ORIGINAL ARTICLE

Self-directed Learning and Research Attitudes Among Medical Students

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ABSTRACT

Objective: To describe the correlation between Self-directed Learning (SDL) and medical students' attitude towards research, based on the premise that self-directed learners are independent, motivated, and curious learners.
Study Design: Observational cross-sectional study.
Place and Duration of Study: Rawalpindi Medical College, Rawalpindi, from August 2011 to January 2012.
Methodology: One hundred and ninety-four students of final (5th) year class at Rawalpindi Medical College, Rawalpindi participated in this cross-sectional study. SDL ability of students was measured using Oddi's Continuing Learning Inventory (OCLI) whereas Attitude Towards Research (ATR) scale was used to measure their research attitudes. Spearman's rank-order analysis was performed to measure correlation between SDL scores on OCLI and all the 18 items on ATR scale.
Results: Statistically significant relationships with correlation coefficients ranging from +0.12 to +0.32 were found for the correlation between scores on the OCLI and eleven statements highlighting research use and positive attributes of research (14 items). Those students who participated in extra-curricular research projects (n=58, 29.9%) had relatively higher scores on OCLI as compared to those who did not participate (n=136, 70.1%, p=0.041).
Conclusion: Self-directed learners show a positive attitude towards research, though the relationship is not strong.

Key Words: *Self-directed learning. Research. Undergraduate. Medical education.*

INTRODUCTION

Promoting research activities among undergraduate medical students is both a priority and a challenge for medical educators and academics. Various factors may influence students' attitude towards research. Identifying and emphasizing on these factors can prove pivotal in promoting research culture in medical schools.

Self-directed Learning (SDL) is a pre-requisite for life-long learning. Therefore, it has received considerable attention in medical education.[1] Malcolm Knowles defined self-directed learning as "a process in which individuals take the initiative with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies and evaluating learning outcomes".[2] Researchers have argued that such learning disposition is dependent on personality characteristics that predispose individuals to be self-directed.[3]

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Self-directed learners demonstrate a high degree of cognitive responsibility, critical thinking and motivation.[4] They are curious, are willing to try new things, view problems as challenges and desire change.[5,6] So, theoretically, self-directed learners may be more likely to show a positive attitude towards research. Moreover, as compared to passive learners, active learners are confident and independent, and thus stand a better chance to engage in self-initiated extra-curricular academic activities.

Self-directed learning is regarded as a developmental process that is facilitated by various learning strategies.[7,8] These include problem-based learning, peer/self-evaluation, small group and project based learning and task-based learning.[9,10] If the evidence of relationship between SDL and research attitudes is well established, then application of above-mentioned learning methodologies can not only cultivate SDL but may encourage research as well.

The aim of this study was to describe the self-directed learning (SDL) capabilities of final year undergraduate medical students, determine attitudes of these students towards healthcare research, and explore correlation between SDL and research attitudes.

METHODOLOGY

This study was carried out at Rawalpindi Medical College, Rawalpindi, Pakistan. Research methods and basic concepts in medical research methods and

biostatistics are taught as a part of the subject of 'Community Medicine and Public Health' in the fourth year. Students in groups of 15-19 also undertake a research project in the same year. Under supervision of an instructor in research methods, they formulate a research question, design a protocol, implement the study, collect and analyze the data, and present the results in a student-faculty seminar.

Final year medical students from the graduating class of 2011, who had been exposed to the aforementioned exercise in the preceding year as part of their curriculum, participated in this study. The total size of the class was 276.

Information on SDL and research attitudes of students was collected using pretested and validated questionnaires. Self-directed learning ability was measured using Oddi`s Continuing Learning Inventory (OCLI), which consists of 24, seven-point Likert-type items.[11] The SDL score of each participant was calculated with the accompanying scale, ranging from a minimum of 24 to a maximum of 168. For the purpose of this study, Lorys F. Oddi granted a royalty-free copyright license for the use of OCLI. To measure students' attitudes towards research the three-factor model of 'Attitudes Towards Research' scale was used as proposed by Walker based on a factor analysis of Papanastasiou's "Attitude Towards Research" scale (ATR).[12,13] This scale comprising of 18 items based on a 1 (strongly disagree) to 7 (strongly agree) Likert type scale has three constructs: research use (10 items), positive attributes of research (4 items), and negative attributes of research (4 items). Students' scores in previous year's annual qualifying examination (3rd professional examination) were also noted to determine a relationship between academic performance and attitudes towards research.

English version of questionnaires was used as it is the language of curriculum. The final questionnaire administered to the students consisted of four parts namely: respondent's demographic data, OCLI, ATR scale, and questions to establish their experience in conducting research. Questionnaires were distributed to participants after their consent to participate in the study. Participants were asked to return the questionnaire on the same day. Incompletely filled questionnaires were not considered for inclusion in the final dataset (n = 26). After this exclusion, the final sample consisted of 194 students, which represents 88% of the students present on campus on the day, the study was carried out. Study was approved by the Institutional Review Board of the Medical School.

Data was managed and analyzed using the Statistical Package for Social Sciences version 16 (SPSS Inc., Chicago, III., USA). Descriptive statistics were calculated for age, gender, SDL score on OCLI, and scores in previous years' annual examination. Frequencies and percentages were calculated for categorical variables. Mean and standard deviation were calculated for numerical variables. Chi-square's test and t-test were applied where necessary. The composite score from the OCLI and examination scores were correlated with the scores on each of the 18 questions on ATR scale using Spearman's Rank-Order analysis and correlation coefficient (r_s) values and p-values were noted. P-value of less than 0.05 was considered as the criteria for statistical significance.

RESULTS

Of the 194 students included in the study, 63 (32.5%) students were male. Mean age of students was 22.9 ± 0.7 years. Average score in previous years qualifying examination was 728.22/1000 ± 52.32. Female students had higher scores (735.6 ± 61.6) as compared to male students (713.1 ± 61.6, p= 0.012).

Fifty eight (29.9%) students reported participation in research work outside of mandatory class research projects.

Mean score on ATR scale ranged from 4.72 - 5.91 for statements on research use and positive attributes of research, and 3.32 - 4.28 for statements on negative attributes of research.

The mean SDL score of participants as determined by OCLI was 111.87 ± 17.2. Female students had a mean score of 113.0 ± 18.0 as compared to male students 109.5 ± 15.2 (p=0.190). A statistically significant correlation was noted between SDL scores and eleven statements on ATR scale (Table I) highlighting research

Table I: Relationship between SDL scores on OCLI and all the 18 items on ATR scale.

Item	r_s[1]	p-value
Research makes me anxious	+0.014	0.845
I enjoy research	+0.218	0.002
Research is useful for my career	+0.216	0.002
I find it difficult to understand the concepts of research	-0.151	0.035
I make many mistakes in research	-0.090	0.213
I am interested in research	+0.272	<0.001
Research is connected to my field of study	+0.179	0.013
Most students benefit from research	+0.096	0.181
Research is very valuable	+0.226	0.002
The skills I have acquired in research will be helpful to me in the future	+0.319	<0.001
Research is useful to every professional	+0.257	<0.001
Knowledge from research is as useful as writing	+0.266	<0.001
Research should be indispensable in my professional training	+0.232	0.001
I will employ research approaches in my profession	+0.234	0.001
Research is difficult	-0.039	0.587
I am inclined to study the details of research	+0.165	0.022
Research acquired knowledge is as useful as arithmetic	+0.122	0.090
Research-oriented thinking plays an important role in every day life	+0.115	0.110

[1] Correlation coefficient (r_s) calculated by Spearman`s Rank-Order analysis.

Table II: Relationship between academic performance and all the 18 items on ATR scale.

Item	r_s[1]	p-value
Research makes me anxious	+0.009	0.900
I enjoy research	-0.075	0.299
Research is useful for my career	+0.008	0.909
I find it difficult to understand the concepts of research	+0.032	0.657
I make many mistakes in research	+0.044	0.540
I am interested in research	-0.091	0.208
Research is connected to my field of study	+0.027	0.712
Most students benefit from research	-0.017	0.809
Research is very valuable	-0.037	0.610
The skills I have acquired in research will be helpful to me in the future	+0.021	0.352
Research is useful to every professional	+0.024	0.736
Knowledge from research is as useful as writing	-0.032	0.666
Research should be indispensable in my professional training	+0.033	0.648
I will employ research approaches in my profession	+0.032	0.662
Research is difficult	+0.076	0.289
I am inclined to study the details of research	+0.200	0.005
Research acquired knowledge is as useful as arithmetic	-0.095	0.188
Research-oriented thinking plays an important role in every day life	-0.106	0.141

[1] Correlation coefficient (r_s) calculated by Spearman`s Rank-Order analysis.

use and positive attributes of research. Among these, nine had statistically significant r_s value of more than 0.2. No correlation was noted between SDL scores and three statements out of four representing negative attributes of research ($p > 0.05$, item 1, 4, 5, 15 Table I). These statements were 'research makes me anxious', 'I make many mistakes in research' and 'research is difficult'. A negative correlation $r_s = -0.15$ ($p=0.035$) was noted for the statement 'I find it difficult to understand the concepts of research'. Correlation coefficient (r_s) values and p-values are presented in Table I.

No correlation was found between students' academic performance and 17 of the 18 items on ATR scale ($p > 0.05$, Table II).

SDL score of those who had participated in extra-curricular academic research (n=58, 29.9%) was 115.7 ± 21.3 as compared to 110.2 ± 15.0 of those who did not participate (n=136, 70.1%) ($p=0.041$).

DISCUSSION

In this study, a mild but statistically significant correlation was demonstrated between scores on OCLI and most statements on ATR scale highlighting research use and positive attributes of research. No association was found between scores on OCLI and most items highlighting negative attributes of research. Students who participated in extracurricular research projects had relatively higher scores on OCLI as compared to those who did not.

The factors in relation to SDL on which our hypothesis rests can serve well to explain relationship between SDL scores and most statements on research use and positive attributes of research having r_s-value more than 0.2. Relatively high SDL scores of those students who participated in extracurricular research also supplement the evidence. Although one may expect a negative correlation for all the statements reflecting negative attributes of research, a neutral r_s-value can be explained by the fact that some statements among these may not reflect on the hypothesis. Even if self-directed learners do show a positive attitude towards research it is still possible that they may find research difficult and may make many mistakes in research, therefore, no relationship with these statements seems justified. Theoretically, those interested in research should be less anxious about it and thus expecting an inverse relationship between SDL score and statement 'research makes me anxious' looks rational, though we did not find a negative association.

SDL has been correlated with various psychological and social variables. Ours is the first study to explore the association between SDL and research. Investigators in the domain of health have explored relationships between problem-based learning (PBL) and attitude towards research. Khan *et al*. performed a cross-sectional study to compare research attitudes between medical students of PBL and students of conventional curriculum using a pre-tested questionnaire adapted from a validated questionnaire designed by Vodopivec *et al*.[14,15] They concluded that PBL students showed better attitudes towards research and greater involvement in research activities as compared to their counterparts in conventional curriculum. Another study evaluating occupational and physiotherapy students concluded that PBL students had a more positive attitude towards research and intended to engage in research activities to a greater extent.[16] The authors of both studies did not mention specific underlying factors in connection with PBL that can nurture better research attitudes. Khan *et al*. only speculated that greater free time and favourable mood towards curriculum may have led to the afore mentioned results. It is proposed that improved self-directed learning ability in students of PBL lead to better attitudes. However, the role of SDL in PBL needs to be fully elucidated and further research needs to be performed on this topic.

Various studies that explored the relationship between SDL and PBL have demonstrated positive results. A recent review on PBL and SDL concluded that SDL is a developmental process that is fostered by PBL.[17] In another study, Alam and Nurzakiah using modified version of self-directed learning readiness scale (SDLRS) demonstrated that SDLRS level increases with increase in PBL exposure.[18] The examples and argument presented above provides interesting tentative indirect but debatable evidence for the study hypothesis that would require further investigation. On the other hand, if self-directed learners show positive attitude

towards research, then SDL can serve as a relevant explanation as to why PBL students showed positive attitudes towards research in the previously mentioned studies.

OCLI is one of the two most widely used instruments to measure SDL (the other is SDLRS [self-directed learning readiness scale]). It conceptualizes SDL as personality characteristic rather than simply a process of learning. Several studies have demonstrated the validity of the instrument.[11,19,20] Although in this study, pre-tested instruments were used to assess both SDL and attitude towards research, this study has an important limitation that may have obscured the true relationship between the variables. Using correlation statistics, we have managed to describe the interdependence of SDL and attitudes towards research, but since various motivating factors and other independent variables not related to SDL can influence student attitude toward research, identification of such covariates and regression analysis may be required to determine the true causal relationship between SDL and attitude towards research. For instance, improvement of curriculum vitae can be one reason why students show increasing interest in research.[21] Although such explanatory variables can influence the strength of relationship; there is no reason to doubt the positive relationship between SDL and attitude towards research.

The significance of health research training in implementing evidence-based medicine and a recent decrease in physician-investigators has prompted academics to promote research among medical students.[22,23] Medical students who participate in extra-curricular research have been shown to be more active in research after graduation than those without such experience.[24] Various strategies are being employed to cultivate research and motivate students to pursue careers in research. Identification and accentuation of factors that can influence students' attitude towards research is paramount to these efforts. SDL can be an important one amongst these.

Lifelong SDL is essential to meet the growing challenges in healthcare imparted by a rapid increase in knowledge of health problems. Strong evidence of relationship between SDL and research can reinforce the importance of encouraging SDL. The current study provides preliminary evidence in this regard that will require further investigation in the future.

CONCLUSION

Self-directed learners showed a positive attitude towards research, though the relationship is not strong. Students who participated in extracurricular research projects also had relatively higher SDL scores as compared to those who did not participate. The authors recommend further research to fortify the evidence.

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