The study reveals that 57.4% of elderly ovarian cancer patients exhibit oral frailty, significantly higher than the 53.2% rate among diabetic patients[31] and 40.9% among those undergoing maintenance hemodialysis.[32] This underscores the severe oral frailty challenges faced by elderly ovarian cancer patients, validating our hypothesis (H1). The observed prevalence may stem


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**Table 6** Bootstrap Results of the Mediating Effect of Positive Dyadic Coping on the Relationship Between Social Support and Oral Frailty (n=311)

| Effect | Effect Size | *SE* | *95% CI* | Relative Effect Size |
|---|---|---|---|---|
| Gross effect | −0.091 | 0.008 | −0.103~-0.078 | — |
| Direct effect | −0.068 | 0.016 | −0.104~-0.049 | 75.9% |
| Indirect effect | −0.022 | 0.010 | −0.038~-0.010 | 24.1% |

**Table 7** Bootstrap Results of the Mediating Effect of Negative Coping on the Relationship Between Social Support and Oral Frailty (n=311)

| Effect | Effect Size | *SE* | *95% CI* | Relative Effect Size |
|---|---|---|---|---|
| Gross effect | −0.090 | 0.008 | −0.106~-0.078 | — |
| Direct effect | −0.102 | 0.019 | −0.138~-0.079 | 112.1% |
| Indirect effect | 0.012 | 0.006 | −0.140~-0.085 | −12.1% |

from two factors: First, as ovarian cancer predominantly affects women, whose oral mastication function is generally worse than men's, making women post-menopause more susceptible to oral frailty.[33] Second, chemotherapy-induced DNA double-strand breaks in oral mucosal cells may accelerate mucosal inflammation.[34] Additionally, neutropenia caused by chemotherapy reduces salivary lysozyme concentration, disrupting microbial diversity and triggering ulcerative mucosal lesions.[35] The diminished salivary secretion from chemotherapy severely compromises oral self-cleaning ability, increasing plaque index and accelerating oral frailty progression,[36] ultimately elevating its incidence in chemotherapy-treated cancer patients. Given the high prevalence of oral frailty in elderly ovarian cancer patients, healthcare professionals should prioritize proactive oral health care and hygiene management for these patients.

Our research findings indicate that elderly ovarian cancer patients not living with their children are more susceptible to oral frailty. This may be because family serves as a crucial social support network for older adults.[37] As elderly spouses of ovarian cancer patients are also aging, those separated from their children often lack both material support and emotional connection. Without access to oral care education, regular dental checkups, and maintenance services, these patients struggle to maintain proper oral hygiene, which increases their vulnerability to oral frailty. Healthcare professionals should therefore emphasize the vital role of family cohesion in supporting oral health for elderly ovarian cancer patients. Additionally, community organizations could collaborate to provide home-based dental examinations and nursing services as convenient community support measures.

The study findings indicate that elderly ovarian cancer patients with comorbid chronic diseases (≥3) and multiple medications are more susceptible to oral frailty. This may be because chronic conditions in these patients lead to more severe systemic inflammatory responses, creating favorable conditions for periodontitis[38] and making the oral environment more vulnerable. Additionally, elderly patients taking multiple medications may experience reduced salivary secretion and flow rate, which diminishes oral self-cleaning ability and increases risks of periodontitis, xerostomia, and oral candidiasis.[39] Therefore, healthcare professionals should comprehensively understand by mastering knowledge in physiology, pathology, and pharmacology, we provide patients with medication optimization services to ensure safe, accurate, and rational drug use, while actively managing chronic diseases effectively.[40]

Our research findings also indicate that elderly ovarian cancer patients who were not informed about oral health behaviors are more prone to oral frailty. This may be because oral frailty, a concept recently proposed by scholars as an indicator for assessing frailty in elderly patients, has not been widely adopted in China. As a result, most healthcare professionals lack sufficient understanding of oral frailty's definition, causes, and associated risks, leading to insufficient emphasis on oral health education for elderly ovarian cancer patients.[41] This highlights the need to enhance healthcare professionals' awareness of oral frailty's impact on elderly ovarian cancer patients and strengthen their training in this area. Additionally, healthcare providers should increase educational opportunities: reinforcing oral health education during patient visits for treatment, outpatient follow-ups, or telephone consultations. They should also diversify

educational approaches: utilizing simple, visually-aided materials like brochures and short videos to improve patients' understanding of oral health benefits. This will help establish healthy oral habits and ultimately reduce the incidence of oral frailty.

## Correlation Analysis of Social Support, Dyadic Coping, and Oral Frailty in Elderly Ovarian Cancer Patients

The findings demonstrate significant correlations between social support, dyadic coping, and oral frailty in elderly ovarian cancer patients (all $P<0.01$). The total scores of social support and oral frailty showed negative correlations, indicating that low social support levels act as a risk factor for oral frailty. Specifically, elderly ovarian cancer patients with inadequate social support are more susceptible to developing oral frailty, which validates our hypothesis (H2) and aligns with Wu Yiran et al's[42] research. This phenomenon occurs because patients with limited social support face greater challenges in accessing scientific oral health knowledge and self-care behaviors such as regular dental checkups and oral hygiene maintenance. Furthermore, reduced social participation due to inadequate support decreases the frequency of outings and daily interactions, accelerating the decline in oral function and thereby speeding up the progression of oral frailty.[43]

The dyadic coping total score, along with its positive and negative dimensions, showed a negative correlation with oral frailty Total Score. This suggest that elderly ovarian cancer patients with lower dyadic coping levels maybe more prone to developing oral frailty, which aligns with our hypothesis (H3). This may be because higher dyadic coping levels reflect stronger marital intimacy. Intimate relationships serve as the primary source of emotional support for patients. Positive dyadic coping enhances patients "ability to cope with illness and significantly improves their mental health.[44] When elderly ovarian cancer patients" spouses actively monitor their oral health and provide necessary care, patients are more likely to maintain good oral hygiene habits. This maybe enhance their oral muscle activity and potentially contribute to slowing the decline in oral function.[45] Additionally, spouses play a vital role in supporting elderly ovarian cancer patients through emotional and material assistance during diagnosis, treatment, and rehabilitation.[46] However, there is no definitive evidence to support whether these changes can improve oral function or reduce the incidence of oral frailty.

The total social support score showed positive correlations with dyadic coping scores (both positive and negative), indicating that elderly ovarian cancer patients with lower social support levels exhibited reduced dyadic coping capabilities. This finding supports our hypothesis (H4), consistent with Chen Juanjuan et al[47] Cancer patients primarily receive social support from spouses, family members, and friends, with spouse support and understanding playing a crucial role in facilitating psychological adjustment for both patients and their partners. Elderly ovarian cancer patients with strong social support typically benefit from robust family support systems and extensive social networks. These resources enable early medical attention and clinical treatment, empowering patients to actively manage their condition. Such support enhances marital communication and mutual reliance, fostering intimate relationships. Furthermore, it alleviates cancer-related psychological distress and strengthens marital bonds, ultimately improving dyadic coping levels in elderly ovarian cancer patients.[48]

## Mediation Effect of Dyadic Coping on the Relationship Between Social Support and Oral Frailty in Elderly Ovarian Cancer Patients

The study findings further demonstrate that positive dyadic coping mediates the relationship between social support and oral frailty with a coefficient of-0.022, accounting for 24.1% of the total effect. Negative dyadic coping mediates this relationship with a coefficient of 0.012, contributing 12.1% to the total effect. These results suggest that social support may be associated with lower levels the onset and progression of oral frailty in elderly ovarian cancer patients, while also may be associated with the partial mediating role of dyadic coping. This aligns with our hypothesis (H5). The findings suggest that dyadic coping plays a role in the influence of social support on oral frailty. High-level social support plays a role in mitigating the degree of oral frailty. Elderly ovarian cancer patients with higher levels of dyadic coping may benefit to some extent. Research findings indicate that positive dyadic coping demonstrates a stronger mediating effect

between social support and oral frailty compared to negative dyadic coping. This discrepancy may stem from the following factors: The Dyadic Coping Inventory (DCI) comprises 37 items, with positive dyadic coping (including stress communication, supportive dyadic coping, proxy dyadic coping, and collaborative dyadic coping) accounting for 27 items, while negative dyadic coping includes only 8 items—resulting in a significantly smaller proportion of items for the latter. Alternatively, positive dyadic coping mechanisms such as stress communication, support, proxy dyadic coping, and collaborative coping may substantially enhance spousal intimacy,[49] which serves as a influence factor for oral health behaviors in elderly patients. Furthermore, the buffer effect model[50] posits that social support only exerts its protective function when individuals face stress, effectively mitigating the negative impacts of stress on mental and physical health. For elderly ovarian cancer patients, externally obtained social support can, through assessment, partially offset or buffer the harm caused by negative interactions with their partners.

Therefore, healthcare professionals should emphasize leveraging the positive role of family support in elderly ovarian cancer patients, integrate internet-based mobile platforms, establish a "trinity" model connecting hospitals, communities, and families, and promote multidisciplinary teamwork[51] by enhancing social support through various measures, we can effectively improve communication and collaborative coping skills between elderly ovarian cancer patients and their spouses. This fosters closer marital bonds, strengthens the emotional connection between patients and their partners, and promotes mutual support in managing oral frailty. These efforts enhance positive dyadic coping strategies and emphasize the importance of maintaining oral health, to play a partial role in maintaining patients' oral health and reducing or delaying the occurrence and progression of oral frailty in elderly ovarian cancer patients.

## Boundedness

First, this study was a single-center study on elderly ovarian cancer patients in a hospital. The small sample size limited the representativeness. In the future, multi-center studies could be carried out to expand the sample size.

Secondly, since all data collection tools in this study rely on self-reporting, which may introduce information bias, it is advisable to combine objective data for a more comprehensive analysis of factors affecting oral frailty in elderly ovarian cancer patients.

Thirdly, this study employed a cross-sectional design with a short observation period, lacking long-term follow-up or tracking. However, oral frailty, social support, and dyadic coping are dynamic constructs that can be studied longitudinally to explore their evolving relationships in elderly ovarian cancer patients.

Finally, this study used OFI-8 to assess oral frailty. The scale was originally developed for elderly populations living in ordinary communities, and when applied to elderly ovarian cancer patients who are generally undergoing chemotherapy, some items may introduce contextual interpretation bias. For example, item 5: "Has the frequency of going out decreased in the past year?" "Reducing outdoor activities" in cancer populations is more likely related to treatment-related complications (such as bone marrow suppression) rather than necessarily only related to oral frailty. Future research could develop specific oral frailty assessment tools tailored to Chinese patients undergoing chemotherapy, taking into account China's national conditions.

# Conclusion

This cross-sectional study suggests that in China elderly ovarian cancer patients with higher oral frailty levels are more susceptible to this condition when exhibiting demographic characteristics such as living separately from children, having a history of chronic diseases (≥3), using multiple medications, or lacking of oral health behaviors. Notably, correlations maybe exist between social support, dyadic coping, and oral frailty. Social support may be linked to decreased risk of oral frailty development in elderly ovarian cancer patients, while dyadic coping may be associated with its onset and progression. Suggesting that healthcare professionals may therefore prioritize monitoring oral frailty in these patients, implement early screening to identify risk factors, enhance oral health management. By improving dyadic coping strategies, we maybe reduce oral frailty levels, improve patients' physical and mental well-being. However, this study is a cross-sectional study with inherent limitations, making it challenging to establish causal relationships. Future longitudinal studies may address this issue.

## Data Sharing Statement

Data is provided within the manuscript files and its associated tables. Further anonymized data may be available from the corresponding author upon reasonable request.

## Ethics Approval and Consent to Participate

This study has been approved by the Ethics Committee of the First Affiliated Hospital of Zhejiang University School of Medicine, with approval number: Lun Shen 2025 Yan No.0991. All patients and their families participated voluntarily and signed informed consent forms, and the study was performed in accordance with the Helsinki II declaration. Informed consent was obtained from all the study subjects before enrollment. All participants were provided with a detailed explanation of the study's purpose, procedures, potential risks and benefits, their right to withdraw at any stage without affecting their standard medical care, and the measures taken to ensure the confidentiality of their personal data.

## Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

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## Disclosure

The authors report no conflicts of interest in this work.

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