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Drivers of Spectacle Compliance among University Student Population in Buraimi, Oman

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Abstract Refractive errors are the leading cause of visual impairment among young adults globally, and spectacle correction remains the most effective and accessible intervention. However, compliance with spectacle wear is consistently suboptimal, especially among university student populations. The study aims to evaluate the driving factors of spectacle wear and to form a baseline for informed decision-making while supporting the current health intervention within the region that focuses on enhancing visual health and academic progress among the population. This cross-sectional study employed a questionnaire-based tool to collect the responses among the university students that are compliant with spectacle wear. Participants with or without refractive errors having no ocular abnormalities or associated pathologies were included in the study. Participant profile was analyzed using descriptive statistics. The association between the type of attitude among the spectacle compliant group and the participant profile was assessed using chi square test. The association between the mean attitude score and the participants profile was evaluated using Generalized Linear Model. Out of the total 275 participants undergoing ocular examination, 154 (56%) were observed to have refractive errors and only 25 (16.23% of these 154) were spectacle compliant. The higher overall mean benefit score (M= 61.27, SD = 18.02) related to spectacles including utility and psychological aspects of spectacle wear indicates agreement for spectacle wear among the student group. The attitude towards spectacle wear among the spectacle compliant university student group is moderate. The perceived visual comfort with spectacles, as well as the positive and intelligent impression created by spectacle wear, is the key drivers of spectacle wear.

Keywords Spectacle Wear, Compliance, Refractive Error, Visual Impairment, Spectacle Correction

1. Introduction

Refractive errors are the leading cause of visual impairment [1] among young adults globally, and spectacle correction remains the most effective and accessible intervention [2]. However, compliance with spectacle wear is consistently suboptimal, especially among university student populations. Recent studies highlight that a significant proportion of students either do not use spectacles as prescribed or wear inappropriate corrections, potentially due to negative perceptions and a lack of awareness [3]. For instance, our previous study found that almost two-thirds of this population had inappropriate spectacle correction [3].

Compliance towards spectacle wear is presumably shaped by the combination of its utility and wearers' psychological factors towards the spectacle modality [3]. While a certain proportion of students recognize the academic as well as the functional benefits associated with the spectacles, the remaining population are deterred by the misconceptions about vision deterioration, fear of dependency and the social stigma associated with spectacle wear [3]. Also, our previous study among the spectacle non-compliant group found that the Health Science students had higher positive perception towards spectacle wear [3]. Family disapproval or prevailing myths related to spectacle wear are found to be associated with the student's noncompliance towards this modality [4].

Spectacle compliance was observed to be associated with higher academic achievement, understanding of the knowledge on the benefits of spectacle wear [5], and the type and severity of associated refractive errors [6] [7]. Spectacle compliance is essential not only for visual improvement but also for influencing the quality of life and the students' academic performance [8]. Previous studies within Omani student population have already indicated positive outcomes associated with the spectacle compliance due to the visual improvement and performance in school related activities [9].

Despite the availability of eye care services and national level school vision screening programs in Oman, the spectacle compliance rates among the student population remain a concern and highlight the importance of health promotion activities focusing on improving this spectacle compliance while involving the students, parents, as well as the school authorities [6] [9]. Such a gap between the eye care service utilization and spectacle compliance is also observed in a previous study conducted in Nepal [10]. Understanding the contextual aspects of the culture and education within Oman, the quality of life and academic benefits associated with spectacle wear, this study highlights the pressing need to evaluate the drivers of spectacle compliance among the university student population. For this study, the participants wearing the same spectacle prescription as per their refractive status identified during the study visit were defined as the spectacle compliant. The study aims to evaluate these driving factors, to form a baseline for informed decision-making, while supporting the current health intervention within the region that focuses on enhancing the visual health and academic progress among the population [6] [9] [11].

2. Methodology

2.1. Study Design

This cross-sectional study employed a questionnaire-based tool to collect the responses among the university students that were compliant with spectacle wear. The data were collected between December 2017 and May 2018 [3]. The participant invitation was disseminated through the university e-mail ID as well as social media groups. All the participants across four different majors, including Health sciences, Business, Engineering and Law, genders and economic status, were given equal preference [3]. The sample size of 128 was calculated considering the 10% compliance with spectacles and at a confidence level of 95% [3]. Out of the total 275 participants undergoing ocular examination, 154 (56%) were observed to have refractive error and only 25 (16.23% of these 154) were spectacle compliant. The questionnaire was circulated among this spectacle compliant group.

2.2. Study Tool

The questionnaire was designed through the literature review [7] [12] [13]. It had positive statements related to spectacle modality. The tool had five items focusing on spectacle utility-related perceptions and six items focusing on psychological factors. The statements related to utility were: Spectacles provide good visual comfort, Spectacles provide me with wearing comfort, Spectacles require less Care and Maintenance, Spectacles are an economic mode of visual correction, and Spectacles are good for ocular safety. The statements related to psychological factors were: Spectacles improve my cosmetic appearance, Wearing spectacles gives a positive impression, Wearing spectacles represents intelligence, Spectacles help in creating a sincere personality, Spectacles are important for long-term visual efficiency, I wear glasses as parents force to wear it. The responses on 'I wear glasses as parents force to wear it' were applied reverse coding approach during scoring.

The content validity was done through the evaluation by the optometry experts using dichotomous responses; questionnaire items achieving more than 80% of the expert agreement were retained within the questionnaire. The internal consistency of the questionnaire was confirmed using Cronbach's alpha of 0.76, indicating acceptable reliability. The test-retest validity was confirmed using the Pearson correlation coefficient of 0.83.

2.3. Study Procedure

Participants with or without refractive errors having no ocular abnormalities or associated pathologies were included in the study. The participants' study eligibility was confirmed through the standard ophthalmic examination including visual acuity, slit lamp assessment as well as subjective and objective refraction. The survey was circulated among the participants having refractive errors and using the same spectacle prescription at the time of study visit. All responses were collected using a five-point likert scale ranging from strong disagreement to strongly agree.

2.4. Ethical Approval

The study obtained ethical approval from the university Research and Ethics Committee. Participation was voluntary and informed consent was obtained from all the study participants. Participants were also ensured for the confidentiality and anonymity of their information.

2.5. Data Analysis

Data were analyzed using IBM SPSS statistics for Windows version 21 (IBM Corp., Armonk, NY, USA).

Participant profile was analyzed using descriptive statistics. The association between the type of attitude among the spectacle compliant group and the participant profile was assessed using a chi-square test. The association between the mean attitude score and the participants' profile was evaluated using Generalized Linear Model.

3. Results

3.1. Participants' Profile

The majority of the males were from Engineering (39; 49.37%), followed by Business (34; 43.04%), Nursing (4; 5.06%), and Optometry (2; 2.53%). The majority of the females were in Optometry (62; 31.63%) and Nursing (42; 21.43%), followed by Business (48; 24.49%) and Engineering (44; 22.45%).

Most of the population was from urban areas with more females (145; 73.98%) than males (30; 37.97%). The majority of the male population was from rural areas (49; 62.03%).

Father's education level was higher among the male population (30; 37.97%) compared to the female population (40; 20.41%). Mother's educational level as elementary education was most reported by both males (39; 49.37%) and females (98; 50.00%).

(33; 41.77%) males and (107; 54.59%) females reported having parents in the medical field (Table 1).

3.2. Spectacle Compliance among the Student Population

Out of the total 275 participants undergoing ocular examination, 154 (56%) were observed to have refractive errors and only 25 (16.23% of these 154) were spectacle compliant. The higher overall mean benefit score (M= 61.27, SD = 18.02) related to spectacles, including utility and psychological aspects of spectacle wear, indicates agreement for spectacle wear among the student group.

3.3. Utility Related Perceptions among the Spectacle Compliant Student Population

Descriptive statistics were used to evaluate participants' utility related perceptions regarding the spectacle among the spectacle compliant group. The highest mean score was observed for the visual comfort associated with spectacles (M = 75.00, SD = 31.46), indicating strong agreement among the participants, followed by the factors associated with wearing comfort (M = 71.00, SD = 28.58), requiring less care and maintenance (M= 72.00 SD = 24.28) and ocular safety (M = 67.00, SD = 33.63). The lowest score was observed for the category of spectacles as an economic mode of visual correction (M = 54.00, SD = 31.19). Overall, participants agreed to the utility related benefits associated with spectacle wear (Table 2).

3.4. Psychology Related Perceptions among the Spectacle Compliant Student Population

Descriptive statistics were used to evaluate psychology related perceptions among the spectacle compliant student population. The factor about the spectacle providing a positive impression (M = 61.00, SD = 26.10) and wearing spectacles reflects intelligence (M = 61.00, SD = 27.08) received the maximum favorable perception. The perception of spectacle creating a sincere personality received a moderate mean score (M = 56.00, SD = 29.12), and for the factor of 'spectacles are essential for long-term visual efficiency' had a slightly lower mean (M = 55.00, SD = 35.36), indicating mixed opinion. The majority of the participants did not agree on the parent force for wearing the spectacles (M = 46.00, SD = 39.32) (Table 3).

3.5. Association between Type of Attitude among Spectacle Compliant Group and Participant Profile

A chi-square test was used to examine the association between the various demographic factors and the type of attitude (positive or negative) among the spectacle compliant participants. The total sample consisted of 25 individuals with only 5(20%) exhibiting a negative attitude and most of them 20 (80%) showing the positive perception towards the spectacle modality. A positive attitude was higher among the male population 87.5% (7 out of 8) compared to the female population 76.5% (13 out of 17). Engineering students showed the highest proportion of positive attitude (100%, 8 out of 8), whereas optometry, nursing and business students had more balanced distributions. Students from urban and rural areas reflected similar distribution of attitudes. However, students from rural areas had a slightly higher positive attitude (83.3%) compared to those from urban areas (23.1%). (87.5%) of the participants whose father had university level education showed higher positive attitudes, whereas mothers' education level did not significantly influence attitude towards spectacle compliance. Interestingly participants with parental association with the medical field were more likely to have negative attitudes (30.8%).

Table 1. Participants' profile

		Gender				Total		Pearson Chi-Square	
		Male		Female					
		N	%	N	%	N	%	Value	P-Value
Study Major	Optometry	2	2.53%	62	31.63%	64	23.27%	49.518[a]	0.00
	Nursing	4	5.06%	42	21.43%	46	16.73%		
	Business	34	43.04%	48	24.49%	82	29.82%		
	Engineering	39	49.37%	44	22.45%	83	30.18%		
Location	Urban	30	37.97%	145	73.98%	175	63.64%	31.543[a]	0.00
	Rural	49	62.03%	51	26.02%	100	36.36%		
Fathers Education	University level	30	37.97%	40	20.41%	70	25.45%	17.220[a]	0.00
	High school level	14	17.72%	83	42.35%	97	35.27%		
	Elementary level	35	44.30%	73	37.24%	108	39.27%		
Mothers Education	University level	17	21.52%	20	10.20%	37	13.45%	7.112[a]	0.03
	High school level	23	29.11%	78	39.80%	101	36.73%		
	Elementary level	39	49.37%	98	50.00%	137	49.82%		
Parent related medical field	Yes	33	41.77%	107	54.59%	140	50.91%	3.703[a]	0.06
	No	46	58.23%	89	45.41%	135	49.09%		
Total		79	100.00%	196	100.00%	275	100.00%		

Table 2. Utility related perceptions among the spectacle compliant student population

		Mean	Std. Deviation
Utility related	Spectacles provide me with good visual comfort	75.00	31.46
	Spectacles provide me with wearing comfort	71.00	28.58
	Spectacles require less Care and Maintenance	72.00	24.28
	Spectacles are an economic mode of visual correction	54.00	31.19
	Spectacles are good for ocular safety	67.00	33.63

Table 3. Psychology related perceptions among the spectacle compliant student population

		Mean	Std. Deviation
Psychological	Spectacles improve my cosmetic appearance	56.00	30.86
	Wearing spectacles gives a positive impression	61.00	26.10
	Wearing spectacles represents intelligence	61.00	27.08
	Spectacles help in creating a sincere personality	56.00	29.12
	Spectacles are important for long-term visual efficiency	55.00	35.36
	I wear glasses as parents force to wear it	46.00	39.32

Table 4. Association between the type of attitude among spectacle compliant group and participant profile

		Type of attitude among spectacle compliant group						Pearson Chi-Square	
		Negative		Positive		Total			
		N	%	N	%	N	%	Value	P-Value
Gender	Male	1	20.00%	7	35.00%	8	32.00%	.414[a]	0.52
	Female	4	80.00%	13	65.00%	17	68.00%		
Study Major	Optometry	1	20.00%	4	20.00%	5	20.00%	3.333[a]	0.34
	Nursing	2	40.00%	4	20.00%	6	24.00%		
	Business	2	40.00%	4	20.00%	6	24.00%		
	Engineering	0	0.00%	8	40.00%	8	32.00%		
Location	Urban	3	60.00%	10	50.00%	13	52.00%	.160[a]	0.69
	Rural	2	40.00%	10	50.00%	12	48.00%		
Fathers_Education	University level	1	20.00%	7	35.00%	8	32.00%	.434[a]	0.80
	High school level	2	40.00%	6	30.00%	8	32.00%		
	Elementary level	2	40.00%	7	35.00%	9	36.00%		
Mothers_Education	University level	1	20.00%	4	20.00%	5	20.00%	.469[a]	0.79
	High school level	3	60.00%	9	45.00%	12	48.00%		
	Elementary level	1	20.00%	7	35.00%	8	32.00%		
Parent_related_medical_field	Yes	4	80.00%	9	45.00%	13	52.00%	1.963[a]	0.16
	No	1	20.00%	11	55.00%	12	48.00%		
Total		5	100.00%	20	100.00%	25	100.00%		

However, the association between and attitude and the variables of gender ($\chi^2(1, N = 25) = 0.414$, $p = 0.52$), study major ($\chi^2(3, N = 25) = 3.333$, $p = 0.34$), location ($\chi^2(1, N = 25) = 0.160$, $p = 0.69$), educational level of father ($\chi^2(2, N = 25) = 0.434$, $p = 0.80$), mother ($\chi^2(2, N = 25) = 0.469$, $p = 0.79$), parental association with medical field ($\chi^2(1, N = 25) = 1.963$, $p = 0.16$) was not statistically significant (Table 4).

3.6. Association of the Mean Spectacle Benefit Scores with Demographic Profile

Also, a generalized linear model was conducted to examine the predictors of the percentage mean attitude score among spectacle compliant participants. Gender (B = -0.429, p = 0.974)) was not a significant predictor for the mean attitude score. Compared to engineering, none of the academic majors including optometry (B = 0.168, p = 0.991), nursing (B = 8.983, p = 0.397) and business (B = -10.624, p = 0.274) significantly influence the mean attitude score. Participants from urban areas had slightly lower scores than from the rural areas (B = -6.643, p = 0.374). Considering the elementary education level of the father as reference, neither university level education (B = 4.602, p = 0.704) nor high school level education (B = -3.424, p = 0.704) predicted the mean attitude score. Age (B = -2.546, p = 0.232) was also not the significant predictor of the mean attitude scores (Table 5).

Table 5. Association of the mean spectacle benefit scores with demographic profile

Parameter	B	Std. Error	95% Wald Confidence Interval		Hypothesis Test		
			Lower	Upper	Wald Chi-Square	df	Sig.
(Intercept)	135.01	41.90	52.89	217.14	10.38	1.00	0.00
[Gender-m1/f2=1]	-0.43	12.99	-25.88	25.03	0.00	1.00	0.97
[Gender-m1/f2=2]	0[a]						
[Major- 1_Optometry,2_Nursing,3_Business,4_Engineering,5_Law,=1]	0.17	14.14	-27.55	27.89	0.00	1.00	0.99
[Major- 1_Optometry,2_Nursing,3_Business,4_Engineering,5_Law,=2]	8.98	10.60	-11.79	29.76	0.72	1.00	0.40
[Major- 1_Optometry,2_Nursing,3_Business,4_Engineering,5_Law,=3]	-10.62	9.71	-29.66	8.42	1.20	1.00	0.27
[Major- 1_Optometry,2_Nursing,3_Business,4_Engineering,5_Law,=4]	0[a]						
[Location_1_Urban_2_rural=1]	-6.64	7.47	-21.28	7.99	0.79	1.00	0.37
[Location_1_Urban_2_rural=2]	0[a]						
[Fathers_Education- 1/2/3/4=1]	4.60	12.13	-19.18	28.38	0.14	1.00	0.70
[Fathers_Education- 1/2/3/4=2]	-3.42	9.02	-21.11	14.26	0.14	1.00	0.70
[Fathers_Education- 1/2/3/4=3]	0[a]						
[Mothers_Education-1/2/3/4=1]	-12.47	12.44	-36.85	11.92	1.00	1.00	0.32
[Mothers_Education-1/2/3/4=2]	-9.88	8.30	-26.15	6.38	1.42	1.00	0.23
[Mothers_Education-1/2/3/4=3]	0[a]						
[Parent_related_medical_field-1/2=1]	-17.82	10.00	-37.42	1.78	3.17	1.00	0.07
[Parent_related_medical_field-1/2=2]	0[a]						
Age in years	-2.55	2.13	-6.72	1.63	1.43	1.00	0.23
(Scale)	196.231[b]	55.50	112.72	341.61			

Dependent Variable: Percentage Mean Attitude Score
Model: (Intercept); Gender- 1_Male, 2_Female, Major- 1_Optometry, 2_Nursing, 3_Business, 4_Engineering, 5_Law; Location: 1_Urban, 2_rural; Fathers_Education- 1. University level/2. High school level/ 3. Elementary level, Mothers_Education-1. University level/2. High school level/ 3. Elementary level, Parent_related_medical_field-Yes/No, Age in years

a. Set to zero because this parameter is redundant.

b. Maximum likelihood estimate.

4. Discussion

The study highlights the essential gap regarding the attitude among the university students that are compliant with spectacle wear. Despite showing spectacle compliance, the overall mean benefit score of 61.27% related to spectacles indicates a scope for improving the favorable attitude towards spectacle wear. Our previous study within the same population, having refractive error but either using no correction (83.5%) or wearing inappropriate spectacle correction (16.5%), also indicated a positive attitude towards spectacle wear [3]. This reflects the positive attitude towards spectacle wear among the student population. However, the remaining gap of enhancing the attitude and improving spectacle compliance needs to be filled.

Interestingly spectacle compliant students from the health science major were observed to have a mixed attitude towards the benefits of spectacle wear, whereas our previous study in the same population, but wearing inappropriate correctly indicted a positive attitude towards spectacle wear [3]. The observations suggest further need for spectacle wear promotion even among the spectacle compliant group.

The lower rate of spectacle compliance among the university student population is a matter of concern. Our study university students observed the spectacle compliance rate of 16.23%, while the previous regional studies among the school population observed the higher compliance rate of up to 79.1% [7]. The lower spectacle compliance rate among our study population could be due to differing priorities or lifestyles or reduced parental monitoring compared to the younger age group of school children. The study findings suggested age-specific interventions to improve the attitude towards spectacle wear.

In this study, the attitude towards spectacle wear among the spectacle compliant university student group is moderate. The perceived visual comfort with spectacles, as well as the positive and intelligent impression created by spectacle wear, is the key drivers of spectacle wear. On the contrary, a previous study indicated that being teased due to the spectacle wear is one of the causes of spectacle non-wear [13]. Also, another study indicated family disapprovals or associated spectacle wear related myths for the spectacle non-wear [4], whereas our study clearly indicated that parental disapproval is an invalid reason behind spectacle non-wear. The moderate attitudes among the spectacle compliant group could be due to the psychological and contextual factors. Various studies indicate that cosmesis, social stigma and peer pressure could be the causative factors for the partial motivation towards spectacle wear, despite their adherence to the spectacle wear within the group [4] [14] [15] [16]. These observations indicate that spectacle compliance is not necessarily aligned with the individual's positive attitude related to spectacle wear; hence, it is essential to address both practical and psychological barriers.

This study reports that the participants are drawn from a single university in the region and do not reflect the broader university population, which might limit the generalizability of the study results [17] [18].

Moreover, cultural, socioeconomic, demographic as well as eye care access related diversities among the population could have a significant impact on the spectacle wear related attitude and compliance [15] [18].

Our study findings support extending the health promotional initiates among university student population [3]. An integrated approach involving students, parents as well as school authorities within the eye care system can be supportive of enhancing the spectacle wear uptake. The interventions can emphasize routine ocular examinations, accessible opportunities for the spectacle replacement services and promotional activities to dispel limits and reinforce spectacle wear benefits. As indicated in our previous study, while economic factors are the negligible barrier [3], psychological and convenience related factors associated with spectacle wear, still pose a challenge to its compliance. The reasons for differences in spectacle wear-related attitudes across the majors need to be further explored. Moreover, longitudinal studies have potential in assessing the evolving attitude and compliance pattern among the targeted audience over time [19] [20]. In addition, further studies can be done to evaluate the impact of frame design, affordability, and parents as well as peer influences on spectacle related compliances and attitudes [14] [15] [16] [19] [20].

This study focuses on an essential public health challenge by evaluating the key drivers of spectacle compliance among university students. Addressing these pressing issues through the comprehensive and customized interventions considering the contextual and age wise needs could significantly reduce the burden of uncorrected refractive error to improve the educational performance as well as the quality of life among students [9].

5. Conclusions

The attitude towards spectacle wear among the spectacle compliant university student group is moderate. The perceived visual comfort with spectacles, as well as the positive and intelligent impression created by spectacle wear, is the key drivers of spectacle wear. This study provides spectacle compliance related actionable insights for public health policymakers and educational institutions. Through leveraging positive attitudes towards spectacle wear, its compliance can be improved to enhance visual, academic as well as quality-of-life outcomes among the student population.

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Conflict of Interest

The author declares no conflict of interest related to this publication.

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