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A study on the validity and reliability of the Amblyopia and Strabismus Questionnaire (A&SQ) in Turkish

Halise ÇOŞKUN[1,*], Sevinç TAŞTAN[1], Emine İYİGÜN[1], Fatih Mehmet MUTLU[2], Osman Melih CEYLAN[2], Halil İbrahim ALTINSOY[2]

[1]School of Nursing, Gülhane Training and Research Hospital, Healt Sciences University, Ankara, Turkey

[2]Department of Ophthalmology, Gülhane Training and Research Hospital, Healt Sciences University, Ankara, Turkey

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Background/aim: This study aims to evaluate the reliability and validity of the Amblyopia and Strabismus Questionnaire (A&SQ) that is translated into Turkish.

Materials and methods: This is a methodological study. A total of 149 patients took part in the survey research between December 2012 and June 2014 in an university hospital, and 37 were retested. Cronbach's alpha coefficient was used for the questionnaire's reliability analysis.

Results: Cronbach's alpha coefficients for the subscales of fear of losing the better eye, distance estimation, visual disorientation, double vision, and social contact and appearance were found to be 0.80, 0.88, 0.95, 0.80, and 0.81, respectively. Five factors determined by the exploratory factor analysis explained 69.87% of the total variance.

Conclusion: The Turkish version of the A&SQ is found as a reliable and valid scale for analyzing Turkish society. The A&SQ might be helpful for measuring quality of life in patients with strabismus.

Key words: Strabismus, quality of life, scale, Turkish

1. Introduction

Strabismus is misalignment of the eyes. Amblyopia is generally diminished vision in one or both eyes (1). The average percentage of strabismus for adults is 4%. Appearance has a considerable influence over psychosocial functions and the eyes play an especially important role in communication and attractiveness. Consequently, strabismus influences the quality of life (2).

Research has shown that strabismus has psychological and physiological effects on daily life, including visual dysfunction, self-image disorders, low self-esteem, and social and emotional barriers (3–6). Strabismus has negative influences over not only employment and promotion (7) but also finding a partner. This negative influence is greater than a scar on the face, a big nose, or protruding ears (8). Strabismus has a significant negative impact on the perceived personality traits (9) and quality of life through both functional and psychosocial factors (10). Two strabismus-specific health-related quality of life questionnaires for adult patients, the Adult Strabismus Quality of Life Questionnaire (AS-20) and the Amblyopia and Strabismus Questionnaire (A&SQ), have been recommended in the management of adult strabismus (11). Comparison of the AS-20 and A&SQ showed satisfactory and comparable results for measuring quality of life in patients with strabismus (12).

In Turkey, there are a limited number of questionnaires used for evaluating life qualities of patients with eye diseases. One of these is the National Eye Institute Visual Function Questionnaire (NEI-VFQ-39), whose reliability and validity testing for Turkey was conducted in 2010 (13). However, this questionnaire is used not for a specific type of disease but for all chronic eye diseases. There is no specific questionnaire for assessing the life qualities of patients that suffer from strabismus in Turkey. Hence, this study aims to introduce the A&SQ in order to evaluate the life qualities of patients with strabismus. With this aim in mind, it analyses the validity and reliability of the A&SQ as translated into Turkish.

2. Materials and methods

2.1. Design, setting, and sample

This methodological study has been conducted in order to analyze the validity and reliability of the A&SQ as

* Correspondence: halisecoskun@gau.edu.tr

translated into Turkish. It was conducted at the polyclinic of the department of ophthalmology in a university hospital between December 2012 and June 2014.

The sampling magnitude was determined according to the number of items plus five calculations. The recommended criterion is at least 5–10 participants per item of an instrument for determining the factor structure (14). Accordingly, for a questionnaire with 26 items, there should be at least 130 survey participants. Hence, 149 patients constituted the sample of the study.

2.2. Instruments

2.2.1. Data collection form

The data collection form consisted of five questions on age, sex, marital status, education level, and job status of the participants.

2.2.2. Amblyopia and Strabismus Questionnaire (A&SQ)

The A&SQ was first developed by van de Graaf et al. in 2004 in order to determine the impact of strabismus on the life quality of patients that suffer from this problem (15). The questionnaire, which was originally in Dutch, is composed of 26 items and 5 subscales. Cronbach's alpha coefficient of the questionnaire is between 0.76 and 0.93. Felius et al. measured the validity of the English translation (16).

The questionnaire was originally developed with the purpose of academic research. However, it may also be used to evaluate the adequacy of recovery and treatment methods. The questionnaire is disseminated via the Internet and it is free to use by researchers with the condition of a reference to its original creators. The A&SQ may either be sent to the participants or used in clinics.

Every item in the A&SQ is scored with minimum and maximum numbers of 0 and 100. The items mostly have five answers but some items have only three answers, meaning that the possible scores are 100, 50, and 0. If an item is unanswered or if the participant considers it unrelated then the answer is scored as 100. The total score of the A&SQ is obtained by summing the individual scores of all items and taking the mean value of the total score. Hence, the possible scores may be between 0 and 100.

2.2.3. Translation process

The questionnaire was first translated from English to Turkish by three academicians with competent English language skills independently of each other. The obtained translation was retranslated into English by three other academicians with competent English. The translators analyzed the consistency of the original questionnaire and the one retranslated into English and found no incoherence (17). The obtained questionnaire was administered to 10 patients in order to determine the extent to which the questionnaire was apprehensible. In the end, we decided that the questionnaire was apprehensible.

2.2.4. Survey study

Necessary permission for the research was obtained from the research ethics committee of the university. Consent of the patients was also received. Patients with strabismus disease were examined by the doctors and those with strabismus who had at least 20/50 visual acuity as found by the Snellen chart, who had no disease except for the strabismus, and who agreed to participate were included in the research. The ratio of 20/50 visual acuity was accepted as the limit since it has the least influence over life quality (16,18). The participants were informed and the questionnaires were distributed. It took about 10–12 min for the participants to complete the questions. Thirty-seven patients that could be reached after 4 weeks were asked to complete the A&SQ again.

2.2.5. Data analysis

SPSS 15.0 (SPSS Inc., Chicago, IL, USA) was used in the analysis of the data. Descriptive statistics, percentage, mean, and standard deviation were used for evaluation of the sociodemographic data. Items were evaluated by using the Pearson correlation coefficient in order to analyze the correlation between items. Cronbach's alpha coefficient was used to analyze the reliability of the questionnaire. Normality analysis was performed using the one-sample Kolmogorov–Smirnov test. Additionally, differences between the mean scores of the test and retest subscales were calculated by using the Pearson correlation coefficient. The questionnaire's factorial structure was analyzed by using exploratory factor analysis and varimax rotation. Before the factor analysis, the Kaiser–Meyer–Olkin test was used to evaluate the appropriateness of the sample size. Varimax rotation was used before factor extraction. Eigenvalues and scree plots were used to determine the number of factors. The value of $P < 0.05$ was taken as the indicator of statistical significance.

2.2.6 Limitation of the research

There is no other strabismus scale in Turkish to use for concurrent validity.

3. Results

3.1. Characteristics of sample

The mean age of the participants was 23.37 ± 5.42 years, and 126 (84.56%) were male and 23 (15.44%) were female. Fourteen (9.40%) of the patients were married and 135 (90.60%) were single. Seventy-seven (51.68%) were primary school, 39 (26.17%) high school, and 33 (22.18%) university graduates. Furthermore, 116 (77.85%) patients were employed, 14 (9.40%) were students, and 19 (12.75%) were unemployed.

3.2. Validity

Table 1 demonstrates the factor analysis results. Exploratory factor analysis found that the A&SQ constituted five

Table 1. Amblyopia and Strabismus Questionnaire (A&SQ) factor loadings.

Items	Five-factor				
	1	2	3	4	5
DE 9. I find it difficult to put the cap on a pen or marker.	0.84				
DE 11. I have difficulties pouring drinks.	0.81				
DE 7. I miss the other person's hand when trying to shake hands.	0.79				
DE 10. I find it difficult to put a power plug into a socket.	0.78				
DE 12. I have difficulties walking down stairs.	0.74				
DE 6. I feel unsure or hesitant when putting something on a table.	0.69				
D 18. Double vision disturbs me in my daily activities (household, study, school, hobbies, work).	0.67				
D 19. When I am tired, I must be very careful not to miss what I reach for.	0.64				
D 20. I have to do things more slowly when I am tired because of my eyesight.	0.54				
SCA 23. I have difficulty making eye contact with people in a group conversation.		0.85			
SCA 22. I have difficulty making eye contact in a one-on-one conversation.		0.84			
SCA 25. Because of my misaligned eyes I feel insecure.		0.79			
D 21. I have to squint or shut one eye in bright sunlight.		0.56			
SCA 26. If I did not have misaligned eyes, I would have more self-confidence.		0.55			
VD 14. I have difficulties finding my way in a shopping mall, especially when I am there for the first time.			0.80		
VD 16. I have difficulties finding my way in a train station, especially when I am there for the first time.			0.78		
VD 15. I have difficulties finding my way in a department store or a supermarket, especially when I am there for the first time.			0.77		
DE 13. I have difficulties playing ball games.			0.51		
DE 8. I have difficulty parking my car.			0.38		
FLBE 3. I worry that something might get into my better eye.				0.85	
FLBE 2. I worry about losing my better eye.				0.78	
DE 5. I have good depth perception.					0.89
DE 4. I can estimate distances well.					0.81
[a] 1. I can see equally well with both eyes.	-	-	-	-	-
[a] 17. I see double.	-	-	-	-	-
[a] 24. My eyes are misaligned (one or both eyes cross, or turn out or turn up).	-	-	-	-	-
Eigenvalues	1.26	9.88	1.56	1.10	2.27
Total percentage and cumulative addition	5.50	42.97	6.79	4.77	9.86
Total percentage of the model	-	-	-	-	69.87

FLBE: Fear of losing better eye, DE: distance estimation, VD: visual disorientation, D: diplopia, SCA: social contact and appearance.
[a] Items 1, 17, and 24 act as filters (16).

factors with each item having an eigenvalue of over one. We found that items number 2 and 3 were loaded to 'factor 4'; items 4 and 5 to 'factor 5'; items 6, 7, 9–12, and 18–20 to 'factor 1'; items 8 and 13–16 to 'factor 3'; and items 21–23, 25, and 26 to 'factor 2'. The five factors determined by the factor analysis explained 69.87% of the total variation. The most explanatory factor was 'factor 2' with an explanatory power of 42.97% (Figure).

3.3. Reliability

Table 2 shows the A&SQ corrected item-total correlation, Cronbach's alpha if item deleted, and Cronbach's alpha for subscales. The analysis of the corrected item-total correlation shows that all correlation coefficients were between 0.26 and 0.93. When the fifth item, which had the lowest item-total correlation, was excluded, the Cronbach's alpha value increased from 0.88 to 0.89. We decided not to exclude the fifth item. Cronbach's alpha coefficients for the subscales of fear of losing the better eye, distance estimation, visual disorientation, double vision, and social contact and appearance were found as 0.80, 0.88, 0.95, 0.80, and 0.81, respectively. As indicated in Table 3, correlation analysis conducted for the test-retest reliability showed a positive correlation between subscale scores of test and retest ($P < 0.05$).

4. Discussion

This study, which aimed to provide researchers with a Turkish translation of the A&SQ, measured the reliability and validity of the translated questionnaire. It has been noted that acceptable Cronbach's alpha values range between 0.70 and 0.95 (19). In this study the Cronbach's alpha values ranged between 0.80 and 0.95. Our study's findings are between the acceptable values. The original study proposed by van de Graaf et al. found the Cronbach's alpha value to range between 0.76 and 0.93 (15). The English translation of the questionnaire found the Cronbach's alpha value ranging between 0.80 and 0.92 (16). The Chinese version of the A&SQ found the Cronbach's alpha value as 0.91 (20). On the other hand, the Italian version of the questionnaire found the Cronbach's alpha value to range between 0.64 and 0.77 and only the fear of losing the better eye and the social contact and appearance subscales were above 0.70 (21). The Turkish version's subscales' Cronbach's alpha values are similar to those of the original and the English versions.

It has been stated that the item-total score correlations in item analysis should not be negative and should have at least 0.30 factor load (22). For example, item analysis of the Italian version of the A&SQ showed that the items' coefficients were between 0.31 and 0.91 (21), whereas these values ranged between 0.41 and 0.94 for the English version

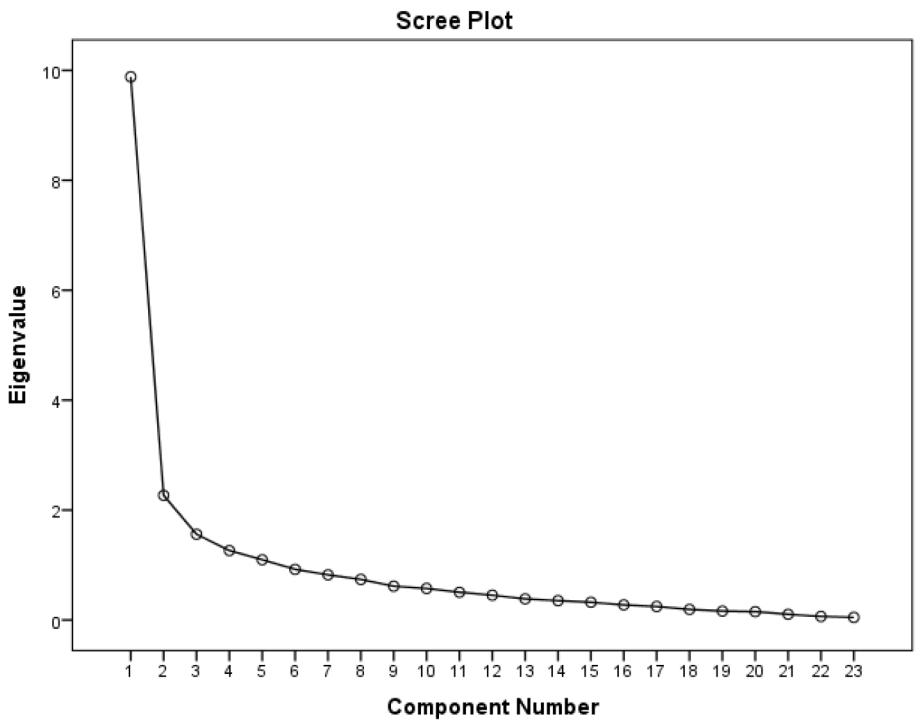

Figure. Scree plot.

Table 2. Item analysis and internal consistency of the A&SQ.

Items	Corrected item-total correlation	Cronbach's alpha if item deleted	Cronbach's alpha
[a] 1. I can see equally well with both eyes.	-	-	-
FLBE 2. I worry about losing my better eye.	0.66	-	0.79
FLBE 3. I worry that something might get into my better eye.	0.66	-	
DE 4. I can estimate distances well.	0.44	0.88	0.88
DE 5. I have good depth perception.	0.27	0.89	
DE 6. I feel unsure or hesitant when putting something on a table.	0.61	0.86	
DE 7. I miss the other person's hand when trying to shake hands.	0.71	0.86	
DE 8. I have difficulty parking my car.	0.41	0.88	
DE 9. I find it difficult to put the cap on a pen or marker.	0.74	0.86	
DE 10. I find it difficult to put a power plug into a socket.	0.80	0.85	
DE 11. I have difficulties pouring drinks.	0.79	0.85	
DE 12. I have difficulties walking down stairs.	0.78	0.85	
DE 13. I have difficulties playing ball games.	0.59	0.87	
VD 14. I have difficulties finding my way in a shopping mall, especially when I am there for the first time.	0.91	0.92	0.95
VD 15. I have difficulties finding my way in a department store or a supermarket, especially when I am there for the first time.	0.93	0.91	
VD 16. I have difficulties finding my way in a train station, especially when I am there for the first time.	0.86	0.96	
[a] 17. I see double.	-	-	
D 18. Double vision disturbs me in my daily activities (household, study, school, hobbies, work).	0.58	0.76	0.80
D 19. When I am tired, I must be very careful not to miss what I reach for.	0.63	0.73	
D 20. I have to do things more slowly when I am tired because of my eyesight.	0.73	0.68	
D 21. I have to squint or shut one eye in bright sunlight.	0.50	0.80	
SCA 22. I have difficulty making eye contact in a one-on-one conversation.	0.72	0.72	0.81
SCA 23. I have difficulty making eye contact with people in a group conversation.	0.77	0.69	
[a] 24. My eyes are misaligned (one or both eyes cross, or turn out or turn up).	-	-	
SCA 25. Because of my misaligned eyes I feel insecure.	0.60	0.78	
SCA 26. If I did not have misaligned eyes, I would have more self-confidence.	0.45	0.84	

FLBE: Fear of losing better eye, DE: distance estimation, VD: visual disorientation, D: diplopia, SCA: social contact and appearance.
[a] Items 1, 17, and 24 act as filters (16).

Table 3. Correlation of the test-retest results of subscales of the A&SQ.

Subscales	Test-retest	
	r*	P
Fear of losing better eye	0.84	<0.001
Distance estimation	0.81	<0.001
Visual disorientation	0.84	<0.001
Double vision	0.86	<0.001
Social contact and appearance	0.93	<0.001

*Pearson correlation coefficient test has been used.

(16). We have found that the correlation coefficients of all items ranged between 0.26 and 0.93.

While evaluating the factorial structure, we paid special attention for each item to have a factor load value of at least 0.30. Since the minimum factor load value was 0.383, none of the items were excluded from the questionnaire. Given that the factor loads of the items were generally strong, we did not make any changes in the Turkish version of the scale. We kept the items as they were in their original form.

Test and retest reliability is an important step for reliability as it demonstrates that the questionnaire does not change over time. The Chinese version of the A&SQ found the test-retest reliability correlation between 0.73 and 1 (20), whereas the Italian version found the same value between 0.92 and 1 (21). The Cronbach's alpha coefficient for internal consistent reliability was 0.89 and the test-retest reliability was 0.95 in another study of the Chinese version of the A&SQ (23).

We have found positive, strong, statistically significant correlations between all subscale scores ($P < 0.05$) and our test-retest reliability correlation ranged between 0.81 and 0.93. These results show that the Turkish version of the A&SQ provided consistent results over time. Hence, we may conclude that the test-retest reliability is maintained.

We used exploratory factor analysis in order to evaluate the factorial validity of the questionnaire. Similar to that of the original one, our questionnaire's items were grouped within five factors and these factors explained 69.87% of the total variation. In our study, 'factor 2' had the most important contribution for the total variation with a percentage of 42.97%. In the analysis of the factorial reliability of the original study, items of the questionnaire were grouped within six factors and these six factors explained 70.48% of the total variance with a maximum contribution of 33.65% by the individual factor. With the exception of the distance estimation subscale, all others were loaded similarly. Since the distance estimation subscale items were loaded in such a way that the near and the far distance estimation could be distinguished, five factors were preferred (24). On the other hand, the Italian version of the A&SQ loaded the items to seven factors and these seven factors explained 74.69% of the total variance with a maximum contribution of 34.17% by the individual factor. In the Italian version, the FLBE and the VD subscale items were loaded similarly to the original study (21). The Chinese version of the A&SQ loaded the items to six factors and these six factors explained 67.58% of the total variance with a maximum contribution of 19.98% by the individual factor (23).

Our study loaded the FLBE, VD, and SCA subscale items similarly to the original study. However, we grouped the 4th and the 5th items, which were grouped under the distance estimation subscale in the original version, to 'factor 5'. We also grouped the 8th and the 13th items under 'factor 3', and the 21st item under 'factor 2'. Since the item loads and the variances were significant, we decided not to change the questionnaire form and to use the factors in the Turkish version as they appeared in the original Dutch version.

This study has found that the Turkish translation of the A&SQ is a reliable and valid measurement tool. Within this context, we propose to use this questionnaire in order to evaluate the life qualities of patients that suffer from the disease of strabismus.

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