Turkish Validity and Reliability of DREEM Questionnaire used in Assessment of Learning Environment in Physiotherapy and Rehabilitation Undergraduate Education

Saadet Ufuk Yurdalan

Marmara University, Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation,
Department of Cardiopulmonary Physiotherapy and Rehabilitation, Maltepe, Istanbul, Turkey
E-mail: ufuk.yurdalan@marmara.edu.tr
Orcid No: 0000-0003-0985-0100

Nuri Sengir (Corresponding author)
Hamad General Hospital, Al Hamadani Street, 38 zone, Building No:23/39 Al Sadd, Doha, Katar
E-mail: nurisengir@hotmail.com
Orcid No: 0000-0001-7891-4345

Emre Isci
Marmara University, Faculty of Health Sciences, Department of Health Management,
Department of Health Policies, Maltepe, Istanbul, Turkey
E-mail: emre.isci@marmara.edu.tr
Orcid No: 0000-0001-5299-4770

Abstract

Purpose: To create a version of the DREEM (The Dundee Ready Education Environment Measure) questionnaire used in the evaluation of the educational environment in health sciences in Turkish and investigate its validity and reliability.

Methods: The Turkish form of the questionnaire was created as a first step of our study. It was answered by 401 undergraduate students studying at Marmara University Faculty of Health Sciences (in Turkey) at the department of Physiotherapy and Rehabilitation. The SPSS 11.5 software package program was used in the analysis of the obtained data.

Results: 55% (n=221) of the students who participated in the study were female and 45% (n= 180) were male with an average age of 21.34 ± 2.04 years. Reliability analysis was performed with internal consistency analysis (Cronbach Alpha analysis). In the internal consistency analysis, the Cronbach Alpha coefficient was calculated as 0.92 and the internal consistency of the questionnaire was determined. The validity of the questionnaire was assessed by Explanatory Factor Analysis. According to the analysis, 6 factors were revealed. Since the data explained 53.38% of the total variance, the DREEM survey was accepted to have construct validity.

Conclusion: Our study proved that the Turkish version of the DREEM questionnaire is valid and reliable to use in physiotherapy and rehabilitation learning environment. It was concluded that DREEM is an effective tool for the evaluation and regulation of education in the institutions providing undergraduate education.

Key Words: DREEM, Physiotherapy Education, Validity, Reliability, Learning Environment

Fizyoterapi ve Rehabilitasyon Lisans Eğitiminde Öğrenme Çevresinin Değerlendirilmesinde Kullanılan DREEM Anketinin Türkçe Geçerlilik ve Güvenilirliği

Özet

Amaç: Sağlık bilimlerinde eğitim ortamının değerlendirilmesinde kullanılan DREEM (The Dundee Ready Education Environment Measure) anketinin geçerlilik ve güvenilirliğini araştırıp Türkçe versiyonunu oluşturmaktı.

Yöntem: Çalışmamızda ilk olarak anketin Türkçe formu oluşturuldu. T.C. Marmara Üniversitesi Sağlık Bilimleri Fakültesi Fizyoterapi ve Rehabilitasyon Bölümünde öğrenim gören 401 lisans öğrencisi çalışmaya katıldı. Elde edilen verilerin analizinde SPSS 11.5 yazılım paket programı kullanıldı.

Sonuçlar: Çalışmaya katılan öğrencilerin 221'i kız, 180'i erkekti ve yaş ortalaması 21,34±2,04 yıldı. Güvenilirlik analizi iç tutarlılık analizi (Cronbach Alfa analizi) ile yapıldı. İç tutarlılık analizinde Cronbach Alfa katsayısı 0,92 olarak hesaplandı ve anketin iç tutarlılığının olduğu saptandı. Anketin geçerliliği ise Açıklayıcı Faktör Analizi ile değerlendirildi. Faktör analizi sonucunda 6 faktör belirlendi. Veriler toplam varyansın %53,38'ini açıkladığından DREEM anketinin yapı geçerliliği olduğu kabul edildi.

Tartışma: Çalışmamızda DREEM anketinin Türkçe versiyonunun Fizyoterapi ve Rehabilitasyon öğrenim çevresinde kullanımının geçerli ve güvenilir olduğu kanıtlandı. Fizyoterapi ve rehabilitasyon lisans eğitimi veren kurumlarda eğitim çevresinin değerlendirilmesi ve düzenlenmesine yönelik etkin bir araç olduğu görüşüne varıldı.

Anahtar Kelimeler: DREEM, Fizyoterapi Eğitimi, Geçerlilik, Güvenilirlik, Öğrenme Çevresi

1. Introduction

A main curriculum component of an effective health sciences education facility is the educational environment it provides and reflects the overall quality of education offered (1).

The teaching and learning process occurs in this educational environment. It is connected to physical, cognitive, cultural, phychosocial, emotional, educational and motivational factors and provides a platform for learning activities to occur between teachers and students (2). The quality and the conceptual structure of the educational enviroment is determined by the policies, management structures and other characteristics of the university. These characteristics are also considered as components of the educational environment (3).

The assessment of the educational environment provides the teachers with a comprehensive feedback on their curriculum (1). In addition it enables the creation of student-centered and high-quality educational programs both clinically and academically (4). For this purpose, various methots have been developed to evaluate students' educational enviroment (5).

In previous studies, the necessity of evaluating the educational environment and its quality has been put forward. Evaluation of the learning enviroment with a validated and reliable questionnaire, can be used to highlight shortcomings and areas to improve (4).

Since the 1970s, various questionnaires have been developed that examine students' experiences and their perceptions of their learning environment. Lizzio et al. showed that the emotional and social environment has a greater effect on academic performance in university education more than secondary school education. The first questionnaire developed by health care professionals was the Medical School Learning Environment Survey (MSLES) in 1970. This questionnaire led to the creation of other questionnaires (5).

There are various questionnaires in the literature that evaluate educational environment. Not all of them are suitable for international use and some have poor reliability.

On the other hand, the validity and high internal consistency of the LEQ (Medical School Learning Environment Questionnaire), MSLES (Medical School Learning Environment Survey) and DREEM (The Dundee Ready Education Environment Measure) questionnaires have been demonstrated. Especially DREEM and MSLES questionnaires have demonstrated are accurate in evaluating the students' perception of the educational environment (including traditional and innovative curricula). In addition, the DREEM questionnaire is superior to other questionnaires as it can be applied in different

countries and cultures. It provides highly reliable outcomes and is felt to be one of the most suitable option in this field (5, 6).

The Turkish version of the DREEM questionnaire was not found in the literature. On the other hand, due to increasing number of students in physiotherapy and rehabilitation faculties of universities, the evaluation of the quality of the educational environment has become of paramount importance. With these goals in mind, we aimed to translate the DREEM questionnaire into Turkish and prove the validity of the new version by ensuring cultural adaptation. The results have the potential to contribute to the optimization of the educational environment by analysing the quality of the learning environment in bachelor education in physiotherapy and rehabilitation and providing universities with feedback and suggestions for improvements.

2. Methods

Our study was performed on the students carrying out their bachelor education in the spring semester of 2015-2016 academic year at T.C. Marmara University Faculty of Health Sciences, Department of Physiotherapy and Rehabilitation. The study permission was obtained from Marmara University Faculty of Health Sciences Dean. Informed consent form and verbal information were provided to the students who participated in the study. The students who agreed to participate in the study had to sign the informed consent form to be included in the study. This study was approved by Marmara University Institute of Health Sciences Ethics Committee on 28.03.2016 with the protocol number 251.

The number of sample was not calculated prior to the study, however five times the number of samples which were a prerequisite for the validity and reliability analyses were included in the study. A total of 404 students completed the survey. Three students were excluded because of incomplete questionnaires. The socio-demographic information form was filled out by the students who were included in the study before the survey. Statistical Package for Social Science (SPSS) 11.5 software was used in the analysis of the data obtained from the study. The level of statistical significance was taken as $p<0,05$. Internal consistency analysis (Cronbach's alpha analysis) was performed for reliability analysis. The validity of the data was analyzed using explanatory factor analysis.

2.1. Inclusion Criteria
- To be a student in Marmara University Faculty of Health Sciences Physiotherapy and Rehabilitation.
- Agree to be participate in the study

2.2. Exclusion Criteria
- Refusal to be participate in the study.

2.3. Data Collection
The DREEM questionnaire was designed by Roff in 1997 to evaluate the educational environment of medical school and health sciences students (7). Identification and evaluation of questionnaire; was made using standart methodology aproximately 100 faculty members of medical and health science faculties and more than 1000 students. Qualitative and quantitative data were used together during the development of questionnaire and the questionnaire was designed not to belong to any culture (8).

DREEM questionnaire consists total of 50 questions, which are grouped into 5 sub-categories. These are students' perception of learning (12 questions), students' teacher perception (11 questions), students' academic self-perception (8 questions), students' learning environment perceptions (12 questions), students' social self-perception (7 questions). Each of the 50 questions are scored using a 5 point scale as follows;

4= Strongly agree
3=Agree
2=Unsure
1=Disagree
0=Strongly disagree

The scores of some questions are reversed. These are: 4, 8, 9, 17, 25, 35, 39, 48, 50. High scores in the questionnaire are considered positive and the total maximum score is 200 points (7).

In our study; the translation from the English version into Turkish was conducted using as guide the study of Beaton et al. (9). A pilot study was conducted with the designed Turkish version of questionnaire on Turkish 20 individuals. The final version of the questionnaire was formed incorporating the feedback from the students of how well they understood the questions and how to better express themselves.

3. Results

3.1. Demographic Informations of Participants

A total of 401 students completed the study and the socio-domographic assessment form. The average age of the students was 21.34 ± 2.04 years and 221 of them were female and 180 were male. 29.6% (n=119) students were in the first year, 23.7% (n=95) were in the second year, 25.2% (n=101) were in the third year and 21.4% (n=86) were in the forth year of their education.

3.2. The Reliability Analysis of DREEM

Internal consistency analysis was performed for the reliability analysis of the questionnaire. The alpha coefficient (Cronbach's alpha) was used to test the reliability of the scale.

As a result of the first internal consistency analysis, questions 9, 25 and 50 had a negative effect on the reliability of the scale. Therefore, they were excluded from the questionnaire and Cronbach's alpha value was calculated again as 0.92 in the internal consistency test. It was accepted that the scale had internal consistency (Table 1).

Table 1. The Results of the Internal Consistency Item Analysis

Items	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha If Item Deleted
1	124.653	413.472	0.386	0.918
2	125.259	416.697	0.449	0.917
3	123.448	412.668	0.446	0.917
4	124.159	419.069	0.238	0.919
5	125.154	419.516	0.324	0.918
6	124.678	415.368	0.412	0.918
7	124.094	404.146	0.628	0.915
8	124.920	413.043	0.384	0.918
10	124.917	419.025	0.248	0.919
11	124.431	414.700	0.426	0.917
12	124.668	414.212	0.384	0.918
13	124.079	403.358	0.615	0.915
14	124.471	420.409	0.180	0.920
15	125.611	422.343	0.217	0.919
16	124.723	407.335	0.566	0.916
17	123.890	427.552	0.027	0.923
18	124.980	416.809	0.461	0.917
19	125.064	419.325	0.284	0.919
20	124.466	404.754	0.658	0.915
21	124.568	407.260	0.611	0.916
22	124.880	406.910	0.583	0.916
23	124.708	411.642	0.484	0.917
24	124.366	405.337	0.587	0.916
26	124.930	413.810	0.454	0.917
28	124.426	424.890	0.102	0.921
29	124.431	405.705	0.605	0.916
30	124.710	411.696	0.473	0.917
31	125.034	413.843	0.456	0.917

Items	Scale Mean If Item Deleted	Scale Variance If Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha If Item Deleted
33	124.658	410.240	0.511	0.917
34	124.780	413.076	0.461	0.917
35	124.389	410.453	0.437	0.917
36	124.571	410.520	0.486	0.917
37	125.112	413.939	0.543	0.917
38	124.830	406.876	0.645	0.916
39	124.503	420.510	0.227	0.919
40	124.800	410.230	0.539	0.916
41	124.875	413.264	0.509	0.917
42	124.054	408.107	0.506	0.9171
43	124.214	405.878	0.587	0.9163
44	124.142	404.342	0.603	0.9161
45	125.034	414.073	0.403	0.918
46	125.047	416.705	0.262	0.919
47	124.820	416.282	0.417	0.918
48	123.990	424.134	0.135	0.920
49	124.493	407.545	0.509	0.917

3.3. The Validity Analysis of DREEM

The Explanatory factor analysis was used to determine the validity of the questionnaire. 5, 6, 11, 14, 18, 20, 22, 24, 28, 29, 31, 32, 35, 36, 38, 40, 41, 42, 43, 44, 45, 48, 49 questions were removed from the questionaire as a result of the 6 factor analysis. Accordingly, the data explained 58.283% of the total variance and was distributed into 8 dimensions (Table 2).

 8 dimensions were formed as a result of the factor analysis, substances were combined in one dimension due to the precense of a substance in two different dimension because they could form a meaningful association. Question 17 was removed because it was included the inappropriate dimension. As a result, the factors were collected in six dimensions and the final state shows in the factor analysis table (Table 2). It was calculated that the data explained 53.38% of the total variance by removing item 17 from the questionnaire.

In the factor analysis; Factors scattered into 6 dimensions and these named as; 1st dimension is 'Students' perception of learning', 2nd dimension is 'Students' learning environment perceptions',3rd dimension is 'Students' teacher perceptions ', 4th dimension is 'Students' self-perception in educational environment', 5th dimension is 'Students' long-term learning perceptions' and 6th dimension is 'Students social self-perceptions'.

Although to reduce the alpha values of the factors to 0.50 in practice is found appropriate, this value may go down when the number of items per factor decreases. In addition, it is accepted that items can be removed from the scale or combined properly when the single item is included to the dimensions in the researches. Obtained values in Table 2 in this case was taken into consideration.

Kaiser Mayer Olkin (KMO) test measures the correlations between variables and the suitability of factor analysis. The value of the KMO test should be in the range of 0 to 1. The KMO value is equal to 1 if any variable is correctly estimated by other variables. Values above 0.8 can be considered excellent. The next test for the suitability of factor analysis is Bartlett Test. Bartlett Test examines the previous correlation matrix in general and examines the statistical significance of this correlation matrix. Desirable is that this test is significant ($p < 0.05$) (10).

In our study; The value of KMO test was 0,84. Therefore, the sample size was 'good'. The p value of Bartlett Sphericity test was less than 0.005. Therefore, the factor analysis of values was appropriate.

Table 2. The Results of the Factor Analysis

Items	Students' Perception of Learning	Students' Learning Environment Perceptions	Students' Teacher Perceptions	Students' Self-Perception in Educational Environment	Students' Long-term Learning Perceptions	Students Social Self-Perceptions	Cronbach's Alpha
7	0.688						
13	0.674						
3	0.635						
1	0.584						0.78
16	0.558						
12	0.535						
21	0.451						
33		0.748					
34		0.634					0.68
30		0.596					
23		0.582					
39			0.739				
8			0.730				0.62
37			0.533				
2			0.503				
10				0.787			
19				0.592			0.45
27				0.491			
47					0.783		0.48
26					0.567		
15						0.850	
46						0.523	0.21
4						0.803	
Percentage of Variance Explained	12.71	9.63	7.74	6.78	6.26	10.26	

4. Discussion

The DREEM questionnaire has been found to be the most suitable method for evaluating the educational environment in the literature. The reliability and validity of DREEM was proven in different countries. The aim of this study is to investigate the validity and reliability of the Turkish version of the DREEM questionnaire. Another aim of our study was to demosntrate the need for a tool for assessing the physiotherapy undergraduate education environment in Turkey. Besides the aim is to provide an opinion on the development of standarts of physiotherapy education environments at the end of the study. This study is the first study Turkish validity and reliability study of DREEM questionnaire in Turkey. Physiotherapy and rehabilitation bachelor education environment was evaluated for the first time in our study and DREEM questionnaire was used as a method in our study for the first time in this field.

Internal consistency, test re-test and parallel forms analyses are generally used for reliablity analyses

(11). Test re-test analysis could not be used in our study due to financial limitations. Parallel forms analysis could not be applied because there is not a similar questionnaire in Turkish which has validity and reliability and evaluates the educational environment in literature. Internal consistency was used in our study as reliability.

In our study, Cronbach's alpha coefficient was calculated and found to be 0.92 in the reliability analysis of the DREEM questionnaire. The alpha value of 0.92, which is accepted as the internal consistency criterion, shows that the internal consistency is very good. Alpha values were measured between 0.70 and 0.80 in different cultures. The alpha value is similar to studies in different countries as Primparyon et al. (12) : 0,91, Mayya et al. (13): 0,92, Oliveira et al. (14): 0,93, Riquelme et al. (15): 0,91.

In our study, despite the high internal consistency, the main factor structure cannot be preserved. This is probably due to the students' perceptions of different educational environments. In addition, this can be caused by the students' negative answers to reversed questions. It is also possible for students to have a focus problem during the questionnaire. Although there were no problems during the translation of the questionnaire from English to Turkish, students may not be able to adapt to cultural differences.

The majority of the participants were first and second-year students. The change of students' perceptions by year of education is not known. Students' perception of the educational environment as the length of study increases should be evaluated with future studies. This method may provide a appropriate assessment approach as Rehman at al. did. They obtained that year-wise comparison showed significantly better Dundee Ready Educational Environment Measure score responses by fourth-year students. (16) Otherwise, Stormon et al. showed that students in preclinical years of study (first and second), and who had dentistry as a first career preference, were positive in all domains of their learning environment in their study in Australia (17).

Explanatory factor analysis is used because our study is the first validity and reliability study in our culture. Varimax Vertical Rotation Technique is used in the exploratory factor analysis. As a result of the explanatory factor analysis, the data explained 53.38% of the total variance. An analysis explaining 50-75% of the total variance is considered a valid analysis in the literature.

There are 5 different factor dimensions in the original DREEM questionnaire. A total of 8 dimensions in the factor analysis were performed in our study. However, two dimensions which are only one question were combined into one dimension to be considered meaningful. The question 17 was excluded.

Khan et al. found ten different dimensions in their study. The DREEM questionnaire was designed not to belong to a single culture. Khan et al. emphasized that the questionnaire could not fulfill this purpose (18).

Ostapczuk et al. obtained low results in their internal consistency of dimensions despite high internal consistency. This was related to low number of questions some sub-categories of the original questionnaire (19).

Validity of questionnaire also evaluated different cultures. For example; the data explained 52% of the variance and was collected in 5 different dimensions. (14).

Both exploratory and confirmatory factor analysis were used in a Swedish version of the questionnaire. Five new factors were proposed as a result of the study. 17th (I think there is a problem of cheating at my school.) and 46th (My accommodation is satisfactory) questions were found to have low correlation and low factor loading. Similar results were obtained for these two questions in our study (20).

Jian Wang et al. found that the value of Cronbach alpha was 0.95, the questions were distributed to five dimensions and normalisation Oblimin and Kaiser's method was used in factor analysis. 52.18% of the total variance was explained as a result of the study. The factor loadings of all five factors were found to be higher than 1 (21).

Khan et al. used both exploratory and confirmatory factor analysis in their study in Pakistan. Internal consistency analysis of 50 items was 0.91, similar to our results. According to the confirmatory factor analysis, 5 dimensions explained 40.10% of the data, 10 factors explained 52.33% of the data in the explanatory factor analysis. According to the original version, this discrepancy is based on cultural differences (18).

Koohpayehzadeh et al. calculated the Cronbach alpha as 0,91 and the data collected 5 dimensions in Iran for the DREEM questionnaire validity and reliability. It was reorganized as a questionnaire with 44 questions unlike the original one (4).

Yusoff et al. in their validity and reliability study in Malaysian culture, did not show cultural adaptation in the five dimensions structure of the original DREEM questionnaire as in our study. Cultural adaptation of the abbreviated version showed better results (22).

The DREEM questionnaire is a useful measurement method to assess the educational environment in health sciences. Its widespread use in the literature reveals the necessity of such a questionnaire.

However, the validity and reliability of the DREEM survey in different nations is insufficient. The study of Hammond et al. revealed two negatives related to the DREEM questionnaire. Firstly, the internal consistency of the questionnaire was quite variable in the literature and was very low in their study. Second, the construct validity (for 5 sub-components) is not good (23).

Whether factor analysis can be applied with KMO and Bartlett tests for the assessment of construct validity. 0.84 coefficient obtains in KMO test and Bartlett test is also found to be appropriate for factor analysis. Factor analysis; is a set of methods that try to explain the structure consisting of multiple dependent variables with independent factors each other. The aim of factor analysis is to reduce the number of variables and to examine the relationship between the variables. Whether a substance in the scale is included in a factor to be defined, depends on the high load value indicating its relationship with that factor in explanatory factor analysis. In our study, factor load of each question determines by using Varimax vertical rotation technique. It is accepted that the loading of items above 0.45 is significant (11).

Three items (9, 25, 50) in reliability analysis and twenty-four items in validity analysis (5, 6, 11, 14, 17, 18, 20, 22, 24, 28, 29, 31, 32, 35, 36, 38) , 40, 41, 42, 43, 44, 45, 48, 49) were removed from the questionnaire. Our study does not support the proposed five dimensions structure of the DREEM questionnaire. The six-factor structure that we created, after the questions were removed, shows a good efficiency. The questions were grouped according to their items and loads and the six factors were renamed taking into account the questions. In the study group, it demonstrated that the questions extracted from the questionnaire are not fully understood. The construct validity of the DREEM questionnaire is observed with the data explaining 53.38% of the total variance according to the results of the construct validity.

In conclusion, this study is the first to examine the validity and reliability of the Turkish version of the DREEM questionnaire. Our study shows that the Turkish version of the DREEM questionnaire is valid and reliable for use in the Physiotherapy and Rehabilitation learning environment. The hypothesis is confirmed by statistical methods. The DREEM questionnaire is a questionnaire that can be used to evaluate the educational environment of Physiotherapy and Rehabilitation. Our study performed in T.C. Marmara University Physiotherapy and Rehabilitation Department. Our recommendation is for further studies to be done in different educational environments and in different cities in the Physiotherapy and Rehabilitation Departments. It is an appropriate questionnaire for evaluating the health education environment in Turkish. Its use in the development, evaluation and follow up of the educational environment would be the next rational step.
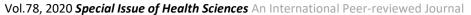
References

[1] Karim J, Al-Halabi B, Marwan Y, Sadeq H, Dawas A, Al-Abdulrazzaq D. The Educational Environment of the Undergraduate Medical Curriculum at Kuwait University. Adv Med Educ Pract.. 2015;6:297–303.

[2] Imanipour M, Sadooghiasl A, Ghiyasvandian S, Haghani H. Evaluating the Educational Environment of a Nursing School by Using the DREEM Inventory. Glob J Health Sci. 2015;7(4):211-216

[3] Bakhshialiabad H, Bakhshi M, Hassanshahi G. Students' Perceptions of the Academic Learning Environment in Seven Medical Sciences Courses Based on DREEM. Adv Med Educ Pract. 2015;6:195–203.

[4] Koohpayehzadeh J, Hashemi A, Arabshahi KS, Bigdeli S, Moosavi M, Hatami K, et al. Assessing Validity and Reliability of Dundee Ready Educational Environment Measure (DREEM) in Iran. Med J Islam Repub Iran. 2014;28(60):1-9.

[5] Page LAF, Kang M, Anderson V, Thomson WM. Appraisal of the Dundee Ready Educational Environment Measure in the New Zealand Dental Educational Environment. Eur J Dent Educ. 2012;16(2):78-85.

[6] Soemantri D, Herrera C, Riquelme A. Measuring the Educational Environment in Health Professions Studies: A Systematic Review. Med Teach. 2010;32(12):947-952.

[7] Miles S, Swift L, Leinster SJ. The Dundee Ready Education Environment Measure (DREEM): A Review of Its Adoption and Use. Med Teach. 2012;34(9):620-634.

[8] Roff S. The Dundee Ready Educational Environment Measure (DREEM)—A Generic Instrument for Measuring Students' Perceptions of Undergraduate Health Professions Curricula. Med Teach. 2005;27(4):322-325.

[9] Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the Process of Cross-Cultural Adaptation of Self-Report Measures. Spine (Phila Pa 1976). 2000;25(24):3186-3191.

[10] Williams B, Onsman A, Brown T. Exploratory factor analysis: A Five-step Guide For Novices. JEPHC. 2010;8(3):1-13.

[11] El Hajjar ST. Statistic Analysis: Internal-Consistency Reliability and Construct Validity. IJQQRM. 2018;6(1):27-38.

[12] Pimparyon P, Caleer SM, Pemba S, Roff S. Educational Environment, Student Approaches to Learning and Academic Achievement in A Thai Nursing School. Med Teach. 2000;22(4):359-364.

[13] Mayya S, Roff S. Students' Perceptions of Educational Environment: A Comparison of Academic Achievers and Under-Achievers at Kasturba Medical College, India. Educ Health (Abingdon). 2004;17(3):280-291.

[14] De Oliveira Filho GR, Vieira JE, Schonhorst L. Psychometric Properties of the Dundee Ready Educational Environment Measure (DREEM) Applied to Medical Residents. Med Teach. 2005;27(4):343-347.

[15] Riquelme A, Oporto M, Oporto J, Mendez JI, Viviani P, Salech F, et al. Measuring Students' Perceptions of the Educational Climate of the New Curriculum at the Pontificia Universidad Católica de Chile: Performance of the Spanish Translation of the Dundee Ready Education Environment Measure (DREEM). Educ Health (Abingdon). 2009;22(1):112.

[16] Rehman R, Ghlas K, Fatima SS, Hussain M, Alam F. Dream of A Conducive Learning Environment: One DREEM for all Medical Students! J Pak Med Assoc. 2017;67(1):7-11.

[17] Stormon N, Ford PJ, Eley DS. DREEM-ing of Dentistry: Students' Perception of the Academic Learning Environment in Australia. Eur J Dent Educ. 2019;23:35-41.

[18] Khan JS, Tabasum S, Yousafzai UK, Fatima M. DREEM ON: Validation of the Dundee Ready Education Environment Measure in Pakistan. J Pak Med Assoc. 2011;61(9):885-888.

[19] Ostapczuk MS, Hugger A, De Bruin J, Ritz-Timme S, Rotthoff T. DREEM on, Dentists! Students' Perceptions of the Educational Environment in A German Dental School as Measured by the Dundee Ready Education Environment Measure. Eur J Dent Educ. 2012;16(2):67-77.

[20] Jakobsson U, Danielsen N, Edgren G. Psychometric Evaluation of the Dundee Ready Educational Environment Measure: Swedish Version. Med Teach. 2011;33(5):267-274.

[21] Wang J, Zang S, Shan T. Dundee Ready Education Environment Measure: Psychometric Testing with Chinese Nursing Students. J Adv Nurs. 2009;65(12):2701-2709.

[22] Yusoff MSB. The Dundee Ready Educational Environment Measure: A Confirmatory Factor Analysis in a Sample of Malaysian Medical Students. Int J Humanit Soc Sci. 2012;2(16):313-321.

[23] Hammond SM, O'Rourke M, Kelly M, Bennett D, O'Flynn S. A Psychometric Appraisal of the DREEM. BMC Med Educ. 2012;12(2):1-5.