

Attitudes and perceptions of Sudanese high-school students and their parents towards spectacle wear



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Background: Uncorrected refractive error is a major cause of avoidable vision impairment and may have significant impact on social life, education and economic prospects of people. This condition could be easily treated by wearing spectacles, but because of attitudes and misconceptions of some communities towards spectacle wear and eye care, such methods are underutilised.

Aim: To assess the attitudes and perceptions of Sudanese high-school students and their parents towards spectacle wear.

Setting: The study was conducted in eight randomly selected high schools from the South Darfur state of Sudan.

Methods: A cross-sectional school-based study comprising 387 high-school students with age ranging from 12 to 17 years together with 47 students' parents with age ranging from 32 to 52 years. Quantitative and qualitative methods were used to collect data from eight high schools. Semi-structured questionnaires were distributed to collect the quantitative data, and seven focus group meetings were held in the schools with students' parents to derive the qualitative data.

Results: The findings revealed that 39%, 32% and 27.1% of the students believed that wearing spectacles affected their opportunities for education, employment and marriage, respectively. A total of 36.4% of the students believed that wearing spectacles could lead to making the eyes weaker or could damage the eyes, resulting in early blindness, and 22.5% of the respondents believed that spectacles were only for older people. In general, the perception towards spectacle wear was different between genders, with females appearing to be more vulnerable to social and psychological distress when wearing spectacles compared to males. A total of 79% of the parents were aware that wearing spectacles would improve vision if an eye doctor prescribed the spectacles. However, parents reported that the disadvantages of wearing spectacles were that they reduced the power of the eyes and spectacle wear had psychological effects, particularly among females. Parents felt that their children had lost an important asset, that the community looked at them as handicapped and that their children would be blind in future.

Conclusion: The fear and stigma related to the use of spectacles are widely experienced among students and their parents in Sudan, and particularly among females. Eye health education programmes should be broadcast through the public media to promote awareness and benefits about spectacle wear and eye care.

Introduction

The World Health Organization reports that the major cause of global vision impairment is uncorrected refractive error and estimates that 80% of vision impairment is avoidable.¹ Refractive error occurs when the eye does not focus light correctly onto the retina.² There are three types of ametropia (refractive error), namely myopia, hypermetropia and astigmatism. It affects more than a third of the population, and although the exact cause of refractive error remains unknown, the common risk factors heredity, nutrition and the environment could lead to the development of refractive errors.² Uncorrected refractive errors drive children and adults further into poverty by limiting their opportunities in education or employment, and could seriously affect their quality of life and productivity.^{3,4}

Current data reveal that more than 2.3 billion people in the world have vision impairment because of uncorrected refractive error, and estimates are that more than 90% of them live in

rural and developing nations.^{5,6} Recently, Holden et al.⁷ predicted that the prevalence of myopia worldwide would be 49.8% by 2050.

It is clear that uncorrected refractive errors not only affect the social life and economic prospects of people as it is one of the major causes of vision impairment but also could have great impact on the psychological development of people.⁸ Uncorrected refractive error is the leading cause of vision impairment among children,⁹ that could easily be corrected by spectacles, which are the least expensive and most common optical method for correcting refractive error.¹⁰ Because of ignorance, stigmas, misconceptions and cost-related issues, this method, however, is underutilised. There have been a large number of studies on prevalence and distribution of refractive errors in school children worldwide, but there have only been a few studies conducted to understand the psychosocial impacts of and perceptions towards spectacle wear among school-aged children.⁸ Studies by Agarwal and Dhoble,⁸ Castanon Holguin et al.¹¹ and Nyamai et al.¹² indicated that the attitudes and perceptions towards spectacles were barriers for correcting refractive error among children.

The school-based study indicated that the prevalence of myopia, hypermetropia and astigmatism among Sudanese school-aged children is 6.8%, 1.9% and 2.5%, respectively.¹³ Uncorrected refractive error is estimated to be the main cause of visual impairment among Sudanese school-aged children at 57%.¹³ Eye health education plays an important role in reducing avoidable blindness as well as to help ensure a healthy and educated community.¹⁴ To date, no studies have been conducted to determine the attitude and perception towards spectacle use in high-school children in the South Darfur state of Sudan. This study focused specifically on young high-school children and their parents, because the attitudes and perceptions of these participants are critical to the success of interventions aimed at reducing vision impairment because of refractive error.

Methods

Study design

An observational cross-sectional school-based study consisting of semi-structured questionnaires as well as focus group discussion (FGD) methodology was employed for assessing the attitudes and perceptions towards spectacle wear and eye care.

Setting

The study was conducted in both public and private high schools in the South Darfur state of Sudan. The South Darfur state is located in the far south-west of Sudan, 1096 km away from the capital city, Khartoum. It is the second most populous state in Sudan (4.45 million people).¹⁵

Inclusion criteria consisted of students aged between 12 and 17 years as well as all parents who agreed to participate in the study. Exclusion criteria consisted of students aged

younger than 12 years and older than 17 years. There were no exclusion criteria for the parents.

Sample selection

The sample size for the students was calculated by using the formula for estimating a single population proportion as follows:

$$N = \frac{Z^2 \times (P) \times (1 - P)}{C^2} \quad [\text{Eqn 1}]$$

Z = value of the z-statistic at the 95% confidence level = 1.96,
P = estimated proportion of the outcome of the response assumed to be 50% of the students' attitudes and perceptions about spectacle wear and eye care for maximum sample size,
C = maximum acceptable sampling error = 4.70% or 0.047 in decimal notation:

$$\frac{(1.96)^2 \times (0.5) \times (1 - 0.5)}{(0.047)^2} = 435 \quad [\text{Eqn 2}]$$

This calculation resulted in a sample size of 435 students. Considering a 10% non-participant rate (44), the final sample size of this study was determined to be 479 students. The selection process firstly identified all public and private schools within 21 districts of South Darfur from a list of schools of the entire state obtained from the Ministry of Education. Thereafter, eight schools, four for males and four for females, were randomly selected from the list of 21 districts. The sampling frame consisted of a listing of the grade level within each school with the number of children in seventh and eighth grade classrooms. Finally, 60 students were randomly selected from each school. For the sample size for the parents, seven schools were randomly selected to carry out FGD with parents of high school-aged children. A total of 47 parents participated in the focus group (29 females and 18 males).

Data collection

A semi-structured questionnaire was developed based on the literature review in order to collect quantitative data from the students.^{8,10,11,12} The questions sought to gain insight into the students' attitudes and perceptions towards spectacle wear and eye care. The questionnaire had 15 statements that used a three-point Likert scale to measure attitudes and perceptions of high school-aged children towards spectacle wear and eye care. Prior to implementation, the questionnaire was evaluated by a sample of optometrists, ophthalmologists and eye care managers and then pretested with a pilot study, which was carried out with 50 students outside of the main research field. Data were gathered by a self-administered questionnaire in the classroom setting supervised by the principal investigator and research assistant.

For the qualitative process, a semi-structured guideline was developed to guide the discussions. The main consideration

for the FGDs was to assess key concepts related to attitudes and perception towards spectacle wear and eye care. Three trained data collectors used the focus group guide in order to collect the data through the discussions which were conducted in the local language (Arabic) and then transcribed into English. The FGDs were audio recorded.

Data analysis

The quantitative data were analysed using the Statistical Package for the Social Sciences (SPSS), version 22. The data were checked for data entry errors and any missing values were entered before conducting the data analysis. Descriptive statistics were used to describe the data. Analysis of variance (ANOVA) was used for statistical comparison of means, and chi-squared tests were used to determine statistical significance. The qualitative data were analysed using transcript-based analyses. The focus group audiotapes were transcribed verbatim by the principal investigator and the information was cleaned by stripping non-essential words. For all statistical determinations, the significance level was established at $p < 0.05$.

Ethical considerations

Ethical permission for conducting the study was obtained from the University of KwaZulu-Natal's Biomedical Research Ethics Committee (ref: BE247/14) and the National Research Ethics Review Committee in Sudan. Permission was also obtained from the South Darfur authorities in Sudan to undertake the research at their facilities. Informed consent was obtained from all participants included in the study, and assent was obtained from children to facilitate a better understanding of conditions for involvement in the study. The research was conducted in accordance with the Declaration of Helsinki.

Results

Quantitative results

Study population

A total of 479 students from eight selected schools (four male schools and four female schools) were invited to participate in the study. However, only 387 students returned completed questionnaires, giving a response rate of 81%. In addition, 47 parents consisting of 29 females and 18 males participated in the focus groups. The focus groups ranged from five to eight people. The average group size was seven people. Thus, the results of 387 students and seven focus groups with 47 parents were analysed and represented as follows.

Socio-demographic characteristics of participants

The demographic characteristics of the high-school children are shown in Table 1. The sample consisted of 198 (51.2%) females and 189 (48.8%) males. The mean age and standard deviation (s.d.) of females and males was 14.15 ± 1.27 (s.d.)

TABLE 1: Distribution of the high-school children ($N = 387$) by demographic characteristics.

Characteristics	<i>N</i>	%
Gender		
Male	189	48.8
Female	198	51.2
Age (in years) (mean 14.2 ± 1.26)		
12	26	6.7
13	87	22.5
14	141	36.4
15	80	20.7
16	24	6.2
17	29	7.5
Grades		
Seventh	153	39.5
Eighth	234	60.5

and 14.25 ± 1.25 (s.d.), respectively, whereas the mean age and s.d. of both was 14.20 ± 1.26 . The differences between the mean ages of males and females were not significant (ANOVA $F = 0.635$, $p = 0.426$). The majority of respondents fell within either the 14-year age group (36.4%) or 13-year age group (22.5%), whereas the least number of participants were aged 16 (6.2%). The majority of the respondents (60.5%) were in grade 8. In terms of the parents' education levels, 62.3% school children reported their parents have primary education, 28.2% reported their parents have secondary education and only 9.6% reported their parents have higher education.

The sample of the parents comprised 29 (61.7%) females and 18 (38.3%) males. Their ages ranged from 32 to 52 years, with an average age of 42 years and the largest group of participants (23.4%) being 41–43 years.

Students' attitudes towards spectacle wear and eye care

In this section, the students addressed a combination of positive and negative statements relating to their perceptions towards spectacle wear and eye care. To help in measuring their attitudes towards spectacle wear and eye care, a 3-point Likert scale was used, with options ranging from disagree to agree. This section contained 15 statements related to their attitudes and perceptions as shown in Table 2.

Overall, approximately 39% of the students felt that wearing spectacles affected their opportunities in education (females 43.0% and males 33.9%), and 40.8% of the students felt that wearing spectacles did not affect their chances in education (females 35% and males 47.1%). Thirty-two per cent of the respondents believed that wearing spectacles reduced their chance of finding employment (males 33.3% and females 30.8%), and 45.2% of them believed wearing spectacles would not affect their opportunities for employment (males 47.6% and females 42.9%). Interestingly, 27.1% of the students believed that wearing spectacles reduced their opportunities for marriage (females 29.0% and males 25.4%), whereas half of the respondents believed that wearing spectacles would not affect their chances for marriage (males 54.5% and

TABLE 2: Attitudes and perceptions of the 387 students towards spectacle wear and eye care.

Statements	Disagree %	Unsure %	Agree %	Male		Female		P
				Disagree %	Agree %	Disagree %	Agree %	
I think wearing spectacles affects my opportunity for education.	40.8	20.7	39.0	47.1	33.9	35.0	43.0	0.019
I think wearing spectacles affects my opportunity for employment.	45.2	22.7	32.0	47.6	33.3	42.9	30.8	0.237
I think wearing spectacles may affect my opportunity for marriage.	50.4	22.5	27.1	54.5	25.4	46.5	29.0	0.240
I believe wearing spectacles changes the way people perceive me as attractive.	47.8	16.0	36.2	48.7	37.0	47.0	35.4	0.962
I believe wearing spectacles reduces the power of the eyes.	50.6	22.0	27.4	55.0	27.5	46.5	27.3	0.506
I believe people perceive wearing spectacles as a sign of wealth.	54.8	17.8	27.4	55.6	27.5	54.0	27.3	0.937
In my opinion, wearing spectacles is a cosmetic blemish.	48.3	19.9	32.0	52.4	27.5	44.4	36.0	0.066
In my opinion, wearing spectacles is an embarrassment.	51.4	17.6	31.0	55.0	31.2	48.0	30.8	0.592
In my opinion, wearing spectacles is a sign of intelligence.	45.5	21.7	33.0	52.4	31.0	38.9	35.0	0.069
I think using spectacles can lead to reduced respectability.	52.7	22.2	25.1	54.0	26.5	51.5	23.7	0.802
In my opinion, wearing spectacles reduces personal activities such as sport.	43.4	19.4	37.2	38.1	44.0	48.5	31.0	0.009
I think the best way to prevent myself from vision loss is wearing glasses.	27.6	17.3	55.0	27.5	54.5	27.8	55.6	0.967
In my opinion, wearing spectacles for a long time would damage the eyes and lead to early blindness.	40.8	22.7	36.4	42.3	38.1	39.4	34.8	0.941
In my opinion, spectacles may be used to relieve discomfort such as headache, photophobia and tearing.	31.5	29.5	39.0	39.7	38.6	23.7	39.4	0.000
I believe that using spectacles is only for old people.	63.3	14.2	22.5	66.7	21.2	60.1	23.7	0.363

Note: These statements are translated from Arabic.

females 46.5%). About 36.2% of the respondents in this study believed that wearing spectacles made them more attractive (males 37.0% and females 35.4%), whereas 47.8% of them felt that wearing spectacles made them less attractive (males 48.7% and females 47%).

On the question regarding wearing spectacles for treatment of refractive error, 27.4% of the respondents believed that wearing spectacles would reduce the power of the eyes (make the eyes weaker), but 50.6% of respondents believed that wearing spectacles would not make their eyes weaker. In addition, 27.4% of the students believed that wearing spectacles changed their appearance, making them appear richer, whereas 54% of the participants believed that wearing spectacles does not make them appear richer. Thirty-two per cent of the participants felt that wearing glasses was a cosmetic blemish (36.0% females and 27.5% males) and 48.3% of them believed that wearing spectacles was not a cosmetic blemish (52.4% males and 44.4% females). Thirty-one per cent of the students felt that wearing spectacles was embarrassing, whereas just over half of them (51.4%) felt that wearing spectacles was not embarrassing. However, 33.0% of the respondents believed that wearing spectacles was a sign of intelligence – the population of females who believed this (35%) was slightly more than males (31.0%) – whereas 45.5% of respondents did not believe that wearing spectacles was a sign of intelligence (males 52.4% and females 38.9%).

Of the participants, 25% felt that wearing spectacles would lead to reduced respectability (26.5% males and 23.7% females) and 52.7% of them thought that wearing spectacles would not affect their respectability (males 54.0% and females 51.5%). Thirty-seven per cent of the respondents agreed that wearing spectacles affected their sporting activities (males 44.0% and females 31.0%), and 43.4% of them disagreed that wearing spectacles reduced their sporting activities (48.5% females and 38.1% males). Fifty-five per cent

of the respondents agreed that using spectacles would prevent vision loss, and just over a quarter (28.0%) disagreed that using spectacles would prevent vision loss.

About 36.4% of the respondents believed that using spectacles for a long time would damage their eyes and lead to early blindness (38.1% males and 34.8% females). Forty-one per cent of respondents disagreed that wearing spectacles would damage their eyes and lead to early blindness (42.3% males and 39.4% females). Thirty-nine per cent of the respondents disagreed that spectacles would relieve discomfort such as headache, photophobia and tearing, and 31.5% of them agreed that spectacles would relieve such discomfort. A total of 22.5% of the participants believed that the use of spectacles was only for old people; the population of females who believed this (24%) was slightly more than males (21.2%). Sixty-three per cent of respondents disagreed that spectacles were only for old people (66.7% males and 60.1% females).

Qualitative results

Parents' attitudes towards spectacle wear and eye care

Parents were asked about the advantages and disadvantages of wearing spectacles (Table 3). Most of the parents (78.6%) stated that the advantage of wearing spectacles was the improvement of sight as they were prescribed by the doctor. On the other hand parents saw the disadvantage of wearing spectacles as that they reduce the power of the eyes and furthermore spectacle wear had psychological effects, especially among females. The parents expressed the following (direct translation from Arabic):

'If the spectacles were prescribed by the doctor you also face a lot of challenges such as psychological and moral judgment from your family and friends. I have a daughter with spectacles, which she wears inside the house. When she wears the eyeglasses and walks in the street, she comes back home and complains of

TABLE 3: Parents' attitudes and perceptions towards spectacles wear and eye care.

Topics	Participants' responses	Percentage
What are the pros and cons of wearing spectacles?	1. If the spectacles were prescribed by the doctor, then its advantage would be to improve the sight.	78.6
	2. They will reduce the power of the eye.	25.0
	3. The cons of wearing the spectacles are they have moral and psychological effects, especially among girls.	14.3
Do you think there is any harm caused to your child by NOT wearing spectacles?	1. His or her vision becomes worse.	100.0
Do you think there is any harm that may be caused by wearing spectacles?	1. If prescribed by a doctor, they will not lead to any harm.	57.1
	2. Wearing spectacles has social and psychological effects on the child.	10.7
How would you feel if your child had to wear spectacles?	1. I feel that my child has lost an important thing (asset) and the community sees him or her as a handicapped person.	18.0
	2. I feel my child will become blind in future.	10.7
	3. I feel my child is visually handicapped.	10.7
	4. I feel my child has a dark future.	10.7

Note: These statements are translated from Arabic.

harassment as a result of using the spectacles.' (Focus group 6, participant 3, 43-year-old mother of schoolchild)

'Wearing spectacles have pros and cons. If someone has poor eyesight, spectacles improve the sight, and if the eyes are normal, this may lead to deterioration of the vision. I know a person with spectacles that were prescribed by the doctor and these spectacles reduced his vision and he became blind.' (Focus group 1, participant 5, 45-year-old father of schoolchild)

Overwhelmingly though, the parents agreed that if their children were not wearing the prescribed spectacles their vision would get worse. About 57.1% of the parents reported that the spectacles, which were prescribed by the eye doctor, would not lead to any harm. However, almost 11% of the participants expressed that wearing spectacles has social and psychological effects on the children even if prescribed by the eye doctor. One parent expressed the following:

'Personally if there is another method of treatment I would choose it. However, I chose the spectacles for my child because there were no alternative methods for the treatment of poor eyesight.' (Focus group 1, participant 2, 37-year-old father of schoolchild)

Parents were asked about their feelings when their children were advised to wear spectacles to improve their vision. Many parents felt that their children had lost an important thing (asset) and that communities see them as a handicapped person. They felt their children would become blind in future and they felt concerned that their children could become visually handicapped and have a dark future. One parent commented the following:

'If the child is wearing eyeglasses the community looks at him/her like they are a handicapped person. Especially, the girl's family is afraid of the possibility of getting married in the future because wearing spectacles is evidence that she is visually handicapped. Some families prevent their girls from wearing eyeglasses at social events such as at weddings etc. ...' (Focus group 7, participant 2, 51-year-old mother of schoolchild)

Discussion

Quantitative study questions

In this study, a significant percentage of respondents believed that wearing spectacles would affect their opportunities for education and employment. The population of males who felt that wearing spectacles was acceptable (47.1%) was larger than females (35.0%), which was statistically significant ($p = 0.019$); this is in agreement with a previous study by Savur¹⁶ which indicated that 35% of females were teased for wearing spectacles. In this study, 27.1% of the students believed that using spectacles would affect their opportunity for marriage. Of these, 29% were females and 25.4% were males. These findings are similar to a study, which was conducted in India, where 31% of females stated that they were ready to hide their spectacles to avoid rejection before marriage.^{16,17} Moreover, another study, which was carried out among rural Indian students, revealed that 60% of respondents believed that one should not marry a spectacle-user.⁸

Almost 28% of respondents in this study believed that wearing spectacles would lead to weaker eyes. This result is similar to that found by Savur,¹⁶ where 30% of the participants believed that the continuous use of glasses would progressively increase their refractive errors. A significant percentage of the respondents believed that wearing spectacles was embarrassing and could lead to reduced respectability. Furthermore, the students believed that wearing spectacles was a cosmetic blemish, which was particularly expressed by the female respondents (36%). These results are comparable to those found by Dhoble et al.⁸ who reported that one-third (32.0%) of respondents felt that spectacles were cosmetically unacceptable and embarrassing in public – most of them were females. In our study, 37.2% of the students refused to wear spectacles because they affected their activities like sport. The percentage of males (44.0%) was more than females (31.0%), the difference being statistically significant ($p = 0.009$). This may be because males are more likely to participate in sport (football) than females as well as cultural beliefs that may prevent women from participating in sport in these communities. This is in agreement with a study conducted in Pakistan in 2007¹⁸ where parents felt that spectacle wear hindered children's participation in sport and other extra-curricular activities.

In this study, 36.4% of the children believed that wearing spectacles for a long time would damage their eyes and could lead to early blindness, which is in agreement with the results of a study in Nigeria where 23.8% of respondents stated that spectacles would damage their eyes.¹⁷ An even greater number was found in another study which was conducted in Pakistan by Yasmin and Minto,¹⁸ where 69% of respondents believed that using spectacles would cause their vision to deteriorate. However, the perception of most of the students was positive about the use of spectacles to correct their vision and 55.0% of students in our study believed that the best way to protect the eyes from vision loss was by wearing spectacles. This is similar to a study conducted in Saudi Arabia, where 65% of the participants knew the importance of wearing spectacles.¹⁹ A significant percentage of students (22.5%)

believed that glasses were a method to enhance vision only for old people. This is also in line with the work of Ebeigbe et al.¹⁰ who reported in Nigeria that 60% of respondents believed that glasses were meant for old people.

Qualitative study questions

In our study, most of the parents (78.6%) indicated that the advantage of using spectacles was improving vision and the perceived disadvantage was that they make the eyes 'weaker' and they would have social and psychological impacts especially among females. In a study which was conducted in India by Senthilkumar et al.,²⁰ parents were aware that the wearing of spectacles improved distance and near vision. However, they avoided getting spectacles for refractive correction for a female because of cosmetic reasons. In this study, some parents expressed the view that they chose spectacles for the treatment of refractive error for their children because there were no alternative methods for correcting refractive error.

In a survey by Kodjebacheva et al. in southern California,²¹ participants experienced disappointment, unhappiness, worry and concern when they realised that they needed spectacles at a young age. Such reservations were also expressed by more than half of the parents in this study, who reported that if their children were advised to wear spectacles they felt that their children had lost an important thing and that the community would look at them as a handicapped person who could become blind in future.

The poor acceptance and the negative perception towards spectacles as the first-line method for treatment of poor eyesight by the communities in Sudan are of concern in addition to the established barriers for correcting childhood refractive error. There is a lack of health facilities as well as a lack of interventions by health care practitioners to influence the communities about using spectacles, to eliminate the social stigma towards spectacles wear, as well as a lack of health education programmes about the benefits of spectacles wear and the consequences of uncorrected refractive error.

Conclusion

The fear and stigma relating to the use of spectacles for eye care are widely experienced among students and their parents in Sudan, and particularly among females. It is suggested that during routine eye examinations, particularly in communities in developing countries, the practitioner should explain the advantage of wearing spectacles and emphasise the importance of glasses for the treatment of refractive error. This could lead to the elimination of the stigma and fear related to spectacle wear. In addition, education programmes through the mass media and schools, together with public presentations by eye care providers and psychologists, should be increased to address the misconceptions about spectacles. This study recommends the following:

- During eye examinations, optometrists or ophthalmologists should explain the advantages of

wearing spectacles and emphasise the importance of spectacles for the treatment of refractive error.

- Education programmes through the mass media and schools, with public presentations by eye care providers and psychologists, are needed to address misconceptions about spectacle corrections.
- Celebrities and respected community individuals should be enlisted to wear spectacles and talk about the fashionable and trendsetting aspects of eyewear.
- Parents should be educated and counselled about the benefits of wearing spectacles and the possible consequences of not wearing spectacles regularly, such as the development of amblyopia and squint.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

S.H.A. was the project leader who was responsible for the experimental and project design under the supervision of P.C.C-F. and K.S.N. S.H.A. conducted all clinical research. P.C.C-F. and K.S.N. made conceptual contributions and provided guidance for the research. S.H.A. was responsible for the writing of the article with input and edits from P.C.C-F. and K.S.N.

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