

Assessing reliability and validity of Revised Biggs Two-Factor study process questionnaire to measure learning approaches among undergraduate medical students in Lahore, Pakistan

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Abstract

Objective: To assess reliability and validity of Revised Biggs Two-Factor Study Process Questionnaire to measure learning approaches among medical students.

Methods: The cross-sectional study was conducted at Shaikh Zayed Medical College, Lahore, Pakistan, from November 15, 2014, to January 15, 2015. The 20-item Revised Biggs Two-Factor Study Process Questionnaire was used to assess medical students enrolled from the first to the final year of their studies. Data was analysed using SPSS 20. The reliability of the questionnaire was assessed by Cronbach's alpha, and confirmatory factor analysis was done to confirm the factor model.

Results: Of the 480 students approached, 284(59.2%) completed the questionnaire. Cronbach's alpha value was found acceptable at 0.79 and 0.72 for the deep approach and surface approach scales respectively. Comparative Fit Index value (0.858) confirmed a good fit for the model.

Conclusion: Revised Biggs Two-Factor Study Process Questionnaire was found to be a reliable and valid instrument to measure learning approaches among medical students.

Keywords: Learning style, Biggs study process, Medical students, Reliability, Validity. (JPMA 69: 337; 2019)

Introduction

The approach to learning is related to learner's characteristics, and because of this reason there is a diversity found in the learning style of the medical students that emphasises the use of matching assessment tools and instructional strategies.¹ This is of particular importance when learners are from diverse learning environments and educational backgrounds, and have different expectations and estimations of a given situation.² In these conditions, there is often a disparity between instructional procedures and learning approaches, and this discrepancy will usually lead to difficulty in learning.³

Marton and Saljo gave the concept of 'deep' and 'surface' approaches of learning.⁴ A deep approach (DA) is defined as being one that demonstrates an active interest in the course content and is associated with intrinsic motivation and students observe reason and argument carefully and critically, and look for evidence and try to apply those.⁵ On

the other hand, a surface approach (SA) aims at reproducing the learning material without reflecting on either purpose or the link between information. Surface approach is driven by a fear to pass the examinations and students try to acquire by rote learning, moreover, it needs supervision and organised environment.⁶ Both DA and SA have two subscales: the subscale 'Strategy' is about the way a student goes about his/her study, while the subscale 'Motive' is about the reasons for adopting a strategy.^{7,8}

There are several types of learning approaches, and it is imperative to know about learning styles of the students so that the educators can redesign their instructional strategies accordingly. Many model questionnaires have been used to assess and measure learning styles and approaches but most of these models are used in the developed world.⁹ One such model is the Revised Biggs Two-Factor Study Process Questionnaire (R-SPQ-2F)⁷ which has been used in different parts of the world.¹⁰⁻¹² It is a good data-collection tool as its constructs are considered more relevant.

It has been pointed out in literature that R-SPQ-2F has a cross-cultural sensitivity⁸ and reflects on the learning approaches among medical students.

There are several studies available regarding learning style of medical students but they used different

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questionnaires to assess learning styles among medical students.^{1,13,14} In addition to scarce relevant literature from the developing region, recent increase in a number of medical colleges and, subsequently, students along with changes related to medical education, curricula and teaching strategies in Pakistan, the issue needs consideration and exploration. This may not only fill the knowledge gap but also assist in better understanding the effect of this transition on students' learning approaches.

The current study was planned to assess reliability and validity of R-SPQ-2F to measure learning approaches among undergraduate medical students in Pakistan.

Subjects and Methods

The cross-sectional study was conducted from November 15, 2014, to January 15, 2015, at Shaikh Zayed Medical College (SZMC), Lahore, Pakistan, which is one of the premier medical institutions in the country educating undergraduate and postgraduate students and producing high-quality medical doctors, and is affiliated with the University of Punjab, a public-sector university.

The study used the R-SPQ-2F for collecting data. All medical students registered at SZMC from the first to the final year were approached and handed over the questionnaire. The student's participation in the study was on a voluntary basis. Ethical approval was obtained from the ethics committee of The University of Lahore.

The R-SPQ-2F, with 20 questions, is a pretested and validated questionnaire.⁷ The revised instrument has two main scale scores deep approach (DA) and surface approach (SA) and subscales Deep Motive (DM), Deep Strategy (DS), Surface Motive (SM) and Surface Strategy (SS). To obtain main scale scores, item scores are added. A five-point Likert scale was used to evaluate the learning approaches comprising responses to items that are scored as: A = 1, B = 2, C = 3, D = 4, and E = 5 (Annexure).

To validate the questionnaire in our study settings and conditions, it was pretested independently on 30 students in another institute in Lahore with settings similar to the study site. Local experts were also requested to suggest any required modification. The reason of this pretesting was to examine whether this questionnaire works well in local setting or if it needs modifications. Face and content validity of the instrument were established by consulting medical educationist and experts within and outside the study site. However, no major issues were found at this stage. Later, the questionnaire was self-administered to all students in the college during their classes after getting permission from

relevant tutors without their personal involvement in the distribution and collection process to consider confidentiality and avoid biasness. The objective of the study and the way to complete the questionnaire were explained to the students. All the students were also made aware that participation is voluntary and their written consent was taken. Only completed questionnaires were analysed.

Data analysed using SPSS 20 and AMOS 20. Required descriptive and inferential statistics were performed. Main DA and SA scale scores and subscale DM, DS, SM and SS scores were calculated as defined by Biggs et al⁷. Reliability and validity of the scale were assessed by Cronbach's alpha and confirmatory factor analysis (CFA) respectively. The CFA was applied to confirm the factor model.

Results

Of the 480 medical students at baseline, 284(59.2%)

Table-1: Summary of revised Biggs two-factor Study Process Questionnaire.

Scales	Subscales	Items*
DA: Deep Approach	DM: Deep Motive (intrinsic interest) DS: Deep Strategy (maximize meaning)	1 + 5 + 9 + 13 + 17 2 + 6 + 10 + 14 + 18
SA: Surface Approach	SM: Surface Motive (fear of failure) SS: Surface Strategy (narrow target, rote learn)	3 + 7 + 11 + 15 + 19 4 + 8 + 12 + 16 + 20

*Responses: A - This item is never or only rarely true of me; B - This item is sometimes true of me; C - This item is true of me about half the time; D - This item is frequently true of me; E - This item is always or almost always true of me.

Table-2: Reliability of the deep and surface learning approaches.

Approach	Cronbach's Alpha	No. of items
Deep	0.787	10
Surface	0.721	10
Both	0.634	20

Table-3: Goodness of fit for measurement model.

Measure	Observed value	Recommended value
Normed chi-square= χ^2/df	1.882	Between 1 and 3
*CFI	0.858	>0.95 great, >0.8 acceptable
*RMSEA	0.056	<0.05 great, 0.05-0.1 good
*PCL05E	0.158	>0.05

CFI: Comparative Fit Index, RMSEA: Root Mean Square Error of Approximation, PCL05E: p of Close Fit, The thresholds listed in Table-3 are based on literature.²²

ANNEXURE: Questionnaire* to assess learning approaches among undergraduate medical students in a medical college in Lahore, Pakistan.

*Adapted from Revised Study Process Questionnaire (R-SPQ-2F) by Biggs et al.

A. Age: _____ years

B. Gender: 1. Male 2. Female

C. Year as student: 1. 1st year 2. 2nd year 3. 3rd year 4. 4th year 5. 5th year

Questionnaire has a number of questions about your attitudes towards your studies and your usual way of studying. There is no right way of studying. It depends on what suits your own style and the course you are studying. It is accordingly important that you answer each question as honestly as you can. If you think your answer to a question would depend on the subject being studied, give the answer that would apply to the subject(s) most important to you. Please tick or circle the appropriate option/letters alongside the questions. Please answer each item.

The options/letters alongside each question stand for the following response:

A This item is never or only rarely true of me

B This item is sometimes true of me

C This item is true of me about half the time

D This item is frequently true of me

E This item is always or almost always true of me

Please choose the one most appropriate response to each question that best fits your immediate reaction. Do not spend a long time on each item: Your first reaction is probably the best one.

Do not worry about projecting a good image. Your answers are CONFIDENTIAL.

Nr.	Questions	Responses
1	I find that at times studying gives me a feeling of deep personal satisfaction.	A B C D E
2	I find that I have to do enough work on a topic so that I can form my own conclusions before I am satisfied.	A B C D E
3	My aim is to pass the course while doing as little work as possible.	A B C D E
4	I only study seriously what's given out in class or in the course outlines.	A B C D E
5	I feel that virtually any topic can be highly interesting once I get into it.	A B C D E
6	I find most new topics interesting and often spend extra time trying to obtain more information about them.	A B C D E
7	I do not find my course very interesting so I keep my work to the minimum.	A B C D E
8	I learn some things by repetition, going over and over them until I know them by heart even if I do not understand them.	A B C D E
9	I find that studying academic topics can at times be as exciting as a good novel or movie.	A B C D E
10	I test myself on important topics until I understand them completely.	A B C D E
11	I find I can get by in most assessments by memorizing key sections rather than trying to understand them.	A B C D E
12	I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.	A B C D E
13	I work hard at my studies because I find the material interesting.	A B C D E
14	I spend a lot of my free time finding out more about interesting topics that have been discussed in different classes.	A B C D E
15	I find it is not helpful to study topics in depth. It confuses and wastes time, when all you need is a passing acquaintance with topics.	A B C D E
16	I believe that lecturers shouldn't expect students to spend significant amounts of time studying material everyone knows won't be examined.	A B C D E
17	I come to most classes with questions in mind that I want answering.	A B C D E
18	I make a point of looking at most of the suggested readings that go with the lectures.	A B C D E
19	I see no point in learning material that is not likely to be in the examination.	A B C D E
20	I find the best way to pass examinations is to try to remember answers to likely	A B C D E

Thank you.

Relevant info: The responses to items are scored as follows:

A = 1, B = 2, C = 3, D = 4, E = 5

To obtain main scale scores add item scores as follows:

DA = DM + DS = 1 + 2 + 5 + 6 + 9 + 10 + 13 + 14 + 17 + 18

SA = SM + SS = 3 + 4 + 7 + 8 + 11 + 12 + 15 + 16 + 19 + 20

Subscale scores can be calculated as follows:

DM = 1 + 5 + 9 + 13 + 17

DS = 2 + 6 + 10 + 14 + 18

SM = 3 + 7 + 11 + 15 + 19

SS = 4 + 8 + 12 + 16 + 20

DM = Deep Motive, DS = Deep Strategy, SM = Surface Motive, SS = Surface Strategy

DM = Deep Motive: intrinsic interest

DS = Deep Strategy: maximize meaning

SM = Surface Strategy: fear of failure

SS = Surface Strategy: narrow target, rote learning.

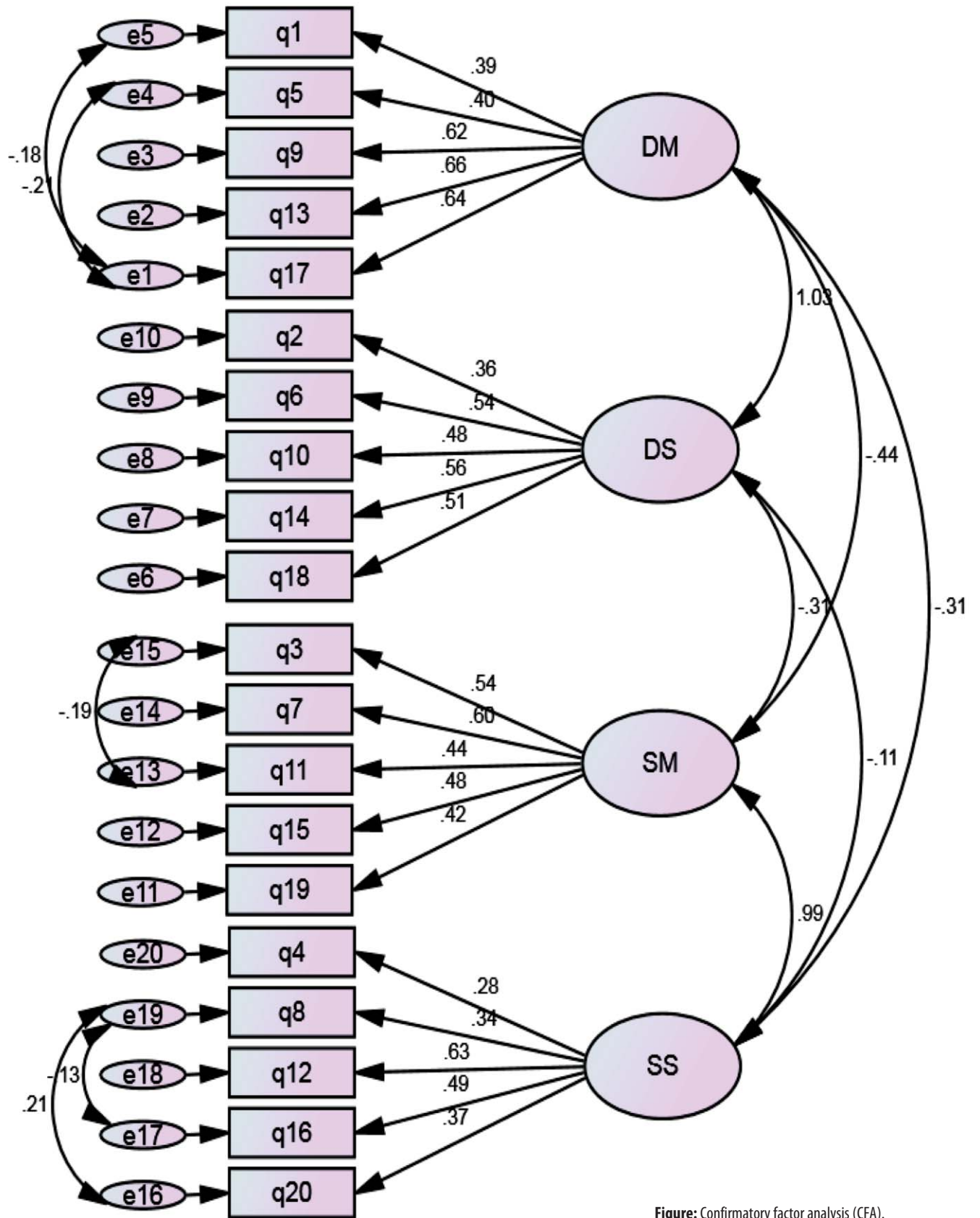


Figure: Confirmatory factor analysis (CFA).

completed the questionnaire. The mean of the subjects was 20.8 ± 1.79 years (range: 17-27 years). Of the total, 69(24.3%) were from the first year, 60(21.1%) second year, 57(20.1%) third year, 52(18.2%) fourth year, and 46(16.2%) from the fifth year.

Responses were summarised (Table-1) and the internal consistencies were comparable with the original version of the scale (Table-2). CFA was applied to determine if there was an opportunity to improve the model (Figure). The goodness of fit for our measurement model was found to be sufficient (Table-3).

Discussion

The study aimed at assessing the reliability and validity of revised R-SPQ-2F to measure learning approaches among medical students in Lahore, Pakistan. Several studies have used various tools to measure learning approaches,^{1,13,14} but the numbers of items, scoring procedures and level of medical students differed across studies.

The alpha value for DA and SA scales as well as comprehensive alpha value of the entire tool showed an acceptable level of internal consistency of 0.787 and 0.721 for DA and SA scales, respectively, that is comparable with that in other studies.^{7,11,12,15,16} Study findings validate the use of the R-SPQ-2F to measure learning approaches among medical students in both pre-clinical and clinical settings.

A study measured psychometric properties of the R-SPQ-2F on non-medical students (M.A. students) and described that its validity and reliability was good and, moreover, it mentioned that teachers could use this questionnaire to ensure their student's study methods.^{17,18} A recent study in Malta University, Malta, reported that the R-SPQ-2F questionnaire has good internal consistency for DA and SA but the internal consistency of the DM, DS, SM and SS subscales was not up to the mark, and it further suggested that these need some changes and/or supplementary questions to offer reliable diagnostic evidence.¹¹

In this study, to appraise the construct validity of the study tool, the DM, DS, SM and SS subscale scores were exposed to CFA and found the outcome acceptable. Few other studies conducted in the United States of America,¹⁸ Spain¹⁹ and Japan²⁰ did not hint at the outcome as conceived by Biggs et al.⁷ for R-SPQ-2F.

Therefore, the difference of CFA results could be the difference in the culture and student characteristics because the Pakistani culture is quite different from the Western countries and even differs from several Asian countries. Furthermore, students' family background,

their upbringing, socioeconomic conditions, and assessments tools and teaching strategies at local institutes are different. Study assumption is also strengthened by the few other studies that have suggested that this tool has a cross-cultural sensitivity.^{7,20}

Similar to our results, two Malaysian studies also reported that this questionnaire has satisfactory goodness-of-fit between the model and the data, and their CFA results displayed that this questionnaire has good construct validity and has goodness-of-fit indices satisfying the standard rule.^{15,17,21,22}

A study gave several suggestions for further validation of RSPQ-2F such as the use of the questionnaire for different groups of students from different faculties like science, social sciences, humanities and others. Additionally, the face-face interviews were recommended to find out detailed information about students learning approaches that influence their academic achievements.¹¹

The present study results are in line with the several other studies carried out worldwide. The good internal consistency and acceptable validity show that this questionnaire can be applied for exploring the learning styles among Pakistani medical students. For improving the quality of the questionnaire like like done earlier,¹¹ it is recommended that if face to face interviews are not possible then at least there should be an arrangement of focus group discussion that further validate this questionnaire base results.

In terms of study limitations, the results might be specific to the group included in the study. Although homogenous environment of the study population might have limited the effect of relatively low response rate, three interactions made with each class could have been increased along with the possibility of considering availability of online survey option. The study did not compare undergraduates and postgraduates considering it a limitation in the holistic context. The study suggests that the R-SPQ-2F is satisfactorily reliable and valid tool in similar study settings but also acknowledges its limitation of providing quantitative data only.

Conclusion

R-SPQ-2F was found to be a reliable and valid instrument to measure learning approaches among medical students. Further studies are suggested with larger sample size to explore the suitability of the questionnaire in other similar settings in the region.

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