



The association between cataract surgery and mental health in older adults: a review

Shan Wang, MD^a, Zijing Du, MD^a, Chunran Lai, MD^a, Ishith Seth, MD^d, Yaxin Wang, MD^a, Yu Huang, PhD^{a,b}, Ying Fang, NP^a, Huiyi Liao, NP^a, Yijun Hu, PhD^{a,*}, Honghua Yu, PhD^{a,c,*}, Xiayin Zhang, PhD^{a,b,*}

Background: Although cataract surgery has been proposed as a potentially modifiable protective factor for enhancing emotional well-being in cataract patients, studies examining the relationship between anxiety or depression and cataract surgery have yielded inconsistent findings. This review summarizes existing evidence to establish whether cataract surgery is associated with depression and anxiety in older adults.

Methods: A literature search was conducted across PubMed, Medline, Web of Science, and Embase databases. An initial screening by abstracts and titles was performed, followed by a review and assessment of the methodological quality of the relevant full papers, and final inclusion of 44 studies were deemed eligible for inclusion in this review.

Results: Among 44 included studies, 36 studies (81.8%) were observational studies concerning the association of cataract surgery or cataracts with anxiety or depression, four studies (9.1%) were interventional studies, and four studies (9.1%) were reviews. Cataract surgery notably enhances the mental health of individuals with impaired vision. However, the multifaceted nature of psychological well-being, influenced by various factors, suggests that cataract surgery may not address all aspects comprehensively. Additionally, preoperative anxiety and depression significantly impact cataract surgery outcomes.

Conclusion: Vision impairment in older adults is closely associated with increased symptoms of depression and anxiety. While surgical intervention for cataracts improves these symptoms, it might be less effective for mental disorders with multifactorial causes. Notably, anxiety or depression poses challenges to successful preoperative and intraoperative cataract surgeries.

Keywords: anxiety, cataract surgery, depression, older adults

Introduction

Cataracts, a most prevalent ocular condition among older adults^[1], are associated not only with deteriorating visual acuity but also with broader psychosocial ramifications. Beyond impairing vision, cataracts have been linked to decreased physical

^aDepartment of Ophthalmology, Guangdong Eye Institute, Guangdong Provincial People's Hospital (Guangdong Academy of Medical Sciences), Southern Medical University, ^bGuangdong Provincial Key Laboratory of Artificial Intelligence in Image Analysis and Application, Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, ^cGuangdong Cardiovascular Institute, Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, Guangzhou, People's Republic of China and ^dCentre for Eye Research Australia, Royal Victorian Eye and Ear Hospital, East Melbourne, VIC, Australia

Shan Wang and Zijing Du contributed equally to this manuscript.

Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

*Corresponding authors. Address: Guangdong Provincial People's Hospital, Guangdong Academy of Medical Sciences, No. 106, Zhongshan Second Road, Yuexiu District, Guangzhou, People's Republic of China. Tel.: +2083827812 E-mail: zhangxiayin@gdph.org.cn (X. Zhang), and E-mail: yuhonghua@gdph.org.cn (H. Yu) and Tel.: +20 83827812. E-mail: huyijun2014@163.com (Y. Hu)

Copyright © 2024 The Author(s). Published by Wolters Kluwer Health, Inc. This is an open access article distributed under the terms of the Creative Commons Attribution-Non Commercial-No Derivatives License 4.0 (CCBY-NC-ND), where it is permissible to download and share the work provided it is properly cited. The work cannot be changed in any way or used commercially without permission from the journal.

International Journal of Surgery (2024) 110:2300–2312

Received 10 October 2023; Accepted 8 January 2024

Published online 17 January 2024

<http://dx.doi.org/10.1097/JS9.0000000000001105>

HIGHLIGHTS

- Cataract surgery has a strong potential to enhance mental well-being, especially concerning issues related to visual impairment.
- The effectiveness of cataract surgery in addressing mental disorders with multifaceted causative factors may vary.
- Anxiety and depression symptoms adversely impact cataract surgery.

activity, reduced social engagement, and an increased risk of mental health challenges, including depression and anxiety^[2–4]. As a result, understanding the intricate relationship between cataracts and mental health becomes imperative for comprehensive patient care strategies tailored to older individuals.

The widespread utilization of cataract surgeries, considered a highly effective intervention, underscores the significance of investigating their impact on mental health^[5]. While these surgeries demonstrably improve visual function and quality of life for many^[6–8], a consensus regarding their definitive positive effect on mental health remains elusive in the scientific literature. Furthermore, limitations in existing studies, such as small sample sizes and short-term assessments, have contributed to the ongoing debate regarding the influence of cataract surgeries on psychological well-being.

In addition, the relationship between cataract surgery and psychological disorders may be bidirectional. Beyond the impact of cataract surgery on mental health, emerging evidence suggests a reciprocal relationship where preoperative mental health can significantly affect surgical outcomes. Research has shown that

individuals with higher levels of preoperative emotional tension are more likely to experience increased pain during and after the surgery^[9]. Preoperative mental health concerns may potentially pose risks to cataract surgery, such as the possibility of elevating intraocular or blood pressure during the procedure and increasing the likelihood of intraoperative bleeding^[9]. Despite these findings, preoperative mental health issues lack adequate attention, standardized diagnostic methods, and awareness among surgeons regarding preventive or corrective measures.

Therefore, this systematic review analyzed published literature to establish the relationship between cataract surgery and the mental health of older adults, providing valuable insights that can inform clinical practices, guide interventions, and prompt further research in this critical area of ocular health and psychosocial well-being.

Methods

We conducted a comprehensive search for relevant papers on cataract surgery and mental health from 1989 to 20 December 2022, using databases including PubMed, Medline, Web of Science, and Embase, with language restriction to English. The following keywords were used in various combinations: cataract, cataract surgery, anxiety, anxiety symptoms, depression, depressive symptoms, psychology, mood, mental health, and mental state.

Prospective or retrospective studies, randomized controlled trials, case-control studies, cross-sectional studies, and systematic reviews that provided data on the inter-relationship between cataract surgery and mental health were included. Conference abstracts, comments, and letters to the editor were excluded.

The initial removal of duplicate articles was followed by a meticulous review of the remaining studies based on their titles and abstracts. Subsequently, the selected literature was thoroughly examined in adherence to the aforementioned inclusion and exclusion criteria, which is in accordance with the PRISMA 2020 statement^[10] and AMSTAR 2^[11] (rated high quality). This review aims to delineate the nuanced interaction between cataract surgery and mental health, delving into the underlying mechanisms. The registration unique identifying number is reviewregistry1764.

Results

Epidemiology and risk factors of mental disorder in cataract patients

Several studies have assessed anxiety or depression in cataract patients^[2,4,12–23] (Table 1). These studies consistently indicate that cataract patients experience more severe anxiety and depression compared to healthy individuals. Studies conducted in China revealed anxiety and depression rates of 18% among cataract patients, contrasting with 7.0 and 5.2% in healthy individuals^[14]. In Russia, anxiety rates of 20% and depression rates ranging from 26 to 33.7% were reported among cataract patients^[24–26].

Various factors contribute to anxiety and depression among cataract patients. Concerns about potential blindness, financial strain, declining quality of life due to restricted physical activity, communication barriers, and limited education leading to difficulty understanding medical terms are significant contributors^[14]. Upon cataract diagnosis, inadequate information and communication can fuel uncertainty, encompassing ambiguity, unfamiliarity,

unpredictability, and suspicion^[27]. Illness uncertainty, common in chronic conditions, correlates with patients' mental state due to factors like incomplete information, prolonged disease duration, complex treatments, and compromised physical function^[14,28,29].

Moreover, it was indicated that ~83% of individuals face challenges in daily activities (e.g. walking, reading, watching TV, or performing needlework) due to worsening vision from cataract development. For 26% of these individuals, cataract progression and subsequent limitations in daily activities triggered anxiety^[30]. Studies also establish an association between depression and cataracts, attributed to reduced daily activities leading to loss of self-esteem, difficulties in social interactions, and compromised autonomy^[31,32]. Sex and age further influence anxiety and depression risk. Females and younger age are independent risk factors for anxiety^[33], while older age is associated with depression^[34]. This association could relate to younger patients being more concerned about their long-term vision preservation, unlike older patients who may have heightened concerns about vision loss given their life stage.

The precise mechanism underlying the link between cataracts and depression remains elusive. However, a 16-year longitudinal study revealed that individuals with cataracts faced a higher likelihood of experiencing depression (HR = 1.78, 95% CI = 1.70–1.87, $P < 0.001$), this increased risk might be attributed to challenges in daily activities, particularly instrumental and leisure activities, due to visual impairment^[35]. Depressive symptoms were found to be significantly associated with a higher degree of visual disability, more comorbidity, and lower levels of quality of life^[26,36,37]. Longitudinally, vision impairment was associated with a 1.33 times higher risk of future depression in a national cohort study compared to individuals without visual impairment^[38]. Furthermore, a study involving 662 participants established a direct correlation between reduced edge contrast sensitivity, poorer low-contrast visual acuity, and higher depression and anxiety scores. Impairments in these domains significantly hampered daily functional activities^[18,39]. Decreased visual motion sensitivity may also increase anxiety concerning falls and mobility^[18]. It was highlighted in prospective cohort study that improvements in depressive symptoms were associated with contrast sensitivity or stereopsis following the initial cataract surgery^[40]. Collectively, existing literature largely confirms the association between cataracts and an elevated risk of anxiety and depression. Despite the intricacies in the cause-and-effect relationship, these findings underscore the significant impact of visual impairment on mental health.

Impact of cataract surgery on mental health

Numerous epidemiological evidence reports a robust association of cataract surgery with mental health in Table 2. Anxiety and fear are the most common negative emotions in cataract patients before and during cataract surgery. Prior studies revealed that 32% of patients experienced emotional stress preceding their initial eye cataract surgery^[41]. Throughout the preoperative phase, patient anxiety tends to escalate gradually, peaking on the day of the surgery^[42]. Factors such as withdrawal and visual perception during cataract surgery contribute to heightened preoperative anxiety^[9]. Differences in surgical techniques among different surgeons may contribute to great variation in outcomes^[43]. Crucially, a surgeon's recommendation, especially from peers, and their expertise notably reduce preoperative

Table 1**Characteristics of the included studies about cataract and mental health.**

Study	Author (Year)	Region	Study design	Number of patients	Age	Anxiety and depression measurement	Key findings
^[18] Comorbidity of depression and anxiety in common age-related eye diseases: a population-based study of 662 adults	Eramudugolla <i>et al.</i> ^[18] (2013)	Australia	Cross-sectional	662 individuals	> 70 years	Goldberg Anxiety and Depression Scales (GADS)	Depressive symptoms were associated with cataract, AMD, comorbid eye diseases and reduced low-contrast visual acuity. Anxiety was significantly associated with self-reported cataract, reduced low-contrast visual acuity, motion sensitivity and contrast sensitivity
^[36] Depression and disability associated with impaired vision: the MoVies Project	Rovner and Ganguly ^[36] (1998)	USA	Cross-sectional	872 individuals	≥ 68 years (76.3 ± 5.1 year)	Modified Center for Epidemiologic Studies-Depression scale (mCES-D)	Impaired vision and depression were both associated strongly with functional impairment in older adults. Depression increased the odds of functional impairment independent of vision impairment.
^[19] Depression in ophthalmological patients	Pop-Jordanova <i>et al.</i> ^[19] (2014)	Macedonia	Cross-sectional	100 patients	41.6 ± 15.9 years	Beck Depression Inventory (BDI)	Most depressed patients got age-related macular degeneration, proliferative diabetic retinopathy, glaucoma and cataract. The level of depression was related to the severity of eyes diagnoses. A positive correlation between depression and age and educational level was confirmed
^[26] Depressive symptoms in older adults awaiting cataract surgery	Palagyi <i>et al.</i> ^[26] (2016)	Australia	Cross-sectional	329 cataract patients	≥ 65 years (75.7 ± 5.3 years)	5-item Geriatric Depression Scale (GDS-5)	Visual impairment in older adults was associated with susceptibility to depression.
^[38] Longitudinal Associations of Self-reported Vision Impairment With Symptoms of Anxiety and Depression Among Older Adults in the United States	Frank <i>et al.</i> ^[38] (2019)	USA	Cohort	7584 participants	≥ 65 years	Patient Health Questionnaire for Depression and Anxiety (PHQ-4)	There was a significant bidirectional and longitudinal association between self-reported vision impairment (VI) and mental health symptoms
^[20] Prevalence and correlates of depressive symptoms among Chinese patients with cataracts treated in tertiary general hospitals	Liu <i>et al.</i> ^[20] (2020)	China	Cross-sectional	Three thirty-nine cataract patients	≥ 18 years	Chinese Hospital Anxiety and Depression Scale	Depressive symptoms were common among Chinese patients with cataract. Among patients with cataract, depressive symptoms were associated with education, marital status, economic status, and subtype of cataract
^[12] The associations and mediators between visual disabilities and anxiety disorders in middle-aged and older adults: A population-based study	Zhang <i>et al.</i> ^[12] (2023)	China	Cohort	117 252 participants	38–73 years	International Classification of Diseases (ICD-10), Composite International Diagnostic Interview (CID) short-form questionnaire, seven-item Generalized Anxiety Disorder Questionnaire (GAD- 7)	An overall association between visual disabilities and anxiety in middle-aged and older adults. The association between poorer visual acuity and anxiety disorders was partially mediated by subsequent onsets of eye diseases, especially cataracts, and socioeconomic status

<p>^[21]The prevalence of anxiety symptoms and disorders among patients with ophthalmic disease were relatively higher than that reported in the general population</p>	<p>Ulhaq <i>et al.</i>^[21] (2022)</p>	<p>Indonesia</p>	<p>Systematic Review</p>	<p>23 415 subjects</p>	<p>/</p>	<p>The prevalence of anxiety symptoms and disorders among patients with ophthalmic disease were relatively higher than that reported in the general population</p>
<p>^[22]The Prevalence of Depression and Depressive Symptoms among Eye Disease Patients: A Systematic Review and Meta-analysis</p>	<p>Zheng <i>et al.</i>^[22] (2017)</p>	<p>China</p>	<p>Systematic Review</p>	<p>Six thousand five hundred eighty-nine individuals</p>	<p>/</p>	<p>The overall prevalence of depression among eye disease patients was 25%, varying with disease categories.</p>
<p>^[23]Visual Impairment, Eye Disease, and the 3-year Incidence of Depressive Symptoms: The Canadian Longitudinal Study on Aging</p>	<p>Grant <i>et al.</i>^[23] (2021)</p>	<p>Canada</p>	<p>Prospective cohort</p>	<p>22 558 individuals</p>	<p>45–85 years (59.2 ± 9.6 years)</p>	<p>The prevalence of depression among eye disease patients was higher than that in healthy people The risk of depressive symptoms was higher in those who report ever having a cataract</p>

anxiety levels^[44]. The surgical process itself serves as a potent stressor, triggering various physiological reactions like sweating, hypertension, tachycardia, hyperventilation, and muscle tension^[4,9]. The conclusion that surgery was significantly associated with anxiety or depression was underscored in a prospective cohort study^[45]. However, postsurgery, a notable reduction in anxiety levels was observed^[42].

Depressive symptoms disproportionately affect the elderly population. Studies demonstrate an increased incidence of depressive symptoms among patients undergoing surgery^[4]. Moreover, individuals awaiting cataract surgery with impaired vision exhibit a higher likelihood of experiencing depressive symptoms^[46]. The waiting time for cataract surgery is not consistent in different countries or regions, and the longer the waiting time, the greater the negative impact on the emotional state of the patient, including anxiety^[19]. Actually, the potential surgical failure and the risk of vision loss may contribute to depressive symptoms in older adults^[4].

Cataract surgery, its impact on alleviating anxiety and depression associated with visual impairments is still a subject of debate. While several studies have demonstrated the favorable effects of cataract surgery on anxiety or depression^[4,6,8,13,14,16,25,35,46–62], others have found no significant effect^[7,37,40,63–65]. Kotaro *et al.*^[8] found that many conditions assessed with the mini-mental state examination and the beck depression inventory improved after cataract surgery. These improvements included color vision difficulties, general vision, myopic activity difficulties, hyperopic activity difficulties, peripheral vision difficulties, role limitations, social functioning limitations due to vision, and mental health problems^[8]. In addition, Mitsonis *et al.* reported elevated anxiety and depression scores in patients whose visual acuity did not improve postsurgery, indicating a potential correlation between lack of visual improvement and heightened postoperative anxiety and depression^[4,62].

The mechanism of cataract surgery to improve patients' anxiety or depression mainly includes several aspects (Fig. 1). On the one hand, after successful cataract surgery and vision recovery, vision-related quality of life improves significantly in a broad range of social and visual functions, which leads to an improvement in the psychological state of anxiety and depression in patients. On the other hand, timely cataract surgery plays a crucial role; studies have shown that patients awaiting surgery with severe visual impairment face a higher risk of depression, and a more pronounced improvement in depressive symptoms is observed postsurgery among these individuals^[25,26,55]. Moreover, randomized controlled trials have shown that those who undergo cataract surgery as early as possible have reduced anxiety, increased confidence, and higher activity levels^[65,66]. Beyond visual improvements, cataract surgery appears to impact broader aspects. A functional MRI study has shown that cataract surgery can reverse cataract-induced brain structural and functional changes by improving the fractional amplitude of low-frequency fluctuations and gray matter volume in cognitive-related and visual areas^[67]. Notably, evidence suggests that cataract surgery may not only enhance cognitive performance but also alleviate neuropsychiatric symptoms like visual hallucinations^[7].

Impact of mental health on cataract surgery

The impact of preoperative anxiety on the cataract surgery experience is notable, particularly concerning pain management.

Table 2**Characteristics of the included studies about cataract surgery and mental health.**

Study	Author (Years)	Region	Study design	Number of patients	Age	Anxiety and Depression measurement	Key findings
^[4] Anxiety and depression in cataract surgery: a pilot study in the elderly	Mitsonis <i>et al.</i> ^[4] (2006)	Greece	Case-control	251 cataract patients 115 controls	> 65 years	Hamilton Rating Scales for Anxiety and Depression (HAM-Anxiety, HAM-Depression)	Anxiety and depression scores were higher in cataract patients than in healthy individuals; higher for women than for men. Patients with improved visual acuity after surgery had lower mean levels of anxiety and depression than those with neither improvement before surgery
^[80] Anxiety in patients undergoing cataract surgery: a preoperative and postoperative comparison	Ramirez <i>et al.</i> ^[80] (2017)	USA	Prospective cohort	Sixty one cataract patients	> 18 years (63.9 ± 13.0 years)	Likert scale	The patient's preoperative anxiety included the surgery itself and becoming blind, and postoperative anxiety is the surgery itself. The anxiety of patients decreased after operation. Preoperative discussion may improve anxiety and satisfaction
^[47] Beyond monetary benefits of restoring sight in Vietnam: Evaluating well-being gains from cataract surgery	Feeny <i>et al.</i> ^[47] (2018)	Vietnam	Cohort	Eighty-two cataract patients and 83 caregivers	About 50 years	Rand Corporation's Rand 36-item Health Survey, 3-point Likert scale	Cataract surgery considerably improved the well-being of patients and their caregivers
^[49] Blue light-filtering intraocular lenses and postoperative mood: a pilot clinical study	Leruez <i>et al.</i> ^[49] (2014)	France	Prospective cohort	Thirty-four cataract patients	76.5 ± 7.2 years	30-item geriatric depression scale (GDS)	The GDS score was improved 3 months after the implantation of IOLs, and that the studied blue-filtering IOLs did not affect the postoperative mood differently than untinted IOLs
^[16] Cataract and Depressive Symptoms among Older Chinese Adults	Wang <i>et al.</i> ^[16] (2016)	China	Cross-sectional	4611 elderly adults	≥ 60 years	9-item Patient Health Questionnaire (PHQ-9) depression scale	There was a significant association between age-related cataract and depressive symptoms among older Chinese adults, particularly in poorly educated ones. Cataract surgery may play a role in improving mental health in the elderly
^[35] Cataract and the increased risk of depression in general population: a 16-year nationwide population-based longitudinal study	Chen <i>et al.</i> ^[35] (2020)	China	Cohort	280 970 participants (116 629 cataract patients, 116 629 noncataract cohorts)	62.6 years (20–101 years)	ICD-9-CM codes from 2000 to 2015 (ICD-9-CM codes 296.2, 296.3, 300.4 and 311) and ICD-10-CM codes in 2016 (ICD-10-CM F32, F33, and F34.1)	The risk of depression in cataract patients was higher than that in noncataract patients. Patients with cataract who did not undergo surgery had a higher risk of depression than those who underwent surgery
^[50] Cataract surgery and changes in quality of life measures	Pesudovs <i>et al.</i> ^[50] (2003)	Australia	Cohort	Thirteen cataract patients	74.92 ± 9.5 years	Cantril Ladder and the Profile of Mood States (POMS)	Quality of life including anxiety and depression can be measurably improved by cataract surgery
^[25] Cataract-related vision loss and depression in a cohort of patients awaiting cataract surgery	Freeman <i>et al.</i> ^[25] (2009)	Canada	Cohort	Six hundred seventy-two cataract patients	> 45 years	30-item Geriatric Depression Scale	Patients with worse visual acuity were more likely to be depressed while waiting for cataract surgery. Shortening the wait time for cataract surgery, especially for those with worse vision, could

^[51] Change in vision, visual disability, and health after cataract surgery	Helbostad <i>et al.</i> ^[51] (2013)	Norway	Prospective cohort	One hundred forty-eight cataract patients	> 70 years (78.9 ± 5.0 years)	Short-Formular 36 mental health index (SF-36 Mental Health)	potentially reduce the risk or shorten the duration of depression Vision improved and visual disability decreased in the year after surgery, whereas changes in general health (physical and mental health) and visual functioning were short-term effects
^[52] Changes in patient subjective happiness and satisfaction with cataract surgery	Yotsukura <i>et al.</i> ^[52] (2020)	Japan	Cohort	Two hundred forty-seven cataract patients	32–92 y (67.9 ± 11.4 y)	Subjective Happiness Scale (SHS)	Cataract surgery may improve visual function and happiness
^[53] Correlation between depression and vision in aged patients before and after cataract operations	Fagerström ^[53] (1994)	Finland	Cohort	Hundred cataract patients	71–76 years	Beck Depression Inventory consisting of 13 items	Depression was significantly correlated with vision after the cataract operation. Depression increased with lowered visual acuity and diminished with improved visual acuity
^[42] Determinants of surgery-related anxiety in cataract patients	Nijkamp <i>et al.</i> ^[42] (2004)	Netherlands	Cross-sectional	One hundred twenty-eight cataract patients	50–89 years (73.2 ± 8.6 years)	State-Trait Anxiety Inventory (STAI)	Women and patients with higher trait anxiety were more likely to experience higher levels of state anxiety. Positive outcome expectancies and social support may decrease anxiety. The level of anxiety was the highest before surgery, decreased immediately after surgery, and increased again after the postoperative visit
^[7] Effect of cataract surgery on cognition, mood, and visual hallucinations in older adults	Jefferis <i>et al.</i> ^[7] (2015)	England	Prospective cohort	One hundred twelve cataract patients	≥ 75 years (80.7 ± 3.9 years)	15-item Geriatric Depression Scale (GDS15)	Cataract surgery did not improve mood, but improved visual acuity, visual quality of life, cognitive performance and neuropsychiatric symptoms
^[54] Effect of the time interval between cataract surgery for both eyes on mental health outcome: a cohort study of 585,422 patients	Hou <i>et al.</i> ^[54] (2021)	China	Retrospective cohort	585 422 cataract patients	69.3 ± 9.5 years	International Classification of Diseases, 9th Revision, Clinical Modification (ICD-9-CM) and ICD-10 codes as follows: ICD-9-CM: 296.2*, 296.3*, 311.*, 300.0*, 307.4*, and 780.5*; and ICD-10: F32.*, F33.*, F41.*, F51.*, and G47.*	It is expected that within 1 y, performing two operations within a short-time interval may be beneficial to maximize the effect of cataract surgery and thus reduce the number of mental health consultations
^[44] Emotional aspects of cataract surgery	O'Malley <i>et al.</i> ^[44] (1989)	UK	Retrospective cohort	Fourteen cataract patients	85 years	/	Little effect of surgery was found on mood changes, general cognition on health, or activity. Confidence in the surgeon and reassurance from friends who had undergone surgery were found to be the most anxiety relieving
^[65] Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial	A. J. E. Foss <i>et al.</i> ^[65] (2006)	UK	Randomised controlled trial	Two thirty-nine female cataract patients	> 70 years	Hospital Anxiety and Depression Scale	Second eye cataract surgery improved visual disability and general health status, including handicap and confidence about falling, but excluding anxiety and depression
^[9] Fear and Anxiety Associated with Cataract Surgery Under Local Anesthesia in Adults: A Systematic Review	Obuchowska <i>et al.</i> (2021)	Poland	Systematic Review	/	/	/	Cataract surgery under local anaesthesia was often accompanied by fear and anxiety. These emotions result from fear of surgery, such as pain and loss of vision
	Zhang <i>et al.</i> ^[14] (2018)	China	Cross-sectional	Two sixty-three primary glaucoma patients; 100	57.20 ± 13.94 years (glaucoma group)	Hospital Anxiety and Depression Scale (HADS)	Patients with glaucoma or cataract had a high risk of illness uncertainty, anxiety and

Table 2

(Continued)

Study	Author (Years)	Region	Study design	Number of patients	Age	Anxiety and Depression measurement	Key findings
[14] Illness uncertainty, anxiety and depression in Chinese patients with glaucoma or cataract				age-related cataract patients	70.23 ± 9.78 years (cataract group)		depression. The scores of HADS of cataract patients decreased after surgery
[55] Impact of cataract surgery on depression and cognitive function: Systematic review and meta-analysis	Pellegrini <i>et al.</i> ^[55] (2020)	Italy	Systematic Review	/	/	Geriatric Depression Scale (GDS), Center for Epidemiological Studies-Depression Scale (CES-D), Self-Reporting Questionnaire-20 (SRQ-20), Beck Depression Inventory (BDI), Hamilton Rating Scale for Depression (HAM-D), Self-rating Depression Scale (SDS), Depression Anxiety Stress Scale (DASS)	Cataract surgery had a positive effect on depression and cognitive function in the elderly
[64] Impact of cataract surgery on health-related quality of life in nursing home residents	Owsley <i>et al.</i> ^[67] (2007)	USA	Prospective cohort	Forty-five cataract patients	≥ 60 years	15-item Geriatric Depression Scale (GDS),	Nursing home residents who underwent cataract surgery experienced short-term significant improvements in their vision, vision-targeted health-related quality of life, except for depression
[56] Impact of cataract surgery on vision-related life performances: the usefulness of Real-Life Vision Test for cataract surgery outcomes evaluation	Ni <i>et al.</i> ^[56] (2015)	China	Case-control	Fifty-six cataract patients, 44 age-matched controls	60–82 years	Self-rating depression scale scores	Cataract surgery was associated with improved visual function, self-report surveys, and real-life visual ability. Cataract patients experienced decreased depressive symptoms and significant improvements in the vision-targeted quality of life after surgery
[57] Impact of First Eye versus Second Eye Cataract Surgery on Visual Function and Quality of Life	Shekhawat <i>et al.</i> ^[57] (2017)	USA	Cohort	Three twenty-eight cataract patients	70.4 ± 9.6 years	25-item National Eye Institute Visual Functioning Questionnaire (NEI-VFQ)	Second eye cataract surgery significantly improved visual function and quality of life well beyond levels achieved after first eye cataract surgery alone. Cataract surgery improved certain socioemotional aspects of quality of life
[58] Improvement in Cognitive Status and Depressive Symptoms Three Months after Cataract Surgery	Kheirkhah <i>et al.</i> ^[58] (2018)	Iran	Cohort	Two hundred fifty cataract patients	71.77 ± 8.08 years	Geriatric Depression Scale (GDS)	Cataract surgery was effective for relieving depressive symptoms in the elderly
[68] Preoperative Anxiety Levels and Pain during Cataract Surgery	Socea <i>et al.</i> ^[68] (2020)	Israel	Prospective cohort	One hundred three cataract patients	68.9 ± 8.9 years	Visual Analog Scale for Anxiety (VASA)	A significant association was found between preoperative anxiety and level of pain experienced during routine cataract surgery
[66] Randomised trial of effectiveness of second eye cataract surgery	Laidlaw <i>et al.</i> ^[66] (1998)	UK	Randomised controlled trial	Two hundred eight cataract patients	41–97 years	Short-Form (SF)-36	There was a clear benefit from second eye cataract surgery, including mental health
[37] Sleep and mood changes in advanced age after blue-blocking (yellow) intraocular lens (IOLs) implantation during cataract surgical treatment: a randomized controlled trial	Zambrowski <i>et al.</i> ^[37] (2018)	French	Randomized superiority trial	Two hundred four cataract patients	60–90 years	Beck Depression Inventory (BDI)	Using yellow IOLs for cataract surgery did not significantly impact sleep but may induce mood changes in aging
		Greece	Prospective cohort	One hundred fifty cataract patients	Male: 73.83 ± 8.55 years	Beck's Depression Inventory-II (BDI-II)	The success of phacoemulsification surgery for cataract as evaluated with the change in

[46] Successful Cataract Surgery Leads to an Improvement in Depressive Symptomatology	Mylona <i>et al.</i> ^[46] (2021)				Female: 73.45 ± 7.055 years		BCVA was related to the rate of improvement in depressive symptomatology
[8] The impact of cataract surgery on cognitive impairment and depressive mental status in elderly patients	Ishii <i>et al.</i> ^[8] (2008)	Japan	Prospective cohort	One hundred two cataract patients	55–93 years (75.3 ± 8.2 years)	Beck Depression Inventory (BDI)	Cataract surgery significantly improved vision-related quality of life in elderly patients, and cognitive impairment and depressive mental status also improved in parallel with improvement in vision-related quality of life
[63] The impact of cataract surgery on depression among older adults	McGwin <i>et al.</i> ^[63] (2003)	USA	Cohort	Three hundred forty-two participants: the cataract surgery group (146), the cataract no surgery group (104), and the no cataract group (92)	The cataract surgery group (70.82 ± 6.75 years) The cataract no surgery group (71.11 ± 5.53 years) The no cataract group (66.82 ± 5.76 years)	Epidemiological Studies-Depression Scale (CES-D)	Cataract surgery did not appear to have an effect on reducing depressive symptoms in elderly people
[48] The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam	To <i>et al.</i> ^[48] (2014)	Vietnam	Prospective cohort	Four hundred thirteen cataract patients	≥ 50 years (66.5 ± 7.8 years)	Center for Epidemiological Studies-Depression Scale (CES-D)	There was a small but significant improvement in depressive symptoms score after cataract surgery for an older population in Vietnam
[61] The Impact of Cataract Surgery on Vision-Related Quality of Life and Psychological Distress in Monocular Patients	Li <i>et al.</i> ^[61] (2021)	China	Prospective cohort	Eighty cataract patients	Monocular patients group: 63.73 ± 11.56 years Binocular patients group: 67.08 ± 8.45 years	Self-rating Anxiety Scale (SAS), Self-rating Depression Scale (SDS)	Monocular patients gained more improvements in visual acuity, quality of life, and psychological distress by cataract surgery than binocular patients do
[62] The impact of cataract surgery on visual functioning, vision-related disability and psychological distress: a randomized controlled trial	Walker <i>et al.</i> (2006)	Australia	Randomised controlled trial	Forty-five cataract patients	74.73 ± 7.20 years	Depression Anxiety Stress Scale (DASS)	First eye cataract surgery was effective in improving outcomes in visual functioning and disability. Improved mood after surgery was related to less vision-related disability compared with unchanged or worse depression
[13] The impact of first eye cataract surgery on mental health contacts for depression and/or anxiety: a population-based study using linked data	Meuleners <i>et al.</i> ^[13] (2013)	Australia	Retrospective cohort	21 110 cataract patients	75.20 ± 7.83 years	International Classification for Diseases (ICD) 10-AM codes: F32, F32.0, F32.1, F32.2, F32.3, F32.4, F32.5, F32.6, F32.7, F32.8, F32.9, F33, F33.0, F33.1, F33.2, F33.3, F33.4, F33.5, F33.6, F33.7, F33.8, F33.9, F38.1, F41.2, F41.3, F43, F43.2, F44.7.	A significant 18.80% decreased in the number of mental health contacts for anxiety and/or depression in the year after cataract surgery compared with the year before surgery
[40] Vision, quality of life and depressive symptoms after first eye cataract surgery	Fraser <i>et al.</i> ^[40] (2013)	Australia	Prospective cohort	Ninety-nine cataract patients	72.0 ± 7.9 years	Center for Epidemiological Studies-Depression Scale	Contrast sensitivity and stereopsis, but not visual acuity, were significant factors affecting improvement in vision-related quality of life or depressive symptoms after first eye cataract surgery. There was a small, non-clinically significant improvement in depressive symptoms after surgery

It was shown in a prospective observational study that preoperative anxiety was significantly associated with the level of pain experienced by patients during cataract surgery, and the level of preoperative anxiety was identified as the only significant predictor of painful feeling during cataract surgery^[68]. Besides, heightened pain levels among patients have been linked to decreased co-operation during cataract surgery under topical anesthesia^[69]. Patients who are painful, uncooperative, and possibly agitated are more likely to result in a more difficult procedure, even in eyes without potential risk factors for complications^[68]. Moreover, anxiety-related physiological responses, including increased blood pressure and intraocular pressure, pose potential risks during surgery^[9].

The primary cause of anxiety during cataract surgery is the fear of the surgery as well. Patients often exhibit involuntary reactions like eye or head movements, coughing, or difficulty co-operating during cataract surgery when experiencing fear or anxiety^[70]. Following cataract surgery, patients commonly report reduced but persisting anxiety levels compared to presurgical stages. When postoperative vision remains unchanged, concerns about surgical failure and potential vision loss may heighten anxiety levels^[9]. However, when the patient's vision improved, the associated anxiety decreased significantly.

Preoperative depression is frequently observed among patients undergoing major surgeries^[71]. Depressive disorders can lead to a suppressed immune system, which may predispose patients to increased cancer mortality and postoperative infection rates, such as insertion of ventricular assist devices^[72], craniotomies^[73], and coronary artery bypass surgery^[74]. It has been demonstrated that depression before surgery is significantly related to postoperative pain measurement and analgesic needs^[71,75]. Patients with preoperative anxiety and depression tend to experience heightened postoperative pain intensity and consume more analgesics^[76]. Moreover, preoperative depressive symptoms often correlate with prolonged postoperative delirium and hindered recovery to independent function^[71,77]. Therefore, depression has been established as an independent risk factor for postoperative delirium. Perioperative depression is mainly related to the degree of diseases and the patient's psychological state and other factors, including tumor size, type, location, duration of diseases, and their own psychological quality, which may cause extremely adverse effects on the prognosis of surgery, leading to poor clinical treatment effect.

In summary, there is a high incidence of perioperative anxiety and depression, which significantly impacts the surgical outcome. Recognizing and effectively managing these psychological factors are imperative in optimizing clinical interventions and patient care.

Discussion

As medical advancements enhance and life expectancy rises, the incidence of cataracts has surged, leading to an increased need for cataract surgeries as an effective treatment option. Concurrently, there is a growing prevalence of anxiety and depression, particularly in the elderly, necessitating its recognition as a significant public health concern. Our comprehensive review reveals a notable correlation between cataract surgery and anxiety or depression, suggesting its potential in alleviating these mental health concerns. However, while some studies support this

correlation, others indicate conflicting outcomes, emphasizing the complexity of this relationship. It is crucial to recognize the broader impact of psychological disorders on surgical outcomes for a more nuanced understanding.

The potential impact of cataract surgery on mental health manifests across various dimensions. Initially, cataract surgery offers promise in bolstering mental well-being by enhancing the vision-related quality of life for older adults. Anxiety and depression, prevalent among the elderly, often go undetected or are mistakenly attributed to aging or other comorbidities, exacerbating disability and compromising their overall quality of life^[4]. Cataract-induced visual impairment significantly limits independence, self-esteem, and daily activities in older individuals, underscoring its role in potentially triggering anxiety or depression^[58]. Deficits in marginal contrast sensitivity and low-contrast vision due to cataracts may also severely impair daily functional activities, thus potentially increasing the risk of anxiety or depression^[18,39]. Also, decreased visual motion sensitivity may also increase the likelihood of falls and mobility, which may contribute to anxiety or depression^[18]. Although senile cataract is the most common type, there are also rare cataracts, such as congenital cataracts. A cross-sectional study involving 11 832 850 subjects reported that congenital cataract ($n=17\ 214$) had a 1.45-fold and 1.27-fold increased risk of anxiety and depressive disorders, respectively^[78]. Another national cohort study in Denmark reported that children with cataracts were 4.1 times more likely to develop anxiety disorders than healthy control^[79]. In addition, cataract surgery, by improving visual impairment, presents a positive ripple effect on mental health. Robust evidence from prospective studies consistently shows a notable reduction in anxiety and depression postcataract surgery, particularly among patients experiencing improved visual acuity^[4,8,58]. The restoration of vision through successful cataract surgery significantly enhances the quality of life in terms of various visual and social functions, thereby positively influencing patients' anxiety or depressive symptoms. However, attributing anxiety or depression solely to visual impairment in cataract patients is a complex assertion, requiring a more comprehensive evaluation.

The notion that cataract surgery may not comprehensively address mental health concerns can be nuanced by considering a broader spectrum of influencing factors beyond visual impairment alone. Anxiety or depression in the elderly is often multifaceted, and influenced by various underlying elements. It is crucial to acknowledge that these mental disorders are not solely attributed to impaired vision but are a culmination of multiple contributors. Physical illnesses prevalent in older adults, such as cardiovascular diseases, cerebrovascular disorders, and respiratory conditions like asthma, can significantly contribute to anxiety and depression^[53]. The intensity of mental disorders may be related to the extent to which various illnesses limit daily life and their lethality^[4]. Furthermore, genetic susceptibility plays a role, alongside life events like social isolation, bereavement, and feelings of loneliness, all of which are significant contributors to mental health challenges^[63].

An additional aspect warranting consideration revolves around the objectivity of psychiatric diagnosis and the variability in methodologies adopted across studies and regions. This variance in diagnostic criteria and the application of distinct rating scales for anxiety and depression assessment could contribute to disparate conclusions regarding the effect of cataract surgery on

these mental health conditions. At present, there are many anxiety and depression screening tools, each of which has diverse measurement scales, items, and degrees of attention to symptomatology. The use of different scales within and across studies introduces a potential source of inconsistency. Studies relying on distinct mental health scales may yield contradictory outcomes, emphasizing the pivotal role of the selected assessment tool in influencing study findings. In brief, the challenge lies in substantially alleviating late-life depression by addressing a single risk factor, such as recovering from visual impairment through cataract surgery. This multifactorial nature of mental health issues contributes to the varying conclusions evident in current studies.

Managing anxiety and depression is crucial for optimizing cataract surgery outcomes in elderly patients, irrespective of the surgery’s direct impact on these conditions. Discussions detailing visual sensations during consultations have been shown to mitigate surgery-related anxiety^[9,80], emphasizing the importance of surgeon-patient communication. Preoperative education serves as a pivotal tool in providing patients with comprehensive and accessible knowledge about cataracts and their treatment, dispelling doubts, and instilling confidence, all crucial factors in reducing surgery-related fear and anxiety^[81]. Collaborative efforts involving diverse healthcare professionals, including ophthalmologists, nurses, psychologists, social workers, educators, and occupational therapists, can significantly enhance preoperative communication strategies with patients^[30]. Notably, studies have indicated that a majority of surgical patients prefer oral consultations or multimedia aids, such as concise videos, over written information. These visual aids have proven effective in alleviating fear, with ~54% of subjects preferring verbal information, 47% opting for video content, while only 36%

avored printed materials^[82]. Additionally, noninvasive interventions like back massage therapy have demonstrated significant reductions in patient anxiety levels before surgery^[83,84]. Other methods, including music therapy, handholding, pharmacological, and psychological options, have shown promise in stress reduction and anxiety management during surgical procedures^[68,85–87]. More than that, early screening for anxiety and depression from the point of cataract diagnosis, coupled with accurate information provision about cataract surgery, remain critical interventions aimed at enhancing patients’ overall quality of life^[4].

Limitations

The limitation of this review is that most of the studies included did not explore other factors related to cataract surgery, such as surgical pressure, duration of surgery, and rehabilitation expectations to determine the true effect of cataract surgery. These factors may affect the answers to the questionnaire. Besides, inconsistencies in the questionnaires utilized across studies contributed to varied study focuses and outcomes. In addition, the assessment time of the questionnaires of the included studies was inconsistent, such as a fixed preoperative or postoperative half-hour assessment, which may lead to large differences in the assessment results. At present, there are few relevant randomized controlled trials, meta-analyses, and prospective studies, most of which are cross-sectional. Thus, the presence of publication bias within the reviewed research cannot be entirely dismissed, emphasizing the need for methodologically rigorous investigations in this domain.

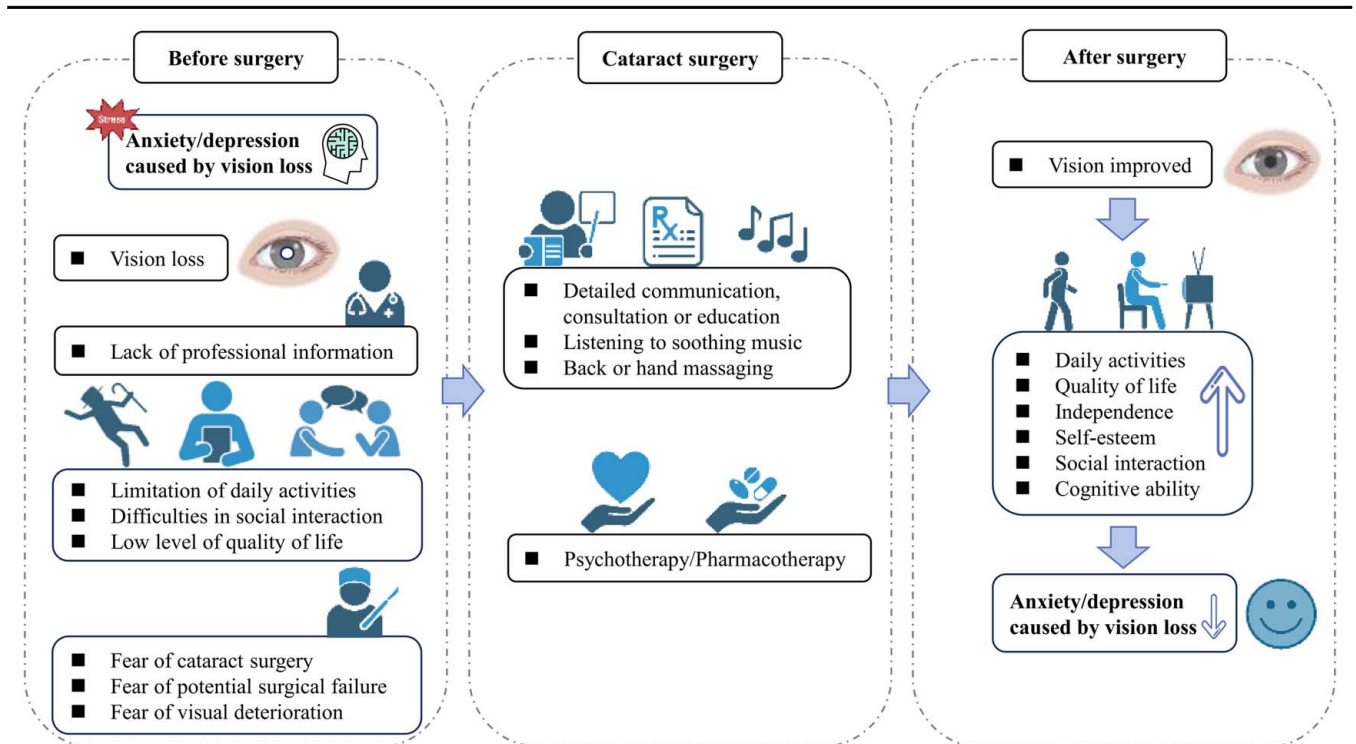


Figure 1. Schematic diagram of the mechanism of cataract surgery to improve anxiety or depression.

Conclusion

In conclusion, cataract surgery is highly likely to improve mental health, primarily in relation to visual impairment. However, the scope of improvement may not fully encompass the broader spectrum of psychological well-being, which is influenced by multifaceted factors beyond visual concerns. Importantly, anxiety and depression exert a significant adverse impact on the outcomes of cataract surgery. Recognizing these implications among elderly patients with visual impairment is crucial, necessitating tailored psychosocial and pharmacological interventions. To deepen our understanding of the intricate relationship between cataract surgery and mental health in the elderly, future research is essential, calling for more comprehensive studies in this area.

Ethics approval

Not applicable (review article).

Consent

Not applicable.

Sources of funding

This study was funded by the National Natural Science Foundation of China (82171075, 82301260), the China Postdoctoral Science Foundation (2021M700899), the Medical Scientific Research Foundation of Guangdong Province, China (A2021378), the Science and Technology Program of Guangzhou, China (20220610092, 202103000045), the Outstanding Young Talent Trainee Program of Guangdong Provincial People's Hospital (KJ012019087), the launch fund of Guangdong Provincial People's Hospital for NSFC (8217040546, 8220040257), the Project of Special Research on Cardiovascular Diseases (2020XXG007), the National Medical Simulation Education Research Project (2021MNYB01). The funders had no role in the study design, data collection, data analysis, data interpretation, or report writing.

Author contribution

W.S., D.Z.J., Y.H.H., and Z.X.Y.: study concept and design; W.S., D.Z.J., L.C.R., I.S., W.Y.X., H.Y., S.X.W., F.Y., Z.Z.T., and H.Y.J.: acquisition, analysis, or interpretation; W.S., D.Z.J., and Z.X.Y.: drafting of the manuscript; D.Z.J., Z.X.Y., I.S., H.Y.J., and Y.H.H.: critical revision of the manuscript for important intellectual content; W.S., D.Z.J., Z.X.Y., and S.X.W.: statistical analysis; Y.H.H. and Z.X.Y.: obtained funding; H.Y.J., Y.H.H., and Z.X.Y.: administrative, technical, or material support; Y.H.H. and Z.X.Y.: study supervision.

Conflicts of interest disclosure

The authors declare no conflict of interest.

Research registration unique identifying number (UIN)

1. Name of the registry: Research Registry.

2. Unique Identifying number or registration ID: review registry1764.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): <https://www.researchregistry.com/register-now/register-your-systematic-review#registryofsystematicreviewsmeta-analyses/registryofsystematicreviewsmeta-analysesdetails/658c3ecb37124d00262600c7f>.

Guarantor

Zhang XY, and Yu HH.

Data availability statement

Data from all studies included in this review are available in online databases.

Provenance and peer review

Not commissioned, externally peer-reviewed.

References

- [1] Andrade C. Antidepressants, mood stabilizers, antipsychotics, and the risk of cataract. *J Clin Psychiatry* 2019;80:19f12744.
- [2] Watkinson S, Seewoodhary R. Cataract management: effect on patients' quality of life. *Nurs Stand* 2015;29:42–8.
- [3] GBD 2019 Blindness and Vision Impairment Collaborators, Vision Loss Expert Group of the Global Burden of Disease Study. Causes of blindness and vision impairment in 2020 and trends over 30 years, and prevalence of avoidable blindness in relation to VISION 2020: the Right to Sight: an analysis for the Global Burden of Disease Study. *Lancet Glob Health* 2021;9:e144–60.
- [4] Mitsonis CI, Mitropoulos PA, Dimopoulos NP, *et al.* Anxiety and depression in cataract surgery: a pilot study in the elderly. *Psychol Rep* 2006;99:257–65.
- [5] Fukuoka H, Sutu C, Afshari NA. The impact of cataract surgery on cognitive function in an aging population. *Curr Opin Ophthalmol* 2016; 27:3–8.
- [6] Morris D, Fraser SG, Gray C. Cataract surgery and quality of life implications. *Clin Interv Aging* 2007;2:105–8.
- [7] Jefferis JM, Clarke MP, Taylor J-P. Effect of cataract surgery on cognition, mood, and visual hallucinations in older adults. *J Cataract Refract Surg* 2015;41:1241–7.
- [8] Ishii K, Kabata T, Oshika T. The impact of cataract surgery on cognitive impairment and depressive mental status in elderly patients. *Am J Ophthalmol* 2008;146:404–9.
- [9] Obuchowska I, Konopinska J. Fear and anxiety associated with cataract surgery under local anesthesia in adults: a systematic review. *Psychol Res Behav Manag* 2021;14:781–93.
- [10] Page MJ, McKenzie JE, Bossuyt PM, *et al.* The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. *Int J Surg* 2021;88: 105906.
- [11] Shea BJ, Reeves BC, Wells G, *et al.* AMSTAR 2: a critical appraisal tool for systematic reviews that include randomised or non-randomised studies of healthcare interventions, or both. *BMJ* 2017;358:j4008.
- [12] Zhang X, Wang S, Du Z, *et al.* The associations and mediators between visual disabilities and anxiety disorders in middle-aged and older adults: a population-based study. *Am Psychol* 2023;78:982–94.
- [13] Meuleners LB, Hendrie D, Fraser ML, *et al.* The impact of first eye cataract surgery on mental health contacts for depression and/or anxiety: a population-based study using linked data. *Acta Ophthalmol* 2013;91: e445–9.
- [14] Zhang D, Fan Z, Gao X, *et al.* Illness uncertainty, anxiety and depression in Chinese patients with glaucoma or cataract. *Sci Rep* 2018;8:11671.
- [15] Fazzi L, Dobrianskyj FM, Reggi JRA, *et al.* The influence of anxiety on quality of life among patients with an indication for cataract surgery. *Sao Paulo Med J* 2015;133:160–1.

- [16] Wang H, Sun H-P, Wang P, *et al.* Cataract and depressive symptoms among older Chinese adults. *Optom Vis Sci* 2016;93:1479–84.
- [17] McCusker S, Koola MM. Association of ophthalmologic disorders and depression in the elderly: a review of the literature. *Prim Care Companion CNS Disord* 2015;17:26671.
- [18] Eramudugolla R, Wood J, Anstey KJ. Co-morbidity of depression and anxiety in common age-related eye diseases: a population-based study of 662 adults. *Front Aging Neurosci* 2013;5:56.
- [19] Pop-Jordanova N, Ristova J, Loleska S. Depression in ophthalmological patients. *Pril (Makedon Akad Nauk Umet Odd Med Nauki)* 2014;35:53–8.
- [20] Liu Z-H, Chen C-Z, Gao C, *et al.* Prevalence and correlates of depressive symptoms among Chinese patients with cataracts treated in tertiary general hospitals. *PeerJ* 2020;8:e9397.
- [21] Ulhaq ZS, Soraya GV, Dewi NA, *et al.* The prevalence of anxiety symptoms and disorders among ophthalmic disease patients. *Ther Adv Ophthalmol* 2022;14:25158414221090100.
- [22] Zheng Y, Wu X, Lin X, *et al.* The prevalence of depression and depressive symptoms among eye disease patients: a systematic review and meta-analysis. *Sci Rep* 2017;7:46453.
- [23] Grant A, Aubin M-J, Buhmann R, *et al.* Visual impairment, eye disease, and the 3-year incidence of depressive symptoms: the Canadian longitudinal study on aging. *Ophthalmic Epidemiol* 2021;28:77–85.
- [24] Marilov VV, Shorikhina OM. Mental disorders in patients admitted for cataract surgery. *Zh Nevrol Psikhiatr Im S S Korsakova* 2009;109:27–30.
- [25] Freeman EE, Gresset J, Djafari F, *et al.* Cataract-related vision loss and depression in a cohort of patients awaiting cataract surgery. *Can J Ophthalmol* 2009;44:171–6.
- [26] Palagyi A, Rogers K, Meuleners L, *et al.* Depressive symptoms in older adults awaiting cataract surgery. *Clin Exp Ophthalmol* 2016;44:789–96.
- [27] Mishel MH. The measurement of uncertainty in illness. *Nurs Res* 1981;30:258–63.
- [28] Colagregco JP, Bailey DE, Fitzpatrick JJ, *et al.* Watchful waiting: role of disease progression on uncertainty and depressive symptoms in patients with chronic hepatitis C. *J Viral Hepat* 2014;21:727–33.
- [29] Giammanco MD, Gitto L, Barberis N, *et al.* Adaptation of the Mishel Uncertainty of Illness Scale (MUIS) for chronic patients in Italy. *J Eval Clin Pract* 2015;21:649–55.
- [30] Marback R, Temporini E, Kara JN. Emotional factors prior to cataract surgery. *Clinics (Sao Paulo)* 2007;62:433–8.
- [31] Mencucci R, Stefanini S, Favuzza E, *et al.* Beyond vision: cataract and health status in old age, a narrative review. *Front Med (Lausanne)* 2023;10:110383.
- [32] Klauke S, Sondocie C, Fine I. The impact of low vision on social function: the potential importance of lost visual social cues. *J Optom* 2023;16:3–11.
- [33] Zhou C, Qian S, Wu P, *et al.* Anxiety and depression in Chinese patients with glaucoma: sociodemographic, clinical, and self-reported correlates. *J Psychosom Res* 2013;75:75–82.
- [34] Mabuchi F, Yoshimura K, Kashiwagi K, *et al.* Risk factors for anxiety and depression in patients with glaucoma. *Br J Ophthalmol* 2012;96:821–5.
- [35] Chen P-W, Liu PP-S, Lin S-M, *et al.* Cataract and the increased risk of depression in general population: a 16-year nationwide population-based longitudinal study. *Sci Rep* 2020;10:13421.
- [36] Rovner BW, Ganguli M. Depression and disability associated with impaired vision: the MoVies Project. *J Am Geriatr Soc* 1998;46:617–9.
- [37] Zambrowski O, Tavernier E, Souied EH, *et al.* Sleep and mood changes in advanced age after blue-blocking (yellow) intra ocular lens (IOLs) implantation during cataract surgical treatment: a randomized controlled trial. *Aging Ment Health* 2018;22:1351–6.
- [38] Frank CR, Xiang X, Stagg BC, *et al.* Longitudinal associations of self-reported vision impairment with symptoms of anxiety and depression among older adults in the United States. *JAMA Ophthalmol* 2019;137:793–800.
- [39] Walker JG, Anstey KJ, Lord SR. Psychological distress and visual functioning in relation to vision-related disability in older individuals with cataracts. *Br J Health Psychol* 2006;11:303–17.
- [40] Fraser ML, Meuleners LB, Lee AH, *et al.* Vision, quality of life and depressive symptoms after first eye cataract surgery. *Psychogeriatrics* 2013;13:237–43.
- [41] Fagerström R. Fear of a cataract operation in aged persons. *Psychol Rep* 1993;72:1339–46.
- [42] Nijkamp MD, Kenens CA, Dijker AJM, *et al.* Determinants of surgery related anxiety in cataract patients. *Br J Ophthalmol* 2004;88:1310–4.
- [43] Wang T, Xia J, Li R, *et al.* Intelligent cataract surgery supervision and evaluation via deep learning. *Int J Surg* 2022;104:106740.
- [44] O'Malley TP, Newmark TS, Rothman MI, *et al.* Emotional aspects of cataract surgery. *Int J Psychiatry Med* 1989;19:85–9.
- [45] Basak F, Hasbahceci M, Guner S, *et al.* Prediction of anxiety and depression in general surgery inpatients: a prospective cohort study of 200 consecutive patients. *Int J Surg* 2015;23:18–22.
- [46] Mylona I, Aletras V, Ziakas N, *et al.* Successful cataract surgery leads to an improvement in depressive symptomatology. *Ophthalmic Res* 2021;64:50–4.
- [47] Feeny S, Posso A, McDonald L, *et al.* Beyond monetary benefits of restoring sight in Vietnam: evaluating well-being gains from cataract surgery. *PLoS One* 2018;13:e0192774.
- [48] To KG, Meuleners LB, Fraser ML, *et al.* The impact of cataract surgery on depressive symptoms for bilateral cataract patients in Ho Chi Minh City, Vietnam. *Int Psychogeriatr* 2014;26:307–13.
- [49] Lerez S, Annweiler C, Gohier B, *et al.* Blue light-filtering intraocular lenses and post-operative mood: a pilot clinical study. *Int Ophthalmol* 2015;35:249–56.
- [50] Pesudovs K, Weisinger HS, Coster DJ. Cataract surgery and changes in quality of life measures. *Clin Exp Optom* 2003;86:34–41.
- [51] Helbostad JL, Oedegaard M, Lamb SE, *et al.* Change in vision, visual disability, and health after cataract surgery. *Optom Vis Sci* 2013;90:392–9.
- [52] Yotsukura E, Ayaki M, Nezu N, *et al.* Changes in patient subjective happiness and satisfaction with cataract surgery. *Sci Rep* 2020;10:17273.
- [53] Fagerström R. Correlation between depression and vision in aged patients before and after cataract operations. *Psychol Rep* 1994;75:115–25.
- [54] Hou C-H, Chen K-J, Lee J-S, *et al.* Effect of the time interval between cataract surgery for both eyes on mental health outcome: a cohort study of 585,422 patients. *BMC Ophthalmol* 2021;21:110.
- [55] Pellegrini M, Bernabei F, Schiavi C, *et al.* Impact of cataract surgery on depression and cognitive function: systematic review and meta-analysis. *Clin Exp Ophthalmol* 2020;48:593–601.
- [56] Ni W, Li X, Hou Z, *et al.* Impact of cataract surgery on vision-related life performances: the usefulness of Real-Life Vision Test for cataract surgery outcomes evaluation. *Eye (Lond)* 2015;29:1545–54.
- [57] Shekhawat NS, Stock MV, Baze EF, *et al.* Impact of first eye versus second eye cataract surgery on visual function and quality of life. *Ophthalmology* 2017;124:1496–503.
- [58] Kheirkhah F, Roustaei G, Mohebbi Abivardi E, *et al.* Improvement in cognitive status and depressive symptoms three months after cataract surgery. *Caspian J Intern Med* 2018;9:386–92.
- [59] Hecht I, Kanclerz P, Tuuminen R. Secondary outcomes of lens and cataract surgery: more than just “best-corrected visual acuity. *Prog Retin Eye Res* 2023;95:101150.
- [60] Lamoureux EL, Fenwick E, Pesudovs K, *et al.* The impact of cataract surgery on quality of life. *Curr Opin Ophthalmol* 2011;22:19–27.
- [61] Li X, Lin J, Chen Z, *et al.* The impact of cataract surgery on vision-related quality of life and psychological distress in monocular patients. *J Ophthalmol* 2021;2021:4694577.
- [62] Walker JG, Anstey KJ, Hennessy MP, *et al.* The impact of cataract surgery on visual functioning, vision-related disability and psychological distress: a randomized controlled trial. *Clin Exp Ophthalmol* 2006;34:734–42.
- [63] McGwin G, Li J, McNeal S, *et al.* The impact of cataract surgery on depression among older adults. *Ophthalmic Epidemiol* 2003;10:303–13.
- [64] Owsley C, McGwin G, Scilley K, *et al.* Impact of cataract surgery on health-related quality of life in nursing home residents. *Br J Ophthalmol* 2007;91:1359–63.
- [65] Aj F, Rh H, O F, *et al.* Falls and health status in elderly women following second eye cataract surgery: a randomised controlled trial. *Age and Ageing* 2006;35:66–71.
- [66] Laidlaw DA, Harrad RA, Hopper CD, *et al.* Randomised trial of effectiveness of second eye cataract surgery. *Lancet* 1998;352:925–9.
- [67] Lin H, Zhang L, Lin D, *et al.* Visual restoration after cataract surgery promotes functional and structural brain recovery. *EBioMedicine* 2018;30:52–61.
- [68] Socea SD, Abualhasan H, Magen O, *et al.* Preoperative anxiety levels and pain during cataract surgery. *Curr Eye Res* 2020;45:471–6.
- [69] Akkaya S, Özkurt YB, Aksoy S, *et al.* Differences in pain experience and cooperation between consecutive surgeries in patients undergoing phacoemulsification. *Int Ophthalmol* 2017;37:545–52.
- [70] Obuchowska I, Eugowska D, Mariak Z, *et al.* Subjective opinions of patients about step-by-step cataract surgery preparation. *Clin Ophthalmol* 2021;15:713–21.

- [71] Ghoneim MM, O'Hara MW. Depression and postoperative complications: an overview. *BMC Surg* 2016;16:5.
- [72] Gordon RJ, Weinberg AD, Pagani FD, *et al.* Prospective, multicenter study of ventricular assist device infections. *Circulation* 2013;127:691–702.
- [73] Chang SM, Parney IF, McDermott M, *et al.* Perioperative complications and neurological outcomes of first and second craniotomies among patients enrolled in the Glioma Outcome Project. *J Neurosurg* 2003;98:1175–81.
- [74] Doering LV, Cross R, Vredevoe D, *et al.* Infection, depression, and immunity in women after coronary artery bypass: a pilot study of cognitive behavioral therapy. *Altern Ther Health Med* 2007;13:18–21.
- [75] Dadgostar A, Bigder M, Punjani N, *et al.* Does preoperative depression predict post-operative surgical pain: a systematic review. *Int J Surg* 2017;41:162–73.
- [76] De Cosmo G, Congedo E, Lai C, *et al.* Preoperative psychologic and demographic predictors of pain perception and tramadol consumption using intravenous patient-controlled analgesia. *Clin J Pain* 2008;24:399–405.
- [77] Bramley P, McArthur K, Blayney A, *et al.* Risk factors for postoperative delirium: an umbrella review of systematic reviews. *Int J Surg* 2021;93:106063.
- [78] Meer EA, Lee YH, Repka MX, *et al.* Association of mood disorders, substance abuse, and anxiety disorders in children and teens with serious structural eye diseases. *Am J Ophthalmol* 2022;240:135–42.
- [79] Al-Bakri M, Skovgaard AM, Bach-Holm D, *et al.* Increased incidence of mental disorders in children with cataract: findings from a population-based study. *Am J Ophthalmol* 2022;236:204–11.
- [80] Ramirez DA, Brodie FL, Rose-Nussbaumer J, *et al.* Anxiety in patients undergoing cataract surgery: a pre- and postoperative comparison. *Clin Ophthalmol* 2017;11:1979–86.
- [81] Morrell G. Effect of structured preoperative teaching on anxiety levels of patients scheduled for cataract surgery. *Insight* 2001;26:4–9.
- [82] Tan JF, Tay LK, Ng LH. Video compact discs for patient education: reducing anxiety prior to cataract surgery. *Insight* 2005;30:16–21.
- [83] Mohammadpourhodki R, Sargolzaei MS, Basirinezhad MH. Evaluating the effect of massage based on slow stroke back massage on the anxiety of candidates for cataract surgery. *Rom J Ophthalmol* 2019;63:146–52.
- [84] Keramati M, Sargolzaei MS, Moghadasi A, *et al.* Evaluating the effect of slow-stroke back massage on the anxiety of candidates for cataract surgery. *Int J Ther Massage Bodywork* 2019;12:12–7.
- [85] Rufai SR, Mitchell BG, Farmer TD, *et al.* Reducing anxiety during conscious surgery - A patient survey. *Int J Surg* 2015;23:118–9.
- [86] El Boghdady M, Ewalds-Kvist BM. The influence of music on the surgical task performance: a systematic review. *Int J Surg* 2020;73:101–12.
- [87] Wiwatwongwana D, Vichitvejpaisal P, Thaikruea L, *et al.* The effect of music with and without binaural beat audio on operative anxiety in patients undergoing cataract surgery: a randomized controlled trial. *Eye (Lond)* 2016;30:1407–14.