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Original Research Article

Association between myopia and psychological well-being: a cross-sectional study based on Saudi university students

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ABSTRACT

Background: Myopia is an escalating global health issue projected to affect half of the world's population by 2050. This study assesses the relationship between myopia and psychological well-being among Saudi university students at King Khalid University in Abha City, KSA.
Methods: A cross-sectional study was conducted using an interview-based questionnaire from October 2023 to July 2024 with participating university students. An ophthalmologist performed ocular examinations, and the questionnaire included socio-demographic data, the visual function questionnaire (VFQ-25), the generalized anxiety disorder 7-item (GAD-7) scale, and the self-rating depression scale (SDS).
Results: A total of 184 participants were studied. Myopic participants had significantly lower scores on visual function subscales, including general vision, near activities, and social functioning ($p < 0.001$). Myopia correlated with higher GAD-7 and SDS scores, indicating elevated anxiety and depression levels. Severe myopia (>900°) was associated with the lowest VFQ-25 scores and highest anxiety and depression levels. Additionally, a significant association emerged between the duration of wearing glasses and increased depressive symptoms ($p=0.041$), suggesting prolonged use of corrective lenses may exacerbate psychological distress.
Conclusion: Myopia substantially impacts visual function and psychological well-being among Saudi university students. Severe myopia is linked to poorer vision and heightened anxiety and depression. These findings highlight the necessity for integrated eye and mental health care interventions in university settings to alleviate the psychological burden of myopia and improve students' overall quality of life.

Keywords: Myopia, Visual function questionnaire, Generalized anxiety disorder 7-item, Self rating depression scale, Saudi Arabia

INTRODUCTION

Myopia, or near-sightedness, is a prevalent refractive error affecting a significant portion of the global population.[1] An increasing trend is observed, particularly among younger individuals. By 2050, 49.8% of the world's population is predicted to suffer from myopia.[2] In certain Chinese cities, the prevalence of myopia among young adults has escalated to pandemic proportions, ranging from 80% to 90%.[3] In KSA, myopia is currently prevalent in 48.7% of adults in Riyadh and 53.5% of college students in Hail and Riyadh.[4] One of the main causes of vision impairment, myopia, is regarded as a serious global public health concern a large number of myopic adolescents with extreme myopia may become legally blind as a result of myopic maculopathy.[5]

While the visual challenges associated with myopia are well-recognized, its influence on psychological well-being is an area that remains underexplored, particularly within the context of KSA.[6] Recent studies have highlighted the significant impact of myopia on psychological well-being, demonstrating that myopia not only contributes to anxiety and depression but also leads to a decline in vision-related quality of life (VR-QoL).[7] For instance, research by Li et al, revealed that 22.0%–25.9% of highly myopic patients had possible or probable depression or anxiety disorders, and the presence of those psychiatric disorders was the major factor associated with the low VR-QoL in highly myopic patients.[8]

Mental health has been assessed with generic and vision-specific measures.[9] Vision-specific scales, such as the mental health subscale of the national eye institute visual function questionnaire, ask for worries about eyesight and feeling frustrated because of bad eyesight.[10] Generic measures such as the generalized anxiety disorder 7-item (GAD-7) scale and the self-rating depression scale (SDS) may also ask about worries and frustrations but do not specify the sources of negative feelings.[9,11]

In KSA, the rising incidence of myopia, especially among university students, is a growing concern due to its potential impact on both academic performance and overall quality of life.[4] University students, who are often under significant academic and social pressures, may be particularly vulnerable to the psychological impacts of myopia.[12] The transition to university life, coupled with the demands of higher education, can exacerbate stress and anxiety, potentially amplifying the negative effects of myopia on mental health.[13]

Several studies have provided alarming statistics on the prevalence of these disorders. A large-scale meta-analysis by Ibrahim et al, found that the prevalence of depression among university students globally ranged from 10% to 85%, with an average prevalence of around 30%.[14] Similarly, the prevalence of anxiety disorders in university students is also high, with estimates ranging from 17% to 32%, according to a meta-analysis by Regehr et al[15] However, there is a paucity of research investigating the relationship between myopia and psychological well-being among this population, particularly in KSA. This study aims to address this gap by examining the association between myopia and psychological well-being among Saudi university students.

METHODS

From October 2023 to July 2024, a cross-sectional descriptive study was conducted on all accepted university students at King Khalid University in Abha City, located in the Aseer region of southwestern KSA. We excluded students with hypermetropia diagnoses, with definite diagnoses of acute and chronic conditions affecting vision other than myopia (hereditary retinoschisis, etc.), and with a history of eye surgery, ophthalmic drugs in the last year, or psychiatric trauma. The city of Abha, located in the Asir region of KSA, presents a unique demographic and health profile that makes it an ideal location for studying the prevalence of myopia and its association with psychological well-being. Abha's diverse population, encompassing various socio-economic backgrounds and lifestyles, provides a comprehensive sample for the current study.

Sample size

The sample size was calculated using the Epi-info software statistical package.[16] The criteria used for sample size calculation were as follows: 95% confidence limit, 80% power of the study, and expected proportion of myopia among university students as 12.8%.[17] The minimum sample size based on the previously mentioned criteria was 169 participants. We conducted a multi-stage stratified random sampling methodology to select our target population. First, we divided the 23 colleges into two groups based on the specialty (medical and non-medical), and then we randomly selected one college from each group. After this, we retrieved lists of all students enrolled in the two selected colleagues to randomly and proportionately select students from different academic years.

Data collection

First, an ophthalmologist performed and recorded all ocular examinations. Participants underwent a routine ocular examination, including naked eyesight, corrected eyesight, eye location, foregoing proportion, and bottom inspections. Then, an interview-based questionnaire was administered to the studied participants. The questionnaire consists of four parts, the first part includes socio-demographic data (age, sex, faculty, academic year, monthly household income, course of wearing glasses, and daily sleep duration). The second part is the visual function questionnaire (VFQ-25). The VFQ-25 is a reliable and valid 25-item version of the 51-item national eye institute visual function questionnaire (NEI-VFQ)18. The VFQ-25 contains 12 subscales (Table 1). It was scored according to

the VFQ-25 Scoring Algorithm.[19] Using this algorithm, the subscales (Table 1) are scored on a scale from 0 to 100, with 100 indicating the highest level of function. The VFQ-25 composite score was calculated as the unweighted average of all items, excluding the general health subscale (one item).

Table 1: 25-item national eye institute visual function questionnaire (VFQ-25).

VFQ-25 Sub-scale	# Items
General Health	1
General vision	1
Ocular pain	2
Near activities	3
Distance activities	3
Vision-specific	
Social functioning	2
Mental health	4
Role difficulties	2
Dependency	3
Driving	2
Color vision	1
Peripheral vision	1
Composite score	24

The third part is the generalized anxiety disorder 7-item (GAD-7). The generalized anxiety disorder 7-item (GAD-7) scale is a widely used instrument designed to assess the severity of generalized anxiety disorder (GAD) symptoms in individuals20. The GAD-7 consists of seven questions that inquire about the frequency of anxiety-related symptoms experienced over the past two weeks. Respondents rate the severity of symptoms on a four-point scale ranging from "not at all" to "nearly every day." Scores on the GAD-7 range from 0 to 21, with higher scores indicating greater severity of anxiety. The following scores correlate with the level of anxiety severity score 0-4, minimal anxiety, score 5-9, mild anxiety, score 10-14 moderate anxiety, and score greater than 15, severe anxiety.

The fourth part is the self-rating depression scale (SDS). The self-rating depression scale (SDS) is a widely utilized tool for assessing the severity of depressive symptoms in individuals.[21] The SDS comprises 20 items that evaluate various aspects of depression, including mood, behavior, and physical symptoms, over the past week. Each item is rated on a four-point scale, ranging from "not at all" to "very often," reflecting the frequency of each symptom. The total score, which ranges from 20 to 80, provides an indication of the overall level of depressive symptoms, with higher scores suggesting greater severity. Ranges for mild to moderate depression, moderate to severe depression, and severe depression are 50–59, 60–69, and over 70, respectively.

A pilot test was carried out on 30 of the studied participants to test the study tools for clarity, feasibility, applicability, and the time required to complete the interview and clinical examination. According to the pilot study results, the necessary modifications and improvements were made before data collection.

Ethical considerations

Approval was obtained from the Research Ethics Committee at King Khalid University (HAPO-06-B-001). The study was executed according to the ethical standards in the 1964 Declaration of Helsinki and its later modifications. Informed consent was obtained from all the subjects involved in the study. They were assured of their strict confidentiality and anonymity.

Data management and analysis plan

The data were analyzed using the Statistical Package for the Social Sciences" SPSS 22.0 software (IBM Microsoft). Kolmogorov's test tested quantitative data normality. Qualitative variables were prescribed using numbers and percentages. Numerical variables were expressed as means and standard deviations or median (IQR), and the Mann-Whitney U-test and Kruskal–Walli's test were used to compare groups. Spearman's correlation analysis was used to evaluate the relationship between the studied variables. P value (<0.05) was adopted as the level of significance.

RESULTS

Table 2 shows that the study included 184 participants, predominantly female (90.2%), with a median age of 21 years. Nearly half of the participants were medical students (53.3%), with the most common academic grades being 6th year (28.8%) and 1st year (23.4%). Most participants reported a household income of over 9,000 SR (73.9%). Regarding myopia, 39.1% were not nearsighted in the right eye, 38.0% were not nearsighted in the left eye, 27.2% had a myopia degree of 300–<600° in the right eye, and 38.0% had a myopia degree of 300–<600° in the left eye. Regarding the course of myopia, 14.1% had been myopic for over 10 years. Regarding glasses, 35.3% did not wear them, while 12.5% had worn glasses for over 10 years. Daily sleep duration varied, with 34.2% sleeping less than 7 hours, 33.7% sleeping 7-9 hours, and 32.1% sleeping over 9 hours.

Table 2: Baseline characteristics of the studied participants.

Studied variables		n=184	%
Sex	Female	166	90.2
	Male	18	9.8
Age, years Median (IQR)		21.0 (19.0-23.0)	

Continued.

Studied variables		n=184	%
Faculty	Medical	98	53.3
	Nonmedical	86	46.7
Grade	1st	43	23.4
	2nd	34	18.5
	3rd	13	7.1
	4th	25	13.6
	5th	16	8.7
	6th	53	28.8
Monthly household income, SR	<1,000	3	1.6
	1000 - 3000	8	4.3
	3000 - 5000	12	6.5
	5000-9000	25	13.6
	>9,000	136	73.9
Myopia degree of the right eye	Not nearsighted	72	39.1
	300–<600°	50	27.2
	600–900°	47	25.5
	>900°	15	8.2
Myopia degree of left eye	Not nearsighted	70	38.0
	300–<600°	70	38.0
	600–900°	27	14.7
	>900°	17	9.2
The course of myopia, years myopia	Not nearsighted	68	37.0
	<1	5	2.7
	1–<3	31	16.8
	3–<5	29	15.8
	5–10	25	13.6
	>10	26	14.1
The course of wearing glasses, years	Not nearsighted	65	35.3
	<1	10	5.4
	1–<3	35	19.0
	3–<5	25	13.6
	5–10	26	14.1
	>10	23	12.5
Daily sleep duration, h	<7	63	34.2
	7–9	62	33.7
	>9	59	32.1

Table 3. Comparison of VFQ-25, GAD-7, and SDS scores between myopic and non-myopic participants.

Studied variables	Myopic (N=66) Mean±SD	Non-Myopic (N=118) Mean±SD	P value
VFQ-25 sub-scale			
General Health	66.0±25.0	73.0±25.0	0.051
General vision	81.0±20.0	91.0±15.0	0.001*
Ocular pain	53.3±19.1	48.8±17.3	0.056
Near activities	77.8±21.8	90.8±15.0	<0.001*
Distance activities	74.5±22.5	93.3±12.2	<0.001*
Vision-specific			
Social functioning	79.9±22.7	95.0±11.8	<0.001*
Mental health	42.8±26.1	30.4±24.7	<0.001*
Role difficulties	35.5±36.7	14.3±30.0	<0.001*
Dependency	33.3±37.9	16.0±33.1	<0.001*
Driving	48.2±14.7	82.2±14.4	<0.001*
Color vision	87.0±26.0	96.0±11.0	<0.001*
Peripheral vision	76.0±27.0	92.0±14.0	0.024*
Composite score	62.2±11.6	69.4±10.8	0.002*
GAD-7 scores	11.5±6.5	8.4±8.0	0.010*
SDS score	42.4±8.1	40.0±10.6	0.028*

*Significant

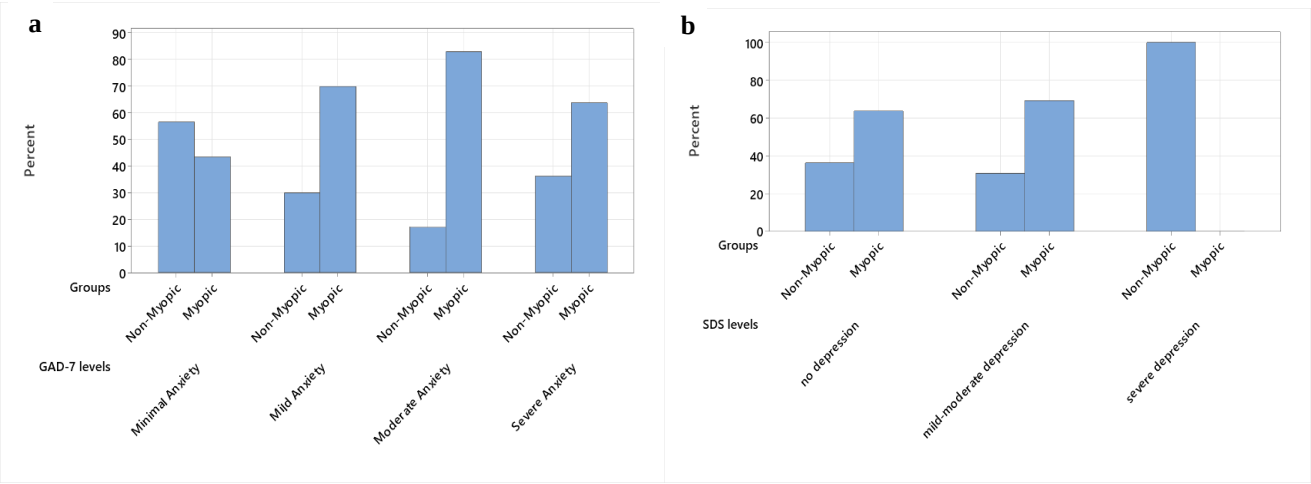

Figure 1 (a & b): Distribution of anxiety & depression levels among myopic and non-myopic participants.

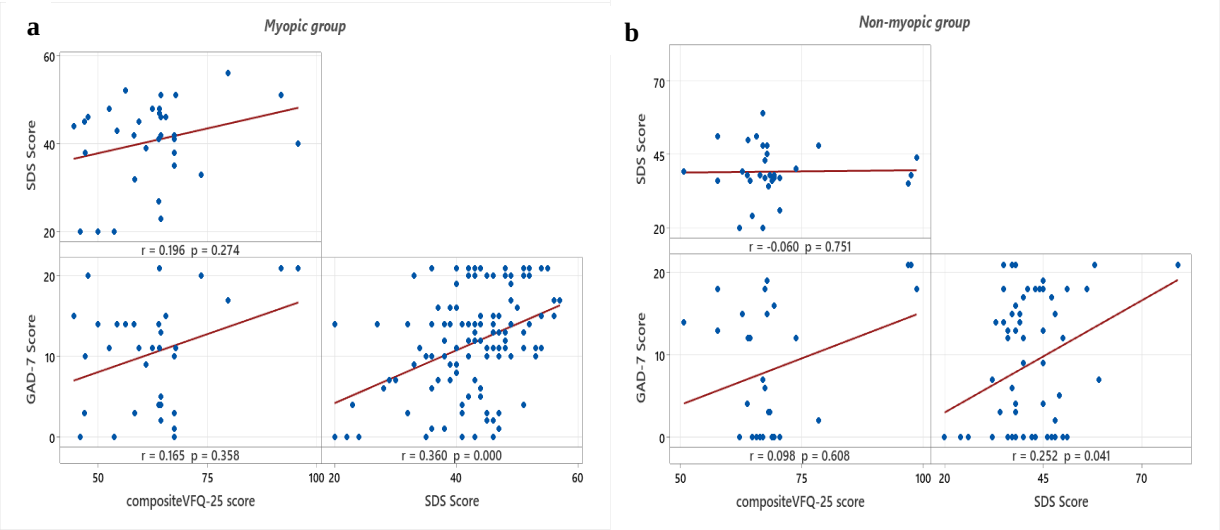

Figure 2 (a & b): Correlation matrix between VFQ-25 composite score and psychological measures among myopic and non-myopic participants.

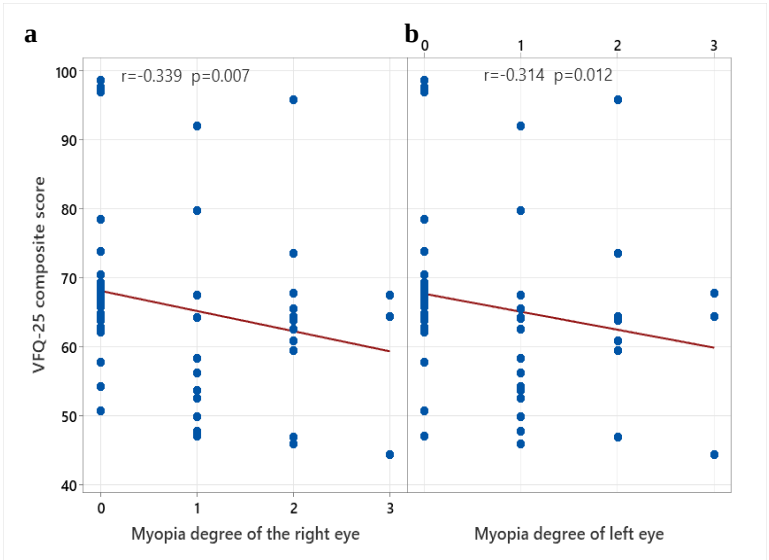

Figure 3 (a & b): Correlation between myopia degree and VFQ-25 composite scores for right and left eyes.

There were three babies who developed respiratory complication 24 hours after birth (not related to prematurity) and required respiratory support. All these 3 babies survived and were discharged subsequently. Of the two intrapartum stillbirths noted in the study, one was a severe IUGR at 30 weeks and the other had intrapartum fetal distress at 32 weeks leading to stillbirth. The abnormal waveform indices were compared with major adverse outcomes (Table 1).

Since there were 2 stillbirths, and one baby died in immediate neonatal period, analysis for neonatal nursery admission is done in 107 babies. There was a total of 39 babies of 107 (36.4%) who required nursery admission for observation either due to respiratory complications, metabolic complications or sepsis. The abnormal waveforms of umbilical artery and middle cerebral artery were also compared with neonatal nursery admission (Figure 1).

Table 3 revealed significant differences across multiple domains measured by the VFQ-25, GAD-7, and SDS scales. Myopic participants scored significantly lower on key visual function sub-scales, including general vision (p=0.001), near activities (p<0.001), distance activities (p<0.001), social functioning (p<0.001), and mental health (p<0.001), indicating poorer visual function compared to non-myopic participants. Additionally, myopic individuals reported more difficulties with driving (p<0.001), color vision (p<0.001), and peripheral vision (p=0.024). In terms of psychological measures, myopic participants had significantly higher GAD-7 scores (p=0.010), indicating greater anxiety levels, and higher SDS scores (p=0.028), reflecting more pronounced depressive symptoms compared to their non-myopic counterparts.

Figure 1 illustrates the distribution of anxiety and depression levels among myopic and non-myopic participants. A higher percentage of non-myopic participants (56.6%) experience minimal anxiety compared to myopic participants (43.3%). Severe anxiety is more prevalent among myopic participants (63.8%) compared to non-myopic participants (36.2%). As regards depression levels, severe depression is significantly more common among myopic participants, with 100% of the myopic participants.

Figure 2 illustrates the correlation matrix depicting the relationship between the VFQ-25 composite score and various psychological measures among myopic and non-myopic participants. Among the myopic participants, the VFQ-25 composite score exhibits a non-significant correlation with the GAD-7 score (r=0.165, p=0.358) and the SDS score (r=0.196, p =0.274). Conversely, there is a significant positive correlation between the GAD-7 score and the SDS score (r = 0.360, p <0.001).

Table 4: Association of baseline characteristics with VFQ-25 composite scores and psychological measures.

Studied variables		VFQ-25 composite score Mean±SD	GAD-7 scores Mean±SD	SDS score Mean±SD
Sex	Female	64.9±11.1	10.72±7.19	41.72±9.13
	Male	68.6±14.1	7.78±7.6	40.06±9.77
	P value	0.495	0.123	0.706
Faculty	Medical	64.0±10.1	10.15±6.88	41.68±9.3
	Nonmedical	67.4±13.2	10.76±7.71	41.42±9.1
	P value	0.577	0.494	0.724
Grade	1st	66.2±6.6	10.65±7.73	44.09±10.71
	2nd	66.7±10.1	11.12±7.35	40.53±8.85
	3rd	82.0±27.8	12±6.62	42.31±9.07
	4th	64.3±13.4	10.48±6.79	42.08±6.93
	5th	63.5±8.6	10.69±4.92	40.5±7.67
	6th	63.6±10.9	9.34±7.91	40.06±9.35
	P value	0.734	0.825	0.510
Monthly household income, SR	<1,000	62.1±16.1	11.33±10.26	39.67±6.51
	1000-3000	55.3±12.0	10.6±6.99	40.9±10.11
	3000-5000	64.0±13.2	11.08±8.1	41.12±10.91
	5000-9000	47.7±0.0	10.27±7.16	41.78±8.83
	>9,000	66.9±11.2	11.33±10.26	39.67±6.51
	P value	0.130	0.941	0.920
Myopia degree of the right eye	Not nearsighted	68.8±10.8	8.51±7.76	40.21±10.21
	300–<600°	61.1±13.1	10.22±7.31	40.12±9.26
	600–900°	64.1±11.2	12.98±5.88	44.17±7
	>900°	58.7±12.5	12.4±6.2	44.67±7.87
	P value	0.026*	0.014*	0.014*

Continued.

Studied variables		VFQ-25 composite score Mean±SD	GAD-7 scores Mean±SD	SDS score Mean±SD
Myopia degree of left eye	Not nearsighted	68.6±11.3	8.99±8.19	40.19±10.41
	300–<600°	61.9±10.8	10.56±6.79	41.81±8.83
	600–900°	66.0±14.1	12.22±6.45	42.78±7.54
	>900°	60.2±10.7	13.06±5.13	44.24±7.02
	P value	0.049*	0.144	0.159
The course of myopia, years	Not nearsighted	69.4±10.8	8.38±7.8	39.26±9.12
	<1	60.6±11.8	8.4±5.22	43.6±7.4
	1–<3	59.4±9.5	12.48±6.93	42.81±9.21
	3–<5	61.1±6.7	11.17±7.31	44.14±10.55
	5–10	60.5±10.9	11.68±6.2	41.12±8.95
	>10	66.7±17.1	11.73±6.56	43.23±7.36
	P value	0.057	0.100	0.118
The course of wearing glasses, years	Not nearsighted	69.3±11.6	9.28±7.94	39.65±10.35
	<1	67.3±0.1	7.5±6.17	42±6.09
	1–<3	55.5±10.0	11.66±6.86	43.09±9.07
	3–<5	61.9±4.4	11.08±7.31	43.16±7.03
	5–10	64.0±13.7	11.92±6.31	43.85±9.5
	>10	63.9±14.3	10.74±7.09	40.13±8.05
	P value	0.032*	0.475	0.041*
Daily sleep duration, h	<7	63.6±13.2	10.9±7.47	41.79±10.25
	7–9	65.0±9.7	10.73±6.82	41.24±7.18
	>9	68.4±11.6	9.63±7.55	41.64±9.97
	P value	0.165	0.597	0.591

Table 4 presents the association between various baseline characteristics and VFQ-25 composite scores and psychological measures. There is no significant difference in VFQ-25 composite scores regarding sex, faculty, academic year, monthly household income, course of myopia, and daily sleep duration. A significant association is found between the degree of myopia in the right eye and VFQ-25 composite scores (p=0.026). Participants with higher degrees of myopia (>900°) report lower scores (58.7±12.5) compared to those with no myopia (68.8±10.8).

Similarly, the degree of myopia in the left eye shows a significant association with VFQ-25 composite scores (p=0.049). Participants with severe myopia (>900°) have lower scores (60.2±10.7) compared to those with no myopia (68.6±11.3). Additionally, there is a significant association between the duration of wearing glasses and VFQ-25 composite scores (p=0.032). Participants who have worn glasses for 1–<3 years report lower scores (55.5±10.0) compared to those who have worn glasses for more extended periods.

Regarding GAD-7 and SDS scores, there were significant associations between the degree of myopia in the right eye with the GAD-7 and SDS scores. Additionally, SDS scores in relation to the duration of wearing glasses revealed a significant association (p=0.041). Participants who had worn glasses for less than one year had slightly lower SDS scores, indicating lower levels of depression compared to those who had worn glasses for longer durations (1–10 years). Figure 3 depicts the correlation between the degree of myopia in both the right and left eyes and the VFQ-25 composite scores. For the right eye, a significant negative correlation is observed between the degree of myopia and VFQ-25 composite scores (r=-0.339, p=0.007). Similarly, for the left eye, the correlation between the degree of myopia and VFQ-25 composite scores is also significant and negative (r=-0.314, p=0.012).

DISCUSSION

In this study, we aimed to assess the impact of myopia on the psychological well-being and vision-related quality of life of university students at King Khalid University in Abha, Kingdom of Saudi Arabia. The results indicate a significant association between myopia, particularly its severity, and visual function status, anxiety, and depression.

The current study revealed that myopic participants scored significantly lower on various sub-scales of the VFQ-25, including general vision, near and distance activities, social functioning, and mental health. Additionally, there is a significant negative correlation between the degree of myopia and VFQ-25 composite scores in both eyes. Participants with higher degrees of myopia (>900°) reported the lowest VFQ-25 composite scores, emphasizing the burden of severe myopia on daily life and mental health. These findings are consistent with the work of Li et al, who found that VFQ-25 composite scores are greatly affected by the degree of myopia.[22]

This study also found that myopia is associated with higher levels of anxiety and depression, as indicated by the GAD-7 and SDS scores. These results align with Yokoi et al, findings, where 22.0%–25.9% of highly myopic patients exhibited possible or probable depression or anxiety disorders.[8] Moreover, several studies have shown that adolescents with myopia are more likely to suffer from psychological problems than their peers.[23,24] The significant positive correlation between GAD-7 and SDS scores among myopic participants suggests the overall psychological burden of myopia.

The current study found that VFQ-25 composite scores were significantly lower among participants who had worn glasses for 1 to less than 3 years compared to those who were not nearsighted and wore glasses for less than one year. This suggests that the duration of wearing glasses may be associated with poorer perceived visual function. Additionally, the significant associations between SDS scores and the duration of wearing glasses highlight a potential relationship between the long-term wearing of glasses and elevated depression levels among the study participants. This finding may be attributed to the participants who wore glasses who were bullied at school and felt victimized, alongside the results of another study that highlights myopic students who wore glasses were at more risk of bullying.[25]

The findings of this study carry significant implications for public health strategies concerning the rising prevalence of myopia among university students in KSA. University students are already under significant academic and social pressures, and the added burden of myopia can exacerbate mental health challenges.

To address the impact of myopia on psychological well-being among university students, it is recommended that universities integrate vision and mental health screenings, ensuring comprehensive care that includes both eye health and psychological support. Universities should also offer stress management programs to help students cope with academic pressures and myopia-related stress. Additionally, supportive academic environments should be created with assistive technologies and accessible study materials. Further research is needed to explore the long-term effects of myopia and the effectiveness of interventions, while policymakers should develop guidelines that combine eye health and mental health services in educational institutions.

This study has several limitations that should be noted. Firstly, the cross-sectional design limits the ability to establish causality between myopia and psychological well-being. The reliance on interview-based questionnaires introduces potential reporting bias, as participants might underreport or overreport their symptoms. Additionally, the study was conducted at a single university, which may limit the generalizability of the findings to other regions or populations in KSA. However, the study also has notable strengths. By focusing on university students, a group is at higher risk for psychological disorders. Besides, the research provides specific comprehensive insights into visual function status, anxiety, and depression levels that can inform targeted public health interventions.

CONCLUSION

In conclusion, our findings show that myopia has a considerable impact on both visual function and psychological well-being among Saudi university students. Severe myopia is linked to lower VFQ-25 scores and increased levels of depression and anxiety. Addressing the psychological components of myopia, particularly in university students, is critical for enhancing their overall quality of life and mental health outcomes.

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