

RESEARCH

Open Access



# Association between psychological resilience, social support and oral health behaviours in patients with implant dentures

Tingting Cui<sup>1†</sup>, Liying Qiu<sup>1†</sup> and Deqiang Hou<sup>2\*†</sup>

## Abstract

**Background** With the improvement of living standards, implant dentures have become the choice of more and more patients with missing teeth. Dentures are not natural teeth, and may cause different degrees of negative impacts on patients in physiological, psychological and social aspects. The objective of this study was to examine the current status of psychological resilience among implant denture patients and the factors that influence it. Additionally, we aimed to analyse the correlation between psychological resilience, social support, and oral health behaviours, with a view to providing a scientific basis for the development of targeted interventions for patients with implant dentures.

**Methods** A survey of 238 patients with implant dentures was conducted in the Department of Stomatology of the Affiliated Hospital of Jiangnan University and Wuxi Stomatological Hospital. The survey included a self-designed general information questionnaire, disease condition questionnaire, The Connor-Davidson Resilience Scale (CD-RISC), The Social Support Rating Scale (SSRS), and The oral health behavior scale.

**Results** The CD-RISC score of patients with implant dentures was  $66.49 \pm 15.59$ , while the SSRS score was  $37.90 \pm 7.73$ , and the oral health behaviour score was  $34.73 \pm 7.92$ . Multiple linear regression analysis showed that age, economic status, social support, and oral health behavioural status were factors influencing the psychological resilience of patients with implant dentures (all  $P < 0.05$ ), and the psychological resilience score was positively correlated with the score of oral health behaviours and the score of social support ( $P < 0.05$ ), and the score of oral health behaviours was positively correlated with the score of social support ( $P < 0.05$ ). Oral health behaviour partially mediated the relationship between psychological resilience and social support.

**Conclusions** The postoperative psychological resilience of patients with implant dentures is at an average level and is affected by various factors, among which social support not only has a direct effect on the psychological resilience of patients with implant dentures, but also has an indirect effect on their psychological resilience through oral health behaviours. Healthcare professionals should actively adopt targeted nursing interventions to improve the

<sup>†</sup>Tingting Cui, Liying Qiu, and Deqiang Hou have contributed equally to this work.

\*Correspondence:  
Deqiang Hou  
Wan13114@163.com

Full list of author information is available at the end of the article



© The Author(s) 2024. **Open Access** This article is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 International License, which permits any non-commercial use, sharing, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if you modified the licensed material. You do not have permission under this licence to share adapted material derived from this article or parts of it. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by-nc-nd/4.0/>.

psychological resilience of patients, improve their postoperative oral health behaviours, and improve their quality of life.

**Clinical trial number** Not applicable.

**Keywords** Implant denture, Psychological resilience, Health behaviours, Social support

## Background

The state of an individual's oral health and the functionality of their oral structures are significant determinants of their overall well-being [1]. As a relatively common oral state, tooth defects and missing teeth have a significant impact on the patient's functional ability in daily life, self-image and social interaction. Such conditions are not only associated with limitations in daily mobility, mastication and cognitive function, but also with an increased risk of developing systemic diseases [2].

The Fourth China Oral Health Epidemiological Survey [3] indicates that 33.8% of individuals aged 55–64 retain their natural dentition, in comparison to only 18.3% of those aged 65–74. Implant-supported dentures assist patients with missing teeth in reconstructing their oral anatomy and reestablishing their normal physiological functions with reduced discomfort, accelerated recuperation, and enhanced esthetics in comparison to traditional dentures. This improves patients' quality of life and also elevates the self-esteem and self-confidence of edentulous patients [4]. As living standards and medical technology continue to improve, patients are increasingly recognising the pivotal role of mastication in their overall health and functional capacity. A growing number of edentulous patients are opting to utilise implant-borne dentures. It is, however, important to recognise that dentures are not a natural tooth substitute. Consequently, they may continue to exert a range of adverse effects on patients in terms of physical, psychological and social aspects [5, 6]. It is therefore recommended that greater emphasis be placed on their oral health-related quality of life [7].

Oral health behaviours largely determine the level of personal oral health, and the adoption of scientific and effective oral health behaviours is of great importance in improving oral health-related quality of life (OHRQOL) after implant surgery. However, the results of a survey suggest that current oral self-management practices of implant patients are not optimistic [8]. Psychological resilience can be defined as the capacity of an individual to withstand adversity when confronted with stressful events. A robust level of psychological resilience can mitigate the sense of shame experienced by patients with implant prostheses, reinforce their oral health behaviours, and has the potential to significantly enhance the quality of life of patients with implant prostheses [9]. Whereas social support is the material or spiritual help

that individuals receive from their social networks to meet physical, psychological and social needs, the lack of social support reduces patients' sense of self-worth and self-confidence, and alters their worldview, social behaviours, illness perceptions and coping styles. The buffering model of social support suggests that strong social support can counteract the negative effects of stressful events and ultimately maintain physical and mental health. It has been shown to have a positive effect on increasing psychological resilience, promoting healthy behaviours and thus enhancing quality of life [7].

To date, the relationship between psychological resilience, social support and oral health behaviour of implant denture patients has not been sufficiently investigated. The objective of this study is to examine the current state of psychological resilience among patients with implant dentures, investigate the relationship between psychological resilience, social support and oral health behaviour, and provide a scientific foundation for the development of targeted intervention measures for patients with implant dentures.

## Method

### Study design and participants

From December 2023 to March 2024, a cross-sectional study was conducted at the Affiliated Hospital of Jiangnan University and Wuxi Stomatological Hospital in Wuxi City, Jiangsu Province, China. A total of 238 patients with implant dentures participated in the survey through convenient sampling. The participants were selected according to the following criteria: (a) Presence of tooth defect or loss, and acceptance of implant denture surgery. (b) Conscious, good at communication and expression. (c) Informed consent and voluntary participation in this study. Also, individuals with other serious diseases, including mental illness and cognitive impairment or who had experienced major negative life events, were excluded from the study.

### Sample size

A total of 11 potential influencing factors were identified through a comprehensive literature review. In accordance with the tenet that the sample size should be 5 to 10 times the number of independent variables, the estimated minimum sample size was 110. However, taking into account an anticipated attrition rate of 10% and sampling error, the appropriate recommended sample size

was at least 120. Ultimately, data were collected from 238 participants across two hospitals.

### Questionnaire design

The Demographic information: sex, age, educational background, marital status, economic status, whether you have other chronic diseases, the number of missing teeth, the length of missing teeth, whether you have other oral diseases, and whether you have had other oral treatments.

The Connor-Davidson Resilience Scale (CD-RISC) [10] is a self-report measure that assesses an individual's resilience to adversity; encompassing both social and non-social causes. The CD-RISC scale comprises three factors: toughness, strength, and optimism. It is comprised of 25 items rated on a scale of (0=not true at all, 1=seldom true, 2=sometimes true, 3=often true, 4=true nearly all the time). A high score indicates a higher level of resilience.

The Social Support Rating Scale (SSRS) [11] developed by Xiao Shuiyuan, 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 Oral Health Behaviour Scale was compiled according to relevant literature [12], and covers two dimensions of oral condition management and oral cleaning behaviour, with a total of 11 items. The Likert 5-level scoring method is employed, whereby a higher score indicates a more optimal oral health behaviour.

### Data collection

The purpose and significance of the study were explained to eligible patients by the researcher. After obtaining consent, the patients were informed of how to fill out the questionnaire. If there were any difficulties in understanding its content, the researcher explained it to the patients. The patients then answered the questions without any introduction that might influence their judgement. Once the questionnaires were completed, they were checked for completeness and any missing information was supplemented and collected on the spot.

**Table 1** Scores of CD-RISC, oral health behaviours, and SSRS in denture implant patients ( $n = 238$ )

Measure	Number of items	Mean scores	Total Score Range
CD-RISC	25	$66.49 \pm 15.59$	0-100
Oral Health Behaviour	11	$34.73 \pm 7.92$	11-55
SSRS	10	$37.90 \pm 7.73$	12-66

### Data analysis

The study aimed to identify the factors that influence the psychological resilience of patients with implant dentures. The statistical methods employed were independent t-tests, one-way ANOVA, and multiple linear regression analysis. The relationship between patients' oral health behaviours, psychological resilience, and social support was analysed using the Pearson correlation coefficient method. The study employed the Bootstrap method to ascertain whether oral health behaviours act as a mediator in the relationship between psychological resilience and social support in patients with implant dentures. The data were processed and analysed statistically using SPSS 26.0 software, with statistical significance set at  $p < 0.05$ .

### Ethical considerations

The initial page of the questionnaire included an introduction to the survey and a statement of informed consent. Subsequently, participants were signing the informed consent form. They would then participate in the official survey. According to the Declaration of Helsinki, the poll guaranteed autonomy, confidentiality, and no damage. The study was approved by the Ethics Committee of Jiangnan University Hospital (Approval No. LS2024038).

### Results

Two hundred and forty questionnaires were distributed, and 238 were recovered, resulting in an effective recovery rate of 99.2%.

#### CD-RISC, oral health behaviours, and SSRS of patients with implant dentures in this study

Table 1 presents that the CD-RISC score ( $66.49 \pm 15.59$ ), the total oral health behaviour score ( $34.73 \pm 7.92$ ) and the total SSRS score ( $37.90 \pm 7.73$ ) of the implant patients were at an intermediate level.

#### Unifactorial analysis of CD-RISC in patients with implant-supported dentures

The results of the unifactorial analysis indicate that the psychological resilience of implant denture patients is affected by various factors, including age, education level, economic situation, chronic disease status, number and duration of missing teeth, and history of other oral diseases. These factors demonstrate statistically significant differences ( $P < 0.05$ ), as presented in Table 2.

#### Correlation between CD-RISC, oral health behaviour, and SSRS in patients with implant dentures

The results of the Pearson correlation analysis demonstrate a positive Correlation between CD-RISC, oral health behaviours, and SSRS. As illustrated in Table 3.

**Table 2** Univariate analysis of factors affecting CD-RISC in patients with implant dentures ( $n = 238$ )

Measure	Items	n (%)	CD-RISC ( $\bar{x} \pm s$ )	t/F	P
Sex	male	112(47.1%)	65.87 $\pm$ 15.48	0.579	0.563
	female	126(52.9%)	67.04 $\pm$ 15.73		
Age	18–44	107(45.0%)	72.70 $\pm$ 13.78	39.613	0.000
	45–59	55(23.5%)	70.02 $\pm$ 13.81		
	$\geq 60$	76(31.5%)	55.18 $\pm$ 13.00		
Education	College	154(65.7%)	71.18 $\pm$ 13.66	6.876	0.000
	High school	84(35.3%)	57.88 $\pm$ 15.31		
Marital status	married	186(78.2%)	65.69 $\pm$ 15.46	1.489	0.139
	single	52(21.8%)	69.33 $\pm$ 15.90		
Economic stress	Y	87(36.6%)	53.89 $\pm$ 13.85	6.605	0.000
	N	151(63.4%)	71.15 $\pm$ 14.64		
Chronic diseases	Y	56(23.5%)	56.34 $\pm$ 13.50	5.962	0.000
	N	182(76.5%)	69.61 $\pm$ 14.88		
Missing numbers	single tooth	141(59.2%)	68.73 $\pm$ 14.33	2.405	0.007
	multitooth	97(40.8%)	63.23 $\pm$ 16.80		
Missing time	Within 1 year	126(52.9%)	68.58 $\pm$ 14.21	2.192	0.029
	More than 1 year	112(47.1%)	64.13 $\pm$ 16.76		
Other oral diseases	Y	133(55.9%)	69.07 $\pm$ 15.35	2.919	0.004
	N	105(44.1%)	63.22 $\pm$ 15.35		
Other oral treatments	Y	104(43.7%)	67.47 $\pm$ 15.90	0.857	0.392
	N	134(56.3%)	65.72 $\pm$ 15.37		

**Table 3** Correlation of postoperative CD-RISC, oral Health Behaviour, and SSRS in patients with dental implants

Measure	SSRS	CD-RISC	Oral Health Behaviour
SSRS	1		
CD-RISC	0.416**	1	
Oral Health Behaviour	0.195**	0.616**	1

**Table 4** Multiple linear regression analysis of CD-RISC in denture implant patients ( $n = 238$ )

Independent variable	$\beta$	SE	t	P
Constant	18.628	8.490	2.194	$P < 0.05$
Age	-2.883	1.139	-2.531	$P < 0.05$
Economic stress	5.260	1.547	3.401	$P < 0.05$
SSRS	0.514	0.094	5.475	$P < 0.05$
Oral Health Behaviour	0.806	0.102	7.941	$P < 0.05$

#### Linear regression analysis was conducted to examine the psychological elasticity in patients with implant dentures

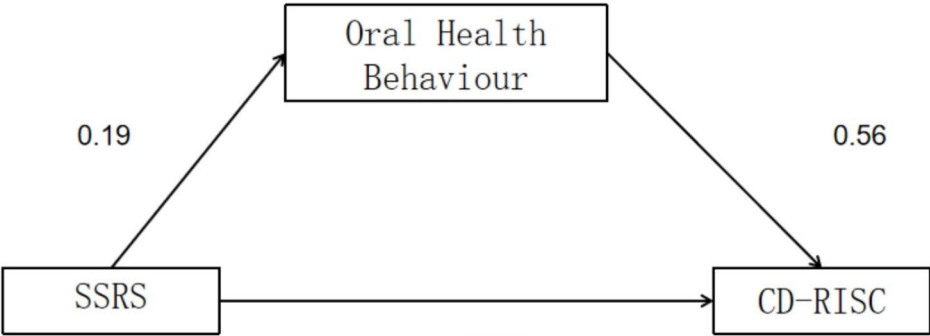
The study used multiple linear regression with the selection of independent variables based on the significant factors in the univariate analysis. It was found that the older the denture implant patients were, the lower their level of psychological resilience, that the better-off patients had significantly higher psychological resilience than the poorer ones, and that social support and oral health behaviours also had an impact on their psychological resilience after denture implantation. Statistically significant results are shown in Table 4.

#### Mediating effect of oral health behaviour in CD-RISC and SSRS of implant denture patients

The study examined the mediating effect of oral health behaviour between psychological resilience and social support of implant denture patients. The dependent variable was psychological resilience, the independent variable was social support, and the mediating variable was oral health behaviour. Model 4 in the Process plug-in developed by Hayes was used, with the Bootstrap repeated sampling number set to 5000. The total, direct, and indirect effects were estimated with 95% confidence intervals. The study found that social support had a positive effect on the psychological resilience of prosthodontic implant patients' oral health behaviours, and that oral health behaviours also had a positive effect on their psychological resilience ( $P < 0.001$ ) (Fig. 1). The 95% confidence intervals for the total, direct, and indirect effects did not include 0, indicating that oral health behaviours had a positive impact on the relationship between psychological resilience of prosthodontic implant patients and social support. The mediating effect value was 0.11, indicating a partially mediating role, and the mediating effect accounted for 26.2% of the total effect (See Table 5).

#### Discussion

A surgical insertion of dental implants subsequently supporting dentures is the choice of many patients with missing teeth, allows patients with edentulism to achieve satisfactory internal fixation and chewing function and can improve their quality of life [13]. However, due to the long treatment cycle of denture implant prosthetics and a certain degree of trauma to the patient, coupled with concern about the restorative effect, some patients experience psychological pressure. Psychological resilience can be defined as a positive adaptation to adversity [14]. It is therefore evident that a high level of psychological resilience can improve an individual's mental health and quality of life. Previous studies have demonstrated that social support can enhance psychological resilience by encouraging individuals to adopt constructive coping strategies. Oral health behaviour is inextricably linked to psychological resilience and social support, and is a key determinant of an individual's personal oral health status [15, 16]. The present results demonstrated that the scores for psychological resilience, social support and oral health behaviour of implant denture patients were within the middle range, indicating that there is a need for improvement in these areas. Consequently, it is of importance to identify the factors influencing the psychological resilience of implant denture patients. This will facilitate the development of evidence-based intervention programmes designed to assist patients in actively modifying their mental outlook and effectively utilising social



**Fig. 1** Pathways of oral health behaviours between social support and psychological resilience in patients with implant dentures

**Table 5** Path model analysis of the mediating effect of oral Health Behaviour between SSRS and CD-RISC in patients with implant dentures (*n* = 238)

	$\beta$	SE	Bootstrap 95%CI		Percentage of total effect
			LLCI	ULCI	
Total effect	0.42	0.06	0.30	0.53	
Direct effect	0.31	0.05	0.21	0.40	
Indirect effect	0.11	0.03	0.04	0.18	26.2%

LLCI and ULCI are confidence intervals. If the confidence intervals (LLCI and ULCI with the same number, excluding 0) do not contain 0, the mediating effect is present

support resources to facilitate the adoption of healthy behaviours.

The results of the multiple linear regression analysis indicate that economic status and age are the primary factors influencing psychological resilience, which is consistent with the findings of other research studies in this field [17–19]. A higher economic income is associated with a higher oral behaviour score and psychological resilience among patients. The higher the economic level, the more selective the various material conditions that patients depend on, the more channels they can obtain knowledge about oral health care, and the greater their financial strength to support their oral health behaviour. On the other hand, patients with a lower economic level will have a certain financial burden due to medical expenses, and they are prone to guilt, anxiety and other negative psychology, which will exacerbate the psychological stress response and lead to a lower level of psychological resilience. Age also exerts an influence on the psychological resilience of patients with implant dentures. The results of this study indicate that the psychological resilience score of elderly patients is significantly lower than that of young and middle-aged patients. It may be the case that younger and middle-aged patients are better able to communicate with medical staff, comprehend and master disease-related knowledge, and administer appropriate treatments for oral diseases, thereby improving their compliance, alleviating negative

emotions such as anxiety and fear, and subsequently enhancing their psychological resilience [20]. The elderly are influenced by traditional concepts, cultural knowledge and other factors, which result in a significant deviation in their understanding of oral health problems. Furthermore, the majority of them lack the requisite oral health knowledge. This is compounded by mobility inconvenience, information occlusion, poor communication, cognitive decline and other factors [21], which increases their uncertainty about the disease. Consequently, their psychological resilience to stressor events is poor, and their psychological endurance is reduced, resulting in a low level of psychological resilience. The preceding findings indicate that health departments should prioritize the enhancement of oral health care institutions and strive to expand the availability of oral medical benefits for low-income individuals. Concurrently, greater attention should be devoted to the oral health issues of the elderly, with the implementation of diverse forms of oral health education tailored to the specific needs and characteristics of this demographic. This approach aims to equip them with the requisite knowledge about oral diseases, instill a proactive attitude towards oral health maintenance, encourage the adoption of optimal oral health practices, and enhance the overall quality of life associated with oral health.

The results of this study are consistent with those of previous research [9] indicating that the level of social support and oral health behaviour of patients with implant dentures are significantly positively correlated with their psychological resilience. The research demonstrates that the level of social support and oral health behaviour of patients with implant dentures can positively predict their psychological resilience. This suggests that the higher the level of social support and oral health behaviour of patients, the stronger their Psychological resilience in the face of stress events and adversity. Social support can provide individuals with mental and emotional comfort and buffer the impact of stressful and stressful events; it can also provide patients with the



external resources they need to cope with negative events and enhance their self-confidence and adaptability, thus promoting the improvement of psychological resilience. Patients with better oral health behaviours tend to be more proactive in making plans and communicating with others for help and support. They therefore tend to have more positive cognitive and emotional experiences that are conducive to overcoming difficulties and adapting to good circumstances. By contrast, patients with poorer oral health behaviours tend to focus on their emotions. They do not realise that it is not the emotion that is troubling them, but rather their own perceptual biases that are causing them distress, and are more likely to be negatively influenced and fall into an emotional rut [22]. Furthermore, this study identified a mediating effect of oral health behaviour on the relationship between social support and psychological resilience in implant denture patients. The primary rationale may be that patients with high oral health behaviour should proactively obtain pertinent knowledge, actively seek assistance, manage diseases in an effective manner, possess greater self-efficacy and more positive emotions, and subsequently facilitate the enhancement of their psychological resilience [23]. The objective of this study was to enhance the psychological resilience, social support, and oral health behaviour scores of implant denture patients. It is therefore incumbent upon medical staff to pay close attention to patients' psychological state during the course of treatment. They should take personalised psychotherapy and nursing measures in accordance with the characteristics of patients' needs, with a view to helping patients to adopt a positive outlook and to facilitate their psychological rehabilitation. In addition, it is imperative to proactively mobilize social resources, encourage multi-level and multi-initiative support, and construct a psychological elastic support system. This will facilitate the adoption of healthy behaviours, enhance patients' compliance, and improve their quality of life [24].

## Conclusion

It is evident that psychological resilience, level of social support and oral health behaviours of implant denture patients need to be improved. Age, economic status, social support and oral health behaviours were the factors influencing their psychological resilience, and oral health behaviours played a partial mediating role in psychological resilience and social support in implant patients. To improve the use of social support, promote oral health behaviours, and increase attention to psychological resilience in patients with implant dentures, health professionals should develop evidence-based, effective, and targeted intervention programmes.

## Limitation

This study is limited by the cross-sectional survey of implant denture patients in only two hospitals in Jiangsu Province. Consequently, the selection of study subjects should be further expanded in the future in order to validate the results of this study.

## Abbreviations

CD-RISC	Connor-davidson resilience scale
SSRS	The social support rating scale
OHRQOL	Oral health-related quality of life

## Acknowledgements

The authors would like to thank all the people who participated in this study for their kind cooperation and participation.

## Author contributions

Tingting Cui performed data analysis work and wrote the manuscript. Lying Qiu and Deqiang Hou designed all the study and helped correct the writing problems. All authors have read and approved the final submission.

## Funding

This research was supported by the Top Talent Support Program for young and middle-aged people of Wuxi Health Committee (BJ2023055).

## Data availability

The data were available upon reasonable request. Data from this study are available from the corresponding author.

## Declarations

### Ethics approval and consent to participate

All procedures have been approved by the Ethics Committee of Jiangnan University Hospital (Approval No. LS2024038). The initial page of the questionnaire included an introduction to the survey and a statement of informed consent. Subsequently, participants will engage in a formal investigation following the signing of the informed consent. They would then participate in the official survey. The informed consent form is included in the questionnaire and has been uploaded in relevant documents. Consent was obtained from all individual participants included in the study.

### Consent for publication

Not applicable.

### Competing interests

The authors declare no competing interests.

### Author details

<sup>1</sup>Medical College of Jiangnan University, Jiangsu, Wuxi 214122, China

<sup>2</sup>Affiliated Hospital of Jiangnan University, Jiangsu, Wuxi 214122, China

Received: 12 August 2024 / Accepted: 18 November 2024

Published online: 07 January 2025

## References

1. Lie SAN, Speksnijder CM, Kalic H, Kessler PAWH. Masticatory function in edentulous patients wearing implant overdentures after graftless maxillary sinus membrane elevation. *Oral Rehabil.* 2024;51(6):1005–15. <https://doi.org/10.1111/joor.13675>.
2. Kutkut A, Bertoli E, Frazer R, Pinto-Sinai G, Fuentealba Hidalgo R, Studts J. A systematic review of studies comparing conventional complete denture and implant retained overdenture. *J Prosthodont Res.* 2018;62(1):1–9. <https://doi.org/10.1016/j.jpor.2017.06.004>.
3. Jiao J, Jing W, Si Y, et al. The prevalence and severity of periodontal disease in Mainland China: data from the Fourth National oral health survey (2015–2016). *Clin Periodontol.* 2021;48(2):168–79. <https://doi.org/10.1111/jcp.e.13396>.

4. Veríssimo AH, Ribeiro AKC, de Medeiros AKB, de Melo LA, da Fonte Porto Carreiro A. Factors associated with edentulous patients' willingness about implant-supported complete denture: a multivariate analysis. *Clin Oral Investig*. 2022;26(2):1835–42. <https://doi.org/10.1007/s00784-021-04158-2>.
5. Jawad S, Clarke PT. Survival of Mini Dental implants used to Retain Mandibular Complete overdentures: systematic review. *Int J Oral Maxillofac Implants*. 2019;34(2):343–56. <https://doi.org/10.11607/jomi.6991>.
6. Rui W, Lulu Y, Yuqin G. Advances in oral health-related quality of life assessment tools for prosthodontic patients. *Chin Nurs Manage*. 2021;21(02):303–7.
7. Wang L, Luo J, Li Y, Zhou Y, Wang W. Social support, anxiety, and depression in patients with prostate cancer: complete mediation of self-efficacy. *Support Care Cancer*. 2022;30(8):6851–6. <https://doi.org/10.1007/s00520-022-07065-8>.
8. Yi Y, Xiaodan Z, Jiangyuan S et al. Research progress on oral health management in patients with a dental implant. 2023;38(07):116–20 <https://doi.org/10.3870/j.issn.1001-4152.2023.07.116>
9. Min Q, YanJun L. The mediating role of psychoelasticity between the sense of shame and oral health-related quality of life in patients with dental defect implant repair. *Nurs Pract Res*. 2023;20(04):503–7. <https://doi.org/10.3969/j.issn.1672-9676.2023.04.00>.
10. Connor KM, Davidson JRT. Development of a new resilience scale: the Connor-Davidson Resilience Scale (CD-RISC). *Depress Anxiety*. 2003;18(2):76–82. <https://doi.org/10.1002/da.10113>.
11. Xiao S. The theoretical basis and research application of Social Support rating scale. *J Clin Psychiatry*. 1994;4:98–100. Google Scholar.
12. Sheng Y, Liqun C. Development and validation of oral health knowledge belief and behavior questionnaire for community elderly. *J Nurs Sci*. 2018;33(07):84–7. <https://doi.org/10.3870/j.issn.1001-4152.2018.07.084>.
13. Peng K, Zhou Y, Dai Y, Wang Q, Hu Y, Dai Q. The effect of denture restoration and dental implant restoration in the treatment of dentition defect: a systematic review and meta-analysis. *Ann Palliat Med*. 2021;10(3):3267–76. <https://doi.org/10.21037/apm-21-421>.
14. Yuan G. A study on the correlation of postoperative quality of life with social support and psychological resilience in elderly oral cancer patients. *Chin Gen Pract Nurs*. 2021;19(17):2424–6.
15. Yao K, Yao Y, Shen X, Lu C, Guo Q. Assessment of the oral health behavior, knowledge and status among dental and medical undergraduate students: a cross-sectional study. *BMC Oral Health*. 2019;19(1):26. <https://doi.org/10.1186/s12903-019-0716-6>. Published 2019 Jan 29.
16. Naidu RS, Nunn JH. Oral health knowledge, attitudes and Behaviour of parents and caregivers of Preschool children: implications for oral Health Promotion. *Oral Health Prev Dent*. 2020;18(2):245–52. <https://doi.org/10.3290/j.ohpda.43357>.
17. Guiying M, Xiaohong Z, Lan X. Analysis of factors influencing the anxiety status of patients with implant restorations for tooth defects. *Genomics Appl Biology*. 2020;39(01):466–4709. <https://doi.org/10.13417/j.gab.039.000466>.
18. Mohlin A, Bendahl PO, Hegardt C, et al. Psychological resilience and Health-Related Quality of Life in 418 Swedish women with primary breast Cancer: results from a prospective longitudinal study. *Cancers Basel*. 2021;13(9):2233. <https://doi.org/10.3390/cancers13092233>.
19. Watt RG, Daly B, Allison P, et al. Ending the neglect of global oral health: time for radical action. *Lancet*. 2019;394(10194):261–72. [https://doi.org/10.1016/S0140-6736\(19\)31133-X](https://doi.org/10.1016/S0140-6736(19)31133-X).
20. Nitschke I, Krüger K, Jockusch J. Age-related knowledge deficit and attitudes towards oral implants: Survey-based examination of the correlation between patient age and implant therapy awareness. *BMC Oral Health*. 2024;24(1):403. <https://doi.org/10.1186/s12903-024-04134-8>.
21. Tiantian G, Ximeng G, Wei F. Analysis of oral health-related quality of life status and influencing factors of elderly people in elderly care institutions. *Chin Nurs Manage*. 2020;20(2):210–4.
22. Jianing D, Lingshan C, Qianming Z, Etal. Current status and influencing factors of psychological resilience in elderly hypertensive patients. *Nurs Pract Res*. 2022;19(19):2843–8.
23. Yuechen L, Han S, Yuxiao L. Etal. The mediating role of psychological resilience between self-efficacy and adherence to functional exercise in discharged stroke patients. *Military Nurs*. 2023;40(10):66–70.
24. Manfredini M, Pellegrini M, Rigoni M, et al. Oral health-related quality of life in implant-supported rehabilitations: a prospective single-center observational cohort study. *BMC Oral Health*. 2024;24(1):531. <https://doi.org/10.1186/s12903-024-04265-y>.

## Publisher's note

Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.