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RESEARCH ARTICLE

Assessing the reliability and validity of the Revised Two Factor Study Process Questionnaire (R-SPQ2F) in Ghanaian medical students

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Abstract

Purpose: We investigated the validity and reliability of the Revised Two Factor Study Process Questionnaire (R-SPQ2F) in preclinical students in Ghana. **Methods:** The R-SPQ2F was administered to 189 preclinical students of the University for Development Studies, School of Medicine and Health Sciences. Both descriptive and inferential statistics with Cronbach's alpha test and factor analysis were done. **Results:** The mean age of the students was 22.69 ± 0.18 years, 60.8% (n = 115) were males and 42.3% (n = 80) were in their second year of medical training. The students had higher mean deep approach scores (31.23 ± 7.19) than that of surface approach scores (22.62 ± 6.48). Findings of the R-SPQ2F gave credence to a solution of two-factors indicating deep and surface approaches accounting for 49.80% and 33.57%, respectively, of the variance. The scales of deep approach (Cronbach's alpha, 0.80) and surface approach (Cronbach's alpha, 0.76) and their subscales demonstrated an internal consistency that was good. The factorial validity was comparable to other studies. **Conclusion:** Our study confirms the construct validity and internal consistency of the R-SPQ2F for measuring approaches to learning in Ghanaian preclinical students. Deep approach was the most dominant learning approach among the students. The questionnaire can be used to measure students' approaches to learning in Ghana and in other African countries.

Key Words: *Learning; Statistical factor analysis; Medical students; Validity; Reproducibility of results; Ghana*

INTRODUCTION

Two major approaches to learning have been described: the surface approach and the deep approach. Generally, students who adopt a surface approach tacitly accept information and memorization as isolated and unrelated facts. For them, learning is motivated by a predominant desire to learn for the sake of examinations or to finish a course of instruction [1,2]. They are confined to specific learning objectives and syllabi of the course. In contrast, students adopting a deep approach have an intrinsic motivation to study a subject area [1]. They actively and critically examine ideas and evidence, and use them with caution and build new information on their previous knowledge. In addition, deep approach has been reported to promote the retention of factual details more effectively [3]. It is accepted that a deep approach contributed positively to learning outcomes [1]. Biggs revised two factor study process questionnaire (R-SPQ2F) has been previously validated among medical students from western and Asian settings [1,4,5]; however, its psychometric properties have not yet been studied among students in a sub-Saharan African context. Due to ethnic and socio-cultural differences, it is important to determine the psychometric properties and the applicability of the R-SPQ2F in a sub-Saharan African setting. Also, studies on the validity of the study process questionnaire among pre-clinical students

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are limited. This study aims to investigate the validity and reliability of the R-SPQ2F in preclinical students of the University for Development Studies, School of Medicine and Health Sciences (UDS-SMHS) in Ghana.

METHODS

Study setting and participants

This cross-sectional study was conducted among second to fourth year medical students. To ensure uniformity of the participants with regards to the type of teaching and learning methodology they were following, first year students were excluded from the study because they were following a conventional method of teaching and learning, described elsewhere [6]. A staff member coordinated the distribution and collection of the questionnaires. The Ethics Committee of the UDS-SMHS reviewed and approved the study.

Instrument

The Biggs' revised two factor study process questionnaire (R-SPQ2F) was employed to assess the students' approaches to learning. A student's learning approach is determined by both motive and strategy as stated by Biggs et al. [4]. This study was done in the preclinical context. The instrument was unidimensional for each subscale and the subscales have been previously found to be internally consistent [5]. It consisted of 20 items on the approaches of students to learning. The instrument was modified with regards to language and relevant examples to meet the context of the study. Included into the instrument were demographic factors such as age, gender and year of study of medicine. The responses to the questionnaire were analysed according to Biggs scoring system. Each student had scores for deep motive, deep strategy, surface motive and surface strategy. All deep motive and deep strategies scores were summed to arrive at a deep approach score for a student. All surface motive and deep strategies scores were summed to arrive at a surface approach score. The possible maximum score was 50 for either deep approach or surface approach comprising of equal motivation and strategy scores whereas a minimum possible score was ten for each approach. The instrument was self-administered to all the students.

Statistical analysis

Descriptive statistics of mean and standard deviation for each approach were calculated. Using Cronbach's alpha scores the internal consistency of the instrument was assessed. The construct validity and reliability of the scales and subscales of the instrument were determined using factor analysis that employed principal component analysis (PCA) with oblimin rotation. We conducted Kaiser-Meyer-Olkin test (KMO) to assess the sampling adequacy. Factors in the PCA were retained by an eigenvalue of >1. The scree plot was also examined to aid in the selection of factors [7]. Using Bartlett's test of sphericity, significant correlations between the scales and subscales of the R-SP2FQ were determined. All statistical analysis was conducted using PASW ver. 18 (SPSS Inc., Chicago, IL, USA) In all statistical tests, P-value less than 0.05 was considered as significant.

RESULTS

Out of the 235 students contacted, 217 returned the questionnaire from which 28 were incomplete, leaving 189 (80.4% response rate) complete questionnaires for the study. Out of the 189 students, 115 (60.8%) were males. The participating students had a mean age of 22.69 ± 0.18. Eighty students (42.3%) were in their second year of medicine, 64 were in their third year, and 45 (23.8%) were in their fourth year of medicine. The deep approach scores of the students were significantly higher than those recorded for the surface approach (31.23 vs. 22.62; P = 0.001). Similarly the deep motive and strategies had higher scores than those of the surface motive and strategies. The deep approach and surface approach scales had Cronbach's alpha values of 0.80 and 0.76, respectively. The subscales had alpha values that ranged from 0.57 to 0.71 (Table 1).

To examine the construct validity of the scales, a principal component analysis was conducted on the four subscale scores with an oblimin rotation to a simple pattern structure. Prior to extraction, the KMO measure of sample adequacy was applied, which yielded an overall index of 0.53. Bartlett's test of sphericity was found to be chi-square = 234.50, P < 0.001, making the factor analysis appropriate. An initial analysis was done to obtain eigenvalues for each factor in the data. With eigenvalues greater than 1 two factors, which had a combined 83% of the variance, were obtained. The scree plot leveled after the second factor supporting the two factor solution. Table 2 shows the factor loadings after rotation. The subscales that cluster around the same factors indicate that factor 1 is deep approach

Table 1. Internal consistency and descriptive statistics of mean and SDs of the Biggs revised two factor study process questionnaire from 2nd year to 4th year preclinical students in 2013 at the School of Medicine and Health Sciences, University for Development Studies (n = 189)

Approach/scale	Mean ± SD	Cronbach's alpha
Deep approach	31.23 ± 7.19	0.80
Deep motive	15.96 ± 3.62	0.57
Deep strategy	15.27 ± 4.09	0.71
Surface approach	22.62 ± 6.48	0.76
Surface motive	9.8 ± 3.4	0.68
Surface strategy	12.82 ± 3.82	0.58

Table 2. Summary of exploratory factor analysis results for the Biggs revised two factor study process questionnaire from 2nd year to 4th year preclinical students in 2013 at the School of Medicine and Health Sciences, University for Development Studies (n = 189)

Subscale	Rotated factor loadings	
	Deep approach	Surface approach
Deep strategy	0.93	0.01
Deep motive	0.93	-0.02
Surface strategy	0.08	0.91
Surface motive	-0.09	0.87
Eigenvalue	1.99	1.34
% of variance	49.80	33.57

and factor 2 is surface approach.

DISCUSSION

The most dominant approach to learning found in this study was the deep approach. Direct comparisons to other studies may be difficult due to the use of variable instruments to assess learning approaches; however, our findings are comparable to a study conducted among Indonesian medical students in which deep approach was the most dominant approach [1]. Another study among medical students in Western Nepal found that the median scores for deep and surface learning styles were 64 and 49, respectively (maximum score, 80) [8]. The alpha values for the two scales indicated a very good level of internal consistency (0.76 for surface approach and 0.80 for deep approach) of the R-SPQ2F. The total variance (80%) explained by the two dimensions of the R-SPQ2F is higher than the 68% reported among medical students in Indonesia [1]. From our factor analysis, two underlying principal factors were identified in the R-SPQ2F, namely, deep approach and surface approach. These factors are similar to the ones reported in previous studies among medical students [1,9]. These results, in combination with the high level of internal consistency validate the adoption and application of the R-SPQ2F for examining preclinical students' approaches to learning in a Ghanaian medical school.

This study is the first of its kind in sub-Saharan Africa and as such provides a basis for future studies. Our study was cross-sectional, making it difficult to make firm conclusions regarding changes in learning approaches over time. In conclusion, our findings demonstrate that the internal consistency and construct validity of the R-SPQ2F are similar to other studies. The R-SPQ2F is valid and reliable for assessing learning approaches among students in the preclinical context and applicable for the sub-Saharan African context. Deep approach was the most predominant approach to learning employed by the students.

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CONFLICT OF INTEREST

No potential conflict of interest relevant to this study was reported.

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SUPPLEMENTARY MATERIAL

Audio recording of the abstract.

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