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Knowledge and attitude of myopes or their guardians towards refractive surgery in Suzhou, China: a cross-sectional survey

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ABSTRACT

Background Refractive surgery is gaining widespread popularity; however, there remains a limited understanding of the knowledge and attitudes of myopes regarding these procedures.

Objectives To investigate the knowledge and attitudes of myopes or their guardians towards refractive surgery.

Design Cross-sectional study.

Participants 581 myopes or their guardians in Suzhou City, Jiangsu Province, China, surveyed between August and October 2022.

Outcome measures Knowledge and attitude scores before and after refractive surgery, ranging from 0 to 45 and 0 to 36, respectively.

Results Postsurgery knowledge (32.35±11.48 vs 27.38±11.74, p<0.001) and attitude (27.77±3.505 vs 26.6±3.267, p<0.001) scores were significantly higher than presurgery scores. Participants showed insufficient knowledge but positive attitudes preoperatively, with significant improvements postoperatively. Factors influencing knowledge scores included education level (Ref. senior middle school or lower; junior college/college, OR=5.81, 95% CI 2.52 to 9.09, p=0.001; postgraduate or higher, OR=7.83, 95% CI 3.83 to 11.8, p<0.001) and survey timing (after refractive error surgery, OR=5.09, 95% CI 3.02 to 7.16, p<0.001), while attitude scores were influenced by knowledge scores (OR=0.05, 95% CI 0.03 to 0.07, p<0.001), gender (female, OR=1.24, 95% CI −2.8–−1.0, p<0.001), age (21–30 years old, OR=−1.9, 95% CI 2.52 to 9.09, p<0.001; >30 years old, OR=−2.5, 95% CI −3.5–−1.4, p<0.001) and survey timing (after refractive error surgery, OR=0.86, 95% CI 0.24 to 1.47, p=0.006).

Conclusions Myopes or their guardians had positive attitudes towards refractive surgery both preoperatively and postoperatively. Insufficient knowledge prior to refractive surgery underscores the critical need for informed decision-making before undergoing the procedure.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ Comparatively big sample size (581 participants) ensures robust statistical power and generalisability of findings.
⇒ Comprehensive assessment of both knowledge and attitudes provides a holistic view of patient perspectives on refractive surgery.
⇒ Study setting in a relatively developed eastern province in China, which might limit generalisability to other regions with different economic and social conditions.
⇒ Use of a self-designed questionnaire may introduce bias and overestimate results, potentially overlooking important variables related to knowledge and attitude.

BACKGROUND

Refractive error (RE) is one of the most common ophthalmologic disorders among children and adolescents worldwide and includes myopia, hyperopia and astigmatism.[1] It is reported that nearly 2.3 billion people worldwide live with RE, and this number is rising as the prevalence of myopia increases.[2] It is well known that a high rate of myopia occurs in East and Southeast Asian schoolchildren and young adults, with 67.3% of grade 7 children and 83.2% of university students affected in central China.[3] High or pathologic myopia represents a significant concern as it can lead to irreversible visual impairment and, in severe cases, blindness, imposing substantial physical, emotional and economic burdens on individuals, families and society.[4]

At present, the main methods of myopia correction include spectacles, contact lenses and refractive surgery.[5] Recent studies discuss many disadvantages of spectacles, reported by myopes, such as inconvenience, limited vision and low resolution, while the use of contact lenses may increase the risk of suffering from conjunctivitis, keratitis and other eye diseases.[6 7] Compared with spectacles and contact lenses, refractive surgery was shown to correct the RE permanently.[8] However, in the face of emerging popularity, there are many expectations and concerns regarding the procedure and its outcome. In particular, a number of patients may refuse refractive

surgery due to the lack of information about correction methods and fear of complications.[9 10] Another study in 2021 demonstrated that although refractive surgery is a common surgical procedure, patients undergoing it have limited knowledge, with the Internet as the main source of information.[11] According to knowledge, attitudes and practices (KAP) theory, knowledge is the basis for behaviour change, and beliefs and attitudes are the driving force for behaviour change.[12–14] Therefore, it is helpful to find out and improve the knowledge and attitude of patients towards refractive surgery, which may contribute to easing their worries associated with the surgery and facilitate informed decision-making.

A majority of previous studies are focused on exploring the efficacy of different control or treatment methods for myopia,[15–17] but, to the best of our knowledge, there is no study evaluating both preoperative and postoperative knowledge and attitude of Chinese patients towards refractive surgery. Accordingly, the purpose of this study was to investigate the knowledge and attitude of the patients or their guardians both before and after refractive surgery.

METHODS

Patient and public involvement

In the design, implementation and dissemination of this study, we actively involved patients and the public. Initially, during the design phase, we conducted focus group discussions with individuals who had undergone refractive surgery and their guardians to understand their knowledge levels, attitudes and informational needs regarding refractive surgery. This ensured that our survey content was both comprehensive and relevant to real-world experiences. To enhance the acceptability and response rate of the survey, we incorporated feedback from potential participants, simplifying language and optimising question structure. Postsurgery, we also invited a subset of participants to review preliminary findings, ensuring our results accurately reflected their experiences and perspectives. For effective dissemination of our research findings, we plan to share the conclusions through various platforms such as social media, community health talks and local healthcare networks. The aim is to increase public awareness about refractive surgery and encourage informed decision-making among potential patients. By involving patients and the public throughout the research process, we not only enhanced the relevance and practicality of our study but also fostered better communication and trust between healthcare providers and patients. These efforts underscore the importance of engaging end-users in medical research to improve outcomes and satisfaction.

Study design and participants

This cross-sectional study included myopes or their guardians between August and October of 2022 in Suzhou city, Jiangsu Province, China. The participants of this study were randomly selected from the ophthalmology department at the author's Hospital. The inclusion criteria were as follows: (1) those who plan refractive surgery in the next 6 months or have undergone refractive surgery (if the myope is <18 years old, his/her guardian will participate in this survey instead); (2) those who can understand and complete questionnaires and (3) those who volunteer to participate. This study was approved by the Ethics Committee of the author's Hospital. Informed consents were obtained from all participants.

Procedures

Convenience sampling was adopted to select the participants from the ophthalmology department of the author's Hospital, and then a self-designed questionnaire was used for the investigation. The questionnaire was designed based on the *Ophthalmology (the ninth version in 2018)*[18] and *Ophthalmic Surgery (the fourth version in 2014)*[19] and modified according to the suggestions of two experts. A pilot survey was performed on a small scale (with 50 questionnaires dispatched) and the validity and reliability were assessed. The Cronbach's alpha (α) of the questionnaire was 0.8547, indicating that the internal consistency of the questionnaire was satisfactory.[20]

The final questionnaire (online supplemental appendix) contained 34 items distributed in three dimensions. The dimension for baseline information included 10 items. The knowledge dimension included 15 items, with each correct answer corresponding to 3 points, and 0 points for wrong or unclear answers, and the total score for knowledge was 0–45 points; the attitude dimension included nine items, and the 5-Level Likert Scale was used for scoring. The selection of 'Highly unaware, or highly agree' for items 1 and 7 was assigned 0 points, the selection of 'Unaware, or agree' was assigned 1 point, the selection of 'fair, or don't care' was assigned 2 points, the selection of 'aware, or disagree' was assigned 3 points and 'Highly aware' or 'Highly disagree' was assigned 4 points. For items 2, 3, 4, 5, 6, 8 and 9, the scores were assigned in reverse to the scores for items 1 and 7. The maximal total score for attitude was 0–36 points. Based on the cut-off adopted by previous KAP studies, a[9 21] knowledge score <70% of the maximal score was considered 'insufficient knowledge', and more than 70% was 'sufficient knowledge'. For the attitude score, <50% of the total score was considered 'negative attitude', 50%–70% was 'moderate attitude' and more than 70% was 'positive attitude'

The online questionnaire was established by the SoJump APP software on WeChat, and a QR code was generated to allow the data collection through WeChat. The participants scanned the QR code and filled out the questionnaire. To ensure the quality and completeness of the questionnaire survey, each IP was allowed to submit the answer only once, and all items were mandatory for participants. The completeness, internal continuity and rationality of the questionnaires were checked by the investigators.

Sample size calculation

The sample size was calculated based on item-respondent theory, in which a ratio of 1:5 up to 1:20 is considered suitable.[22] In this study, a ratio of 1:15 was selected, and with 34 KAP items of the questionnaire (not counting demographics information), the required sample size was 510. Considering a possible 15% invalid rate, the minimal sample size was 580.

Statistical analyses

SPSS 26.0 (IBM Corp, Armonk, New York, USA) was used for the statistical analysis. Continuous data were expressed as mean±SD and compared by t-test. Categorical data were expressed as n (%) and compared by the χ^2 test. ANOVA was used for comparison among multiple groups. Validation factor analysis was conducted to confirm the factorial structure of the designed KAP questionnaire and assess the effect size of each item. Several indices indicated a good model fit for the construct, including standardised root mean residual ≤0.08, root mean square error of approximation ≤0.08, comparative fit index >0.8, Tucker Lewis Index >0.8 and p>0.05 for the χ^2 test. A standardised factor loading >0.5 and a p<0.05 indicated a strong relationship between items and their respective factors, thereby confirming the validity of the construct. The multivariate linear regression analysis was conducted to determine the influencing factors of knowledge and attitude. All the statistical analyses were two-sided, and differences with p<0.05 were considered statistically significant.

RESULTS

A total of 581 participants were recruited for this survey, including 171 males (29.43%) and 410 females (70.47%). Majority of participants were 21–30 years old (64.03%), registered in a non-agricultural account (57.49% vs 42.51%) and educated mainly in junior college/college (77.28%). Despite the differences in participants' occupations, more than 80% of them had an average monthly income higher than RMB 5000. Participants' reasons for surgical correction of visual acuity varied, with the top two being inconvenience in wearing spectacles (67.81%) and appearance improvement (40.96%). Notably, the number of individuals surveyed before and after RE surgery was different: 164 cases (28.23%) before surgery and 417 cases (71.77%) after surgery. Detailed sociodemographic characteristics of participants are shown in table 1.

Knowledge score evaluated in participants after surgery (possible range: 0~45) was significantly higher than those before surgery (32.35±11.48 vs 27.38±11.74, p<0.001). Attitude score in participants after surgery (possible range: 0~36) was also significantly higher than in those before surgery (27.77±3.505 vs 26.6±3.267, p<0.001). According to the knowledge and attitude scores, participants evaluated before surgery had insufficient knowledge but positive attitudes towards the procedure, and those evaluated postoperatively had sufficient knowledge and positive attitudes (table 1 and figure 1).

In participants before surgery, the top three in terms of accuracy rate for the questions under the knowledge dimension were K15, K4 and K3, with the accuracy rates of 79.88%, 79.27% and 78.66%, respectively, whereas K12 (29.27%), K13 (40.24%) and K6 (40.85%) were ranked the last three in accuracy. In participants after surgery, except for K2, K3, K4 and K12 (p>0.05), the accuracy rates of other questions under the knowledge dimension were significantly higher compared with those surveyed before surgery (p<0.05). Specifically, the three questions under the knowledge dimension with the highest accuracy rates were K15 (88.25%), K4 (83.45%) and K2 (78.90%). And the three questions with the lowest accuracy rates were still K12, K13 and K6, with the accuracy of 37.89%, 57.31% and 58.99%, respectively (online supplemental table S1). Regarding the distribution of attitude dimension, scores found in A1, A4, A5, A6, A8 and A9 in patients after surgery were significantly higher than in those surveyed before surgery (p<0.05). For A2, A3, A4, A5, A6 and A8, more participants responded 'highly positive' and 'positive', while less people responded 'negative' and 'highly negative' (online supplemental table S2).

For the knowledge and attitude domains, the two-factor model demonstrated in online supplemental figure S1 was tested by validation factor analysis. Satisfactory model fitness was demonstrated (online supplemental table S3), and the final model demonstrated a strong relationship between items and attitude, as well as knowledge domain, with the composite reliability for all factors except K2, K4, K10 and K12 above the cut-off value of 0.7, as summarised in online supplemental table S4.

Additionally, in the analysis of multivariate linear regression results, the knowledge scores were related to education level (Ref. senior middle school or lower; junior college/college, OR=5.81, 95% CI 2.52 to 9.09, p=0.001; postgraduate or higher, OR=7.83, 95% CI 3.83 to 11.8, p<0.001) and time of participants being surveyed (Ref. before RE surgery; after RE surgery, OR=5.09, 95% CI 3.02 to 7.16, p<0.001) (table 2). Different from the knowledge scores, the influencing factors of attitude scores included knowledge scores OR=0.05, 95% CI 0.03 to 0.07, p<0.001), sex (Ref. male; female, OR=1.24, 95% CI −2.8 to 1.0, p<0.001), age (Ref. ≤20 years old; 21–30 years old, OR=−1.9, 95% CI 2.52 to 9.09, p<0.001; >30 years old, OR=−2.5, 95% CI −3.5 to −1.4, p<0.001), registered residence (Ref. agricultural household registration; non-agricultural household registration, OR=0.82, 95% CI 0.22 to 1.42, p=0.007), monthly income (Ref. ≤RMB 5000; RMB 5000–10 000, OR=0.92, 95% CI 0.06 to 1.78, p=0.036) and time of participants being surveyed (Ref. before RE surgery; after RE surgery, OR=0.86, 95% CI 0.24 to 1.47, p=0.006) (table 3).

The comparison of sociodemographic characteristics between participants before and after surgery showed a significant difference in age (p<0.001) and reasons for surgical correction of visual acuity (p=0.006) (online

Table 1 Sociodemographic characteristics

	N (%)	Knowledge score		Attitude score	
		Mean±SD	P value	Mean±SD	P value
Total score		30.95±11.76		27.45±3.48	
Sex			0.186		0.006
Male	171 (29.43)	29.72±12.59		26.78±3.74	
Female	410 (70.57)	31.45±11.36		27.71±3.32	
Age (years)			0.047		0.001
≤20	97 (16.7)	31.43±12.32		28.59±3.22	
21–30	372 (64.03)	31.47±11.58		27.25±3.37	
>30	112 (19.28)	28.78±11.69		27.06±3.82	
Registered residence			0.542		0.001
Agricultural household registration	247 (42.51)	30.41±12.24		26.89±3.63	
Non-agricultural household registration	334 (57.49)	31.33±11.38		27.85±3.30	
Education level			0.001		0.016
Senior middle school or lower	52 (8.95)	25.44±11.38		26.36±2.81	
Junior college/college	449 (77.28)	31.24±11.95		27.57±3.54	
Postgraduate or higher	80 (13.77)	32.86±9.833		27.43±3.38	
Occupation, N (%)			0.418		0.294
Government administrators of the country or leaders of enterprises and public institutions	24 (4.13)	30.75±10.17		26.08±3.72	
Professionals (teachers, engineering technicians, writers, etc)	127 (21.86)	32.74±10.60		27.62±3.49	
Clerks or relevant personnel	34 (5.85)	31.55±11.29		27.05±2.83	
Personnel in commercial business or service	68 (11.7)	31.54±11.30		27.85±3.22	
Personnel in farming, forestry, animal husbandry, fishery, etc	/				
Operators of production or transportation equipment or relevant personnel	18 (3.1)	31.16±8.826		26.88±2.51	
Army personnel	3 (0.52)	25.33±20.10		28.66±3.21	
Housewife	9 (1.55)	30.88±8.565		27.55±3.04	
Personnel in then medical and relevant industry	27 (4.65)	33.40±13.26		28.11±4.36	
Others	271 (46.64)	29.69±12.53		27.38±3.55	
Monthly income per capita (Yuan)			0.232		0.137
≤5000	79 (13.6)	29.36±11.92		26.54±3.80	
5000–10 000	232 (39.93)	30.46±11.81		27.68±3.26	
10 000–20 000	179 (30.81)	31.97±11.75		27.43±3.55	
≥20 000	91 (15.66)	31.51±11.43		27.61±3.46	
Daily screen usage time (h)			0.369		0.877
<4	102 (17.56)	30.71±11.73		27.50±3.25	
4–6	172 (29.6)	30.62±10.78		27.47±3.65	
>6	307 (52.84)	31.20±12.30		27.40±3.45	
Reasons for surgical correction of visual acuity (multiple choices)					
Remove the glasses and improve appearance	238 (40.96)				
Study in higher schools, job selection or joining the army	126 (21.69)				
Inconvenience in putting up and off the glasses	394 (67.81)				

Continued

Table 1 Continued

	N (%)	Knowledge score Mean±SD	Knowledge score P value	Attitude score Mean±SD	Attitude score P value
Others	14 (3.36)				
Surveyed before or after refractive error surgery			<0.001		<0.001
Before	164 (28.23)	27.37±11.73		26.60±3.26	
After	417 (71.77)	32.35±11.47		27.77±3.50	

supplemental table S5). Moreover, lower knowledge scores were more likely to be found in those who were male (p=0.001), aged more than 30 years old (p=0.018), and had senior middle school or lower education level (p=0.014) in participants surveyed before surgery. In those surveyed after surgery, the participants with senior middle school or lower education level had lower knowledge scores (p=0.017). Regarding attitude scores, the participants who scored lower were male (p=0.006) in participants surveyed before surgery. In those surveyed after surgery, attitude scores differed by age (p=0.002) and registered residence (p=0.001) (table 4).

DISCUSSION

This study suggested that myopes or their guardians had positive attitudes towards corrective surgery both before and after the procedure. The presence of insufficient knowledge among patients prior to refractive surgery underscores the critical need for targeted educational interventions to enhance understanding and informed decision-making before undergoing the procedure. Vulnerable groups were identified who would benefit from targeted education, including male myopes, older patients and those with lower education levels. These findings may provide inspiration and direction for ophthalmic education before the refractive surgery.

In the present study, the majority of participants were females aged <30, which was consistent with the epidemiology of myopia reported in previous studies.[23–25] In addition, patients with a higher educational level and longer daily screen usage time expressed a strong desire for correction, in line with the previous study by Mirshahi *et al*[26] discussing that people with higher educational achievements have a higher prevalence of myopia and a higher correction rate. At the same time in this study, individuals with lower levels of education were found to have less knowledge about refractive correction options. This highlights the presence of a smaller but more vulnerable subgroup within the population that is at greater risk of being underinformed; moreover, they might be more susceptible to becoming victims of disinformation, as the Internet remains a primary source of information about myopia and its correction.[11 27] These findings emphasise the critical need for targeted educational interventions tailored to address the specific needs of individuals with lower educational attainment, ensuring they are adequately informed about available corrective procedures and their implications.

A previous study among female students showed that the respondents had a high level of knowledge and awareness of refractive correction methods, especially refractive surgery.[9] Contrary to this result, the knowledge score and accuracy rates for questions under the knowledge dimension in our study were low before surgery. After surgery, the knowledge scores of the participants were significantly improved, which may be attributed to the preoperative conversation with the surgeon explaining the knowledge of refractive surgery—however, with the unknown source, it is difficult to assess whether or not participants had enough knowledge to make an informed decision at the time of surgery. Interesting to note that our findings showed a good fit for the questionnaire, supporting the construct validity, but demonstrated lower composite reliability for K2, K4, K10 and K12—while

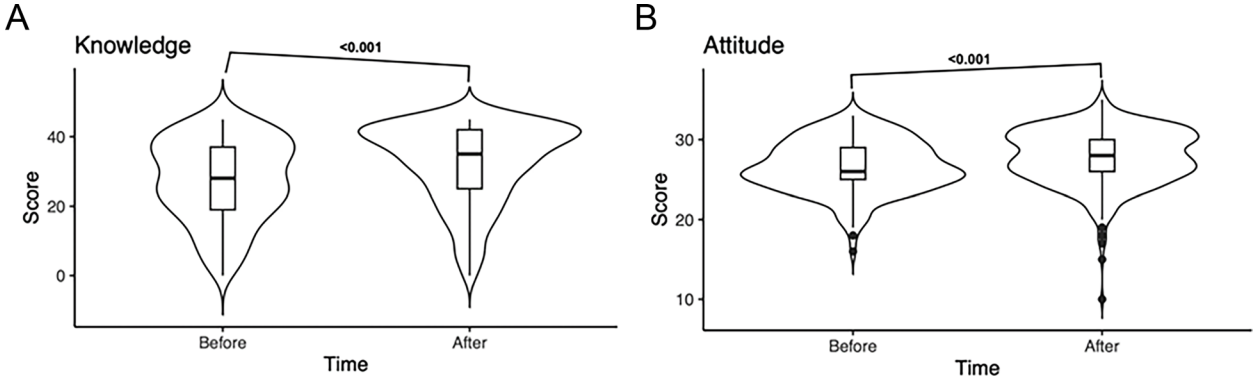

Figure 1 Comparison of knowledge (A) and attitude (B) scores between evaluations before and after surgery.

Table 2 Multivariate linear regression analysis for knowledge

Knowledge	Univariate analysis		Multivariate analysis	
	β (95% CI)	P value	β (95% CI)	P value
			R^2=0.0570*	
			F=12.68 (p<0.001)	
Sex				
Male	Ref†	–	Ref	–
Female	1.73 (–0.36, 3.83)	0.106		
Age (years)				
≤20	Ref	–	Ref	–
21–30	0.03 (–2.58, 2.66)	0.978		
>30	–2.64 –5.84, 0.54)	0.104		
Registered residence				
Agricultural household registration	Ref	–	Ref	–
Non-agricultural household registration	0.92 (–1.0, 2.85)	0.351		
Education level				
Senior middle school or lower	Ref	–	Ref	–
Junior college/college	5.80 (2.45, 9.14)	0.001	5.81 (2.52, 9.09)	0.001
Postgraduate or higher	7.42 (3.34, 11.4)	<0.001	7.83 (3.83, 11.8)	<0.001
Occupation, N (%)				
Government administrators of the country or leaders of enterprises and public institutions	Ref	–	Ref	–
Professionals (teachers, engineering technicians, writers, etc)	1.99 (–3.14, 7.13)	0.445		
Clerks or relevant personnel	0.80 (–5.34, 6.96)	0.796		
Personnel in commercial business or service	0.79 (–4.68, 6.27)	0.776		
Personnel in farming, forestry, animal husbandry, fishery, etc	0.41 (–6.78, 7.61)	0.91		
Operators of production or transportation equipment, or relevant personnel	—	—		
Army personnel	–5.41 (–19.5, 8.72)	0.452		
Housewife	0.13 (–8.88, 9.16)	0.976		
Personnel in the medical and relevant industry	2.65 (–3.81, 9.13)	0.421		
Others	–1.05 (–5.96, 3.86)	0.674		
Monthly income per capita (Yuan)				
≤5000	Ref	–	Ref	–
5000–10000	1.09 (–1.90, 4.10)	0.473		
10 000–20000	2.61 (–0.50, 5.72)	0.101		
≥20 000	2.14 (–1.40, 5.69)	0.235		
Daily screen usage time (h)				
<4	Ref	–	Ref	–
4–6	–0.09 (–2.98, 2.79)	0.949		
>6	0.48 (–2.15, 3.13)	0.716		
Surveyed before or after refractive error surgery				
Before	Ref	–	Ref	–
After	4.97 (2.88, 7.06)	<0.001	5.09 (3.02, 7.16)	<0.001

*Adjusted R-squared.
†Ref—variable used as a reference in the analysis.

Table 3 Multivariate linear regression analysis for attitude

Attitude	Univariate analysis		Multivariate analysis	
	β (95% CI)	P value	β (95% CI)	P value
			R^2=0.1334*	
			F=5.70 (p<0.001)	
Knowledge	0.07 (0.05, 0.09)	<0.001	0.05 (0.03, 0.07)	<0.001
Sex				
Male	Ref†	–	Ref	–
Female	0.93 (0.31, 1.55)	0.003	1.24 (0.59, 1.89)	<0.001
Age (years)				
≤20	Ref	–	Ref	–
21–30	−1.33 (−2.11, 0.56)	0.001	−1.9 (−2.8, 1.0)	<0.001
>30	−1.53 (−2.47, 0.59)	0.001	−2.5 (−3.5, 1.4)	<0.001
Registered residence				
Agricultural household registration	Ref	–	Ref	–
Non-agricultural household registration	0.96 (0.39, 1.53)	0.001	0.82 (0.22, 1.42)	0.007
Education level				
Senior middle school or lower	Ref	–	Ref	–
Junior college/college	1.20 (0.20, 2.20)	0.018	0.99 (−0.04, 2.03)	0.061
Postgraduate or higher	1.07 (−0.14, 2.28)	0.083	0.73 (−0.57, 2.05)	0.268
Occupation, N (%)				
Government administrators of the country or leaders of enterprises and public institutions	Ref	–	Ref	–
Professionals (teachers, engineering technicians, writers, etc)	1.53 (0.01, 3.05)	0.047	1.21 (−0.22, 2.65)	0.098
Clerks or relevant personnel	0.97 (−0.84, 2.79)	0.293	0.52 (−1.20, 2.24)	0.553
Personnel in commercial business or service	1.76 (0.14, 3.39)	0.033	1.45 (−0.07, 2.99)	0.063
Personnel in farming, forestry, animal husbandry, fishery, etc				
Operators of production or transportation equipment or relevant personnel	0.80 (−1.32, 2.93)	0.458	1.70 (−0.37, 3.77)	0.108
Army personnel	2.58 (−1.60, 6.76)	0.226	2.41 (−1.51, 6.35)	0.228
Housewife	1.47 (−1.19, 4.14)	0.279	1.14 (−1.40, 3.68)	0.379
Personnel in the medical and relevant industry	2.02 (0.11, 3.94)	0.038	1.53 (−0.28, 3.35)	0.097
Others	1.29 (−0.15, 2.75)	0.081	0.82 (−0.58, 2.22)	0.25
Monthly income per capita (Yuan)				
≤5000	Ref	–	Ref	–
5000–10000	1.14 (0.25, 2.03)	0.011	0.92 (0.06, 1.78)	0.036
10 000–20000	0.89 (−0.02, 1.81)	0.057	0.52 (−0.40, 1.44)	0.269
≥20 000	1.07 (0.02, 2.11)	0.045	0.82 (−0.22, 1.86)	0.122
Daily screen usage time (h)				
<4	Ref	–	Ref	–
4–6	−0.0 (−0.8, 0.82)	0.939		
>6	−0.1 (−0.8, 0.67)	0.79		
Surveyed before or after refractive error surgery				
Before	Ref	–	Ref	–
After	1.17 (0.54, 1.79)	<0.001	0.86 (0.24, 1.4 7)	0.006

*Adjusted R-squared.
†Ref—variable used as a reference in the analysis.

Table 4 Knowledge and attitude scores surveyed before and after surgery according to different baseline characteristics

Variables	Knowledge score				Attitude score			
	Before surgery	P value	After surgery	P value	Before surgery	P value	After surgery	P value
	Mean±SD		Mean±SD		Mean±SD		Mean±SD	
Total score	27.38±11.74		32.35±11.48		26.6±3.267		27.77±3.505	
Sex		0.001		0.616		<0.001		0.052
Male	21.7±11.14		31.94±12.09		24.95±3.407		27.29±3.687	
Female	29.03±11.43		32.54±11.19		27.09±3.073		28.00±3.398	
Age (years)		0.018		0.266		0.986		0.002
≤20	25.6±13.09		32.50±11.952		26.67±3.792		28.95±3.006	
21–30	28.65±11.05		32.93±11.600		26.61±3.322		27.59±3.364	
>30	21.23±13.04		30.63±10.626		26.50±2.650		27.20±4.059	
Registered residence		0.175		0.705		0.183		0.001
Agricultural household registration	25.88±12.36		32.11±11.804		26.19±3.448		27.15±3.672	
Non-agricultural household registration	28.41±11.236		32.54±11.246		26.89±3.122		28.25±3.303	
Education level		0.014		0.017		0.474		0.100
Senior middle school or lower	20.14±10.567		27.39±11.171		25.64±3.319		26.63±2.604	
Junior college/college	27.32±11.948		32.71±11.639		26.64±3.248		27.92±3.596	
Postgraduate or higher	31.25±9.766		33.73±9.854		26.93±3.355		27.71±3.397	
Monthly income per capita (Yuan)		0.321		0.504		0.179		0.126
≤5000	23.35±11.197		31.02±11.672		25.47±3.375		26.84±3.893	
5000–10 000	26.59±11.494		31.94±11.629		26.88±3.14		28.00±3.270	
10 000–20 000	28.80±12.281		33.54±11.210		26.27±3.336		28.01±3.537	
≥20 000	28.83±11.212		32.48±11.443		27.50±3.217		27.66±3.570	
Daily screen usage time (h)		0.645		0.827		0.717		0.955
<4	25.23±10.959		32.23±11.548		26.18±2.500		27.88±3.354	
4–6	27.47±11.458		31.88±10.281		26.86±3.536		27.72±3.687	
>6	27.84±12.117		32.67±12.126		26.57±3.298		27.77±3.468	
Reasons for surgical correction of visual acuity								
Remove the glasses and improve appearance	29.60±11.554	0.085*	33.56±10.251	0.056	27.53±2.956	0.010*	27.97±3.383	0.308*
Study in higher schools, job selection or joining the army	20.20±11.737	0.003*	30.93±12.667	0.142	25.00±3.866	0.019*	27.81±3.636	0.901*
Inconvenience in putting up and off the glasses	27.50±11.737	0.837*	33.58±10.458	0.004	26.42±3.093	0.271*	27.89±3.312	0.334*
Others	–	–	24.07±13.697	0.006	–	–	26.43±5.515	0.144*

*Comparison of participants' score between those who chose the option and did not.

three of those items also did not differ before and after operation, suggesting that some gaps in knowledge might still be present even after surgery. It is concerning that, according to numerous surveys,[3 28 29] female participants often choose to undergo refractive surgery primarily for aesthetic reasons, such as enhancing their appearance, rather than based on sufficient knowledge about the procedure. This lack of informed decision-making may place patients at a higher risk of encountering unnecessary complications or adverse outcomes associated with the surgery. Notably, the three questions under the knowledge dimension with the lowest accuracy rates before and after surgery were K12, K13 and K6, which were related to indications and complications of refractive surgery. This might be linked to the fact suggested by previous cross-sectional studies that patients were prone to refusing

refractive surgery because of the fear of surgical complications.[30] Without a comprehensive understanding of the potential benefits, risks and limitations of the procedure, patients may be less prepared to make fully informed choices, which could compromise their overall safety and satisfaction with the surgical outcomes. Consequently, targeted education on the indications and complications of refractive surgery should be implemented.

In addition, this study found that the participants had continued positive attitudes towards refractive surgery, both those who only planned the procedure and those who had already underwent it, in line with previous reports on high levels of satisfaction and positive attitudes about vision correction surgery.[31 32] Of note, lower attitude scores were more likely to be observed in the participants aged >30 years and had agricultural household registration. This may be at least partly attributed to the efficacy of refractive surgery for myopia associated with younger age and low myopia.[33] Patients with agricultural household registration are usually older and have higher myopia, and thus the outcome of refractive surgery may be impaired. It is also worth noting that attitude scores were strongly influenced by knowledge scores, suggesting that enhancing education about myopia and refractive surgery might contribute to the development of positive attitudes. As many previous studies demonstrated that the refractive surgeries achieved favourable visual outcomes in the correction of myopia,[34–36] with adequate education and the empowerment of their attitudes, individuals with myopia would be better equipped to make informed decisions regarding refractive surgery, gaining a clearer understanding of its efficacy, as well as its potential advantages and disadvantages. Additionally, while the present survey was not explicitly designed as an educational intervention, we believe that the process of answering the questionnaire can itself stimulate reflection and awareness. By engaging with the questions, participants are exposed to information or concepts they may not have previously considered, which could prompt them to think more deeply about their condition, as was demonstrated before.[37] This inherent potential to influence awareness and attitudes, even if minimally, supports the idea that completing such a questionnaire could be recommended as a potential educational intervention.

There are some limitations in the present study. First, the setting of the trial was in the eastern province with a relatively developed economy and society, limiting the wider generalisability of the results of our study. Second, due to using a self-designed questionnaire, bias and overestimation of real results may be introduced by responders, and some variables related to knowledge and attitude scores may be neglected. Although additional validation factor analysis was conducted to assess the factorial structure of the questionnaire and results demonstrating good validity and reliability, using a convenience sample for both questionnaire validation and measuring results may introduce additional bias, potentially affecting the reliability of the validation process and the generalisability of the findings. Third, as a result of cross-sectional design characteristics, the relationship between knowledge and attitude towards different variables was not specifically determined. Finally, the difference in numbers and the consist of individuals between the preoperative and postoperative groups (there are significant differences in their ages and reasons for surgical correction of visual acuity) could introduce some bias, and a larger preoperative sample size would improve the robustness of future analyses; furthermore, in the future, we will design to keep the preoperative and postoperative groups the same population for investigation.

Conclusion

To summarise, myopes or their guardians showed positive attitudes towards corrective surgery both before and after surgery. The presence of insufficient knowledge among patients prior to refractive surgery underscores the critical need for targeted educational interventions to enhance understanding and informed decision-making before undergoing the procedure. Empowering attitudes and addressing some of the beliefs and concerns of patients with myopia or their guardians may further encourage patients to seek medical help.

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Competing interests None declared.

Patient and public involvement Patients and/or the public were involved in the design, conduct, reporting or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval This study involves human participants. All procedures were performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments. This study was approved by the Ethics Committee of the First Affiliated Hospital of Soochow University (No.321 (2023)). Informed consents were obtained from all the participants. All methods were carried out in accordance with relevant guidelines and regulations. Participants gave informed consent to participate in the study before taking part.

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