Pharmacy students' anxiety towards research during their undergraduate degree; How to reduce it?

Mari Kannan Maharajan[1☯]*, **Kingston Rajiah**[1☯], **Ai May Tam**[2‡], **Siew Ling Chaw**[2‡], **May Jing Ang**[2‡], **Mei Wan Yong**[2‡]

1 Department of Pharmacy Practice, School of Pharmacy, International Medical University, Kuala Lumpur, Malaysia, **2** BPharm (Hons.,) graduate, School of Pharmacy, International Medical University, Kuala Lumpur, Malaysia

☯ These authors contributed equally to this work.
‡ These authors also contributed equally to this work.
* marikannan@imu.edu.my, kanpharm2002@gmail.com

Abstract

Objective

To measure pharmacy students' anxiety towards research and how academic support, academic effort, attitude and self-efficacy influence their research anxiety.

Methods

A cross-sectional study was conducted with undergraduate final year students of pharmacy using a convenient sampling method. A validated self-administered questionnaire was used.

Results

Response rate for this study was 85.9% (128 students from a population of 149). The participants agreed that they read literature to understand research, but did not attend research-related coursework. Most participants (91.4%) felt that they were under stress while doing research. Almost all participants (97.6%) felt that they were doing very badly during their data analysis or they may fail their research projects. The majority of participants agreed that help from the lecturers' and friends in research give emotional support for their research activities.

Conclusion

Academic support for pharmacy students, along with their additional academic effort will improve the students' self-efficacy and reduce research anxiety.

Introduction

The changes in modern health care are rapid and the pharmacy profession is undergoing an evolution to meet the changing health care needs around the world. The transformation of healthcare practice always based on medical and health related research [1, 2]. The research in pharmacy focusing more towards evidence based medicine, which is a key to modern health-care. Considering a broad and multidisciplinary aspects of drug therapy and outcome, there is a need for pharmacy and pharmacy practice based research to improve patient care [3]. In spite of pharmacists being aware of the importance of practice based research, they are less likely to participate in research themselves [4–6]. There is a need for pharmacists to view research participation as part of routine care [7].

Developing a research-oriented pharmacy graduate, with the right attitude towards research is one of the fundamental goals of educational systems [8]. Pharmacy schools around the world have different methods of engaging their students in scholarly research activities [8–11]. Involvement of students in research and research-related coursework is one of the widely used methods to engage students. Faculty observations reveal that, developing positive attitudes towards research among undergraduate students is one of the major challenges globally [12]. There are a number of factors being reported for influencing students' attitude towards research.

The academic support from the lecturers or research supervisors may contribute students' high satisfaction levels. A lecturer's role in mentoring, identifying problematic areas in research and implementing necessary revisions during the research is essential to succeed in the research project. During research projects, assistance from the supervisors prevent academic problems for students. Somers et al., (2004) reported that academic mentoring assist to improve young students' academic functioning [13]. Academic supports such as tutorial classes, direct mentoring and skills program helps in students' grades [14]. Aslam et al., (2005) reported that a mentorship by lecturer plays an important role in student research [15]. However, to date, there is no study has investigated direct link between academic support and undergraduate students' research anxiety.

Generally, students' academic performance in any area is interrelated with their effort [16–19]. However, there were very limited literatures provide more details on how academic effort by students influences their interest in research. Therefore, this study focused academic efforts of students towards research

In practice, research anxiety acts as a carrier filter, preventing fresh graduates from entering into research related jobs. Anxiety significantly affects students' learning and academic performance during their study [20]; more importantly, it may obstruct young adults' academic achievements [21]. It was also reported that students' research anxiety and doubts can greatly affect their ability to master research concepts [22]. Though anxiety may be help in the learning process to some extent, optimum performance is affected by high levels of anxiety [23]. However, undergraduate students usually tend to view research as difficult and stressful and some even develop a "phobia' towards research [24, 25].

Self-efficacy beliefs are essential for professional students, as they one of the key predictors of academic performance [26, 27]. Self-efficacy in leading a research is vital for an individual to succeed in research-related field. "Research self-efficacy" can predict the students' interest in the research field [28]. Many studies have shown that "academic support" was believed to improve students' productivity and help them achieve academic success [29]. Undergraduate students' perception of academic support is one of the major contributing factors to complete the course work successfully and a lack of support may be problematic for undergraduate students. Aslam et al., (2005) demonstrated that mentorship by lecturers play an important role in student research [15].

Developing positive attitudes in students towards research is a key element in current education system [30, 31]. Understanding the attitudes of students towards research is a first step to address the negative views of students towards research. These attitudes will help to describe the pattern of feelings, beliefs, and their reactions regarding research based on their past experience [32, 33]. Hence, the objective of this study was to measure pharmacy students' anxiety towards research and how academic support, academic effort, attitude and their self-efficacy influence their research anxiety.

Methods

Ethical approval

The study was reviewed and approved by the International Medical University-Joint Committee, on Research and Ethics (BP I-01-12 (49) 2015). Before collecting the data, participants' written consent was obtained. Confidentiality and anonymity were retained throughout this study.

Sample frame

A cross-sectional study was conducted for 6 months from June to November, 2015, in International Medical University, Kuala Lumpur, one of the private universities in Malaysia. All final year pharmacy students in this university were invited to participate. All the students were informed that the survey will be anonymous and recorded responses would be used for scientific purposes only. Though all students were invited to participate, a minimum sample size was needed to prove the significance of the study. Hence, using a Raosoft software calculation, a required sample size of 110 was demonstrated; power 80%, distribution of response 50%, with 95% confidence interval and a 5% margin of error. A total of 149 pharmacy students was approached, but the final participating number was 128 which was more than the required sample size to generalize the findings. Convenience sampling was done. The only exclusion criterion was disinterest in participating.

Sampling procedure

International Medical University, Pharmacy students have 8 semesters in their total duration of 4 year course. During final year that is during their 7th semester a six month (24 weeks) research project is mandatory. So the current study targeted these pharmacy students in order to measure their anxiety towards research and how academic support, academic effort, attitude and their self-efficacy influence their anxiety towards research. The researchers of this study approached the pharmacy students during their almost end of semester 7 (week 16–20). These time durations were selected to collect the data as the students had more or less completed their research work by these weeks.

Study tool

The questionnaire was in English which had 48 items with six sections. The first section extracted demographic information of the participants with 5 questions in it. The second section, comprising 8 questions, evaluated the academic support of participants towards research. The third section evaluated the academic effort of participants towards research by assessing their responses to 7 questions. The fourth section, comprising 8 questions, evaluated the self-efficacy of participants towards research. The fifth section, comprising 10 questions assessed the attitude of participants towards research. The sixth section, comprising 10 questions, assessed the anxiety of participants towards research. All the responses, except demographic

details were recorded using a 5 point Likert scale of agreement. A score of 1 was given to strongly disagree, 2 to disagree, 3 to Neutral, 4 to agree and 5 to strongly agree. Negatively worded statements were reverse coded.

Validity and reliability of the study tool

A self-administered questionnaire was prepared based on relevant published studies [22, 24, 28, 29, 32]. An initial version of the questionnaire underwent face and content validity. Content validity was done by a panel of 3 subject experts and their opinion on the relativity and the significance of the questionnaire was considered [34]. Necessary adjustments were amended to the questionnaire based on the experts' opinion prior to its administration to a small group of 10 students for a pilot study. A pilot study was done to confirm the reliability of the questionnaire. By using SPSS V.20 the internal consistency reliability was estimated by coefficient alpha index with reference to the Cronbach's alpha value. Cronbach's alpha is an important concept in the evaluation of questionnaires. It is mandatory that researchers should estimate this quantity to add validity and reliability to interpret their data. The acceptable values of alpha, ranging from 0.70 to 0.95 [35, 36]. In this study, Cronbach's alpha was 0.70 for academic support, 0.72 for academic effort, 0.78 for self-efficacy, 0.72 for attitude and 0.74 for research anxiety sections. For the final analysis, the data of the pilot study were not used.

Data analysis

Frequencies and percentages were presented by using descriptive analyses. The normality of the data was verified by using Kolmogorov-Smirnov test and the significant value were below 0.05 suggesting violations of the assumption of normality. As the data distribution was not normal, skewness of the data was analysed. While determining skewness values, if the calculated z value for skewness lie less than the critical values of ±1. 96 at 0.05 significance level, then the distribution of data is considered normal [37]. In the current study, the skewness tolerance value was 1.90 and hence the data were considered normally distributed. Mean scores for each parameter [38] (academic support, academic effort, self-efficacy, attitude and anxiety to research) was taken. Total mean scores of these parameters were used for inferential analysis. In order to examine the relationship between the students' academic support, academic effort, self-efficacy, attitude and anxiety to research, a Spearman Rho test was employed. The absolute value 0.25 or above with p-value < 0.05 was measured as statistically significant at 95% confidence level. Outliers were investigated using Mahalanobis Distance which is 8.35 and it is within the limit.

Results

Of the total pharmacy student population of 149, 128 pharmacy students participated in this study, giving a response rate of 85.9%. The majority were females (74.2%). The demographic profiles of the respondents are shown in Table 1.

Table 2 presented students' view of academic support towards research. Participants agreed that their lecturers help in research ($\bar{x}$ = 4.11; SD = 0.79) and their friends give emotional support in the research activities when needed ($\bar{x}$ = 3.96, SD = 0.80). These two statements remained on the top two with higher mean scores for academic support.

Table 3 showed academic effort of participants towards research. Participants agreed that they read the research literature more than once in order to gain a full understanding of the research ($\bar{x}$ = 4.01, SD = 0.77), and "least keen in attending any research methods and statistics courses conducted" ($\bar{x}$ = 3.29, SD = 1.01). These two statements explained their academic effort to understand research by themselves.

Table 1. Demographic information of respondents.

Socio-Demographic Characteristic	Frequency	Percentage (100%)
Gender		
Male	33	25.8
Female	95	74.2
Total	128	100
Race		
Malay	2	1.6
Chinese	116	90.6
Indian	8	6.2
Others	2	1.6
Total	128	100
Do you have a previous degree?		
Yes	2	1.6
No	126	98.4
Total	128	100
Do you have previous work experience?		
Yes	92	71.9
No	36	28.1
Total	128	100
Involved in any research activity before?		
Yes	31	24.2
No	97	75.8
Total	**128**	**100**

Table 4 showed participants' self-efficacy towards research. Participants indicated that they could gather literature on their research work from different sources ($\bar{x}$ = 3.78, SD = 0.70). This is an indication of their ability to collect the research related information from the available resources. However, the statement 'I am able to understand the statistics formulas ($\bar{x}$ = 3.04, SD = 0.90) got less score reflected their difficulty in understanding statistics.

The attitude of participants towards research is shown in Table 5. Participants felt that they are under stress while doing research ($\bar{x}$ = 4.29, SD = 0.90) and the mean value for the statement "research is a required part of their professional career" was low ($\bar{x}$ = 2.38, SD = 0.72). The participants' thinking about the importance of research in their professional career might influence their interest and this may be a reason for their stress during research.

Table 2. Academic support of participants towards research.

Academic support	Mean	SD
My friends/peer really try to help me in research	3.96	0.72
My lecturers really try to help me in research	4.11	0.79
I get the emotional help and support I need from my friends/peers	4.05	0.80
I get the emotional help and support I need from my lecturers	3.73	0.90
I can talk about my problems with my friends/peers	4.02	0.70
I can talk about my problems with my lecturers	3.75	0.86
My friend/peer is willing to help me make decisions	3.88	0.77
My lecturer is willing to help me make decisions	3.88	0.78
Total mean score	**31.43**	**6.31**

Table 3. Academic effort of participants towards research.

Academic effort	Mean	SD
Apart from other course assignments, I also can do extra exercises related to research and statistics.	3.44	0.91
Apart from reading the lecture notes, I also read extra readings/information related to research and statistics.	3.50	1.06
I work hard to complete the research.	3.98	0.67
I study hard and prepared well for research methods and statistics.	3.66	0.77
In order to get full understanding on research, I read the research literatures more than once.	4.01	0.77
I am keen to attend research methods and statistics courses conducted.	3.29	1.01
I paid close attention to research methods and statistics courses.	3.58	0.85
Total mean score	**25.46**	**3.95**

Table 6 shows participants' anxiety towards research. Participants said that they struggle with writing research reports, or avoid them as long as they can ($\bar{x} = 3.94$, SD = 1.16). During data analysis, participants felt that they were doing badly or that they may fail in their research projects ($\bar{x} = 3.89$, SD = 1.05). Their lack of research writing skills and less understanding of statistical analysis may be the reasons.

Correlation and multiple regression analyses were conducted to examine the relationship between students' research anxiety and predictor variables (students' academic support, academic effort, self-efficacy and attitude) (Table 7).

Table 4. Self-efficacy of participants towards research.

Self-efficacy of participants	Mean	SD
I am able to learn research methodology and data analysis	3.72	0.64
I am interested to participate in research related courses	3.55	0.84
I am able to understand about research methodology and data analysis.	3.74	0.66
I am able to understand the statistics formulas	3.04	0.90
I am able to explain and tutor other students about research	3.28	0.86
I can do research methods and data analysis even if it is the hardest work	3.27	0.78
I can figure out difficult part in research	3.23	0.84
I am able to gather information regarding research from different sources	3.78	0.70
Total mean score	**27.72**	**6.27**

Table 5. Attitude of participants towards research.

Students' attitude	Mean	SD
I like research.	3.47	0.72
I enjoy doing research.	3.42	0.79
I am confident when I have to deal with research.	3.13	0.80
I am under stress while doing research.	4.29	0.90
I can learn from research.	3.88	0.70
I find it difficult to understand research concepts.	2.54	0.86
I find it difficult to understand research methods.	3.30	0.77
I find statistics formulas are easy to understand.	3.35	0.77
Research is a required part of my professional career.	2.38	0.72
Research skills make me more employable.	3.89	0.79
Total mean score	**33.66**	**0.76**

Table 6. Anxiety of participants towards research.

Research Anxiety	Mean scores	SD
The closer I am to research work; the harder it is for me to concentrate on that.	3.45	0.88
When I perform research, I worry that I will not remember the research protocol.	3.04	1.03
During data analysis, I think that I am doing awful or that I may fail.	3.89	1.05
I lose focus on research and cannot remember important aspects.	3.45	0.84
Usually I remember what to do after the experiment is already over.	3.23	0.95
I worry so much before my performance that I am too worn out to do my best.	3.82	1.04
I feel out of sorts or not really myself when I take any research related tasks.	3.59	0.94
I find that my mind sometimes wanders when I am taking an important research task.	3.70	1.07
After completing a research project, I worry about whether I did well enough.	3.05	0.93
I struggle with writing research reports, or avoid them as long as I can.	3.94	1.16
Total mean score	**32.16**	**9.87**

The predictor variables' scores (students' academic support, self-efficacy, academic effort) was negatively and significantly correlated with the criterion variable (research anxiety) except one predictor variable (attitude of students towards research). There was a strong negative correlation between academic support ($\bar{x}$ = 31.43; SD = 6.31) and research anxiety ($\bar{x}$ = 29.56; SD = 9.87), r (126) = -0.88, p = 0.003; students' self-efficacy towards research ($\bar{x}$ = 27.72; SD = 6.27) and research anxiety ($\bar{x}$ = 29.56; SD = 9.87), r (126) = -0.65, p = 0.004. There was a moderate negative correlation between students' academic effort towards research ($\bar{x}$ = 25.46; SD = 3.95) and research anxiety ($\bar{x}$ = 29.56; SD = 9.87), r (126) = -0.60, p = 0.02. There was no correlation between students' attitude towards research and research anxiety r (126) = 0.39, p = 0.41. Hence, this variable 'students' attitude' was not included in multiple regression.

Before conducting multiple regressions, the relationship among the predictor variables were checked to rule out multicollinearity. Visual examination using scatter plots showed no significant correction between academic support and academic effort. Similarly, there was no correlation between academic support and self-efficacy. However, there was a mild correlation between academic effort and self-efficacy are (126) = 0.29, p = 0.04. Since the variance inflation factor was 2.2 and the tolerance value was 0.92, multicollinearity was neglected [39].

The stepwise multiple regression with three potential predictors was analysed. Only two variables (academic support and academic effort) were significantly affected the research anxiety. In model 1, only with academic support variable, 57.6% of the research anxiety decrease is

Table 7. Descriptive statistics, predictor variable correlations, multiple regression results.

	Mean	SD	Academic support	Academic effort	Self-efficacy	Attitude	Research Anxiety	b	Standard error	Beta
Academic support	31.43	6.31	1	-	-	-	-	-0.399	0.033	-0.458***
Academic effort	25.46	3.95	0.28	1	-	-	-	-0.379	0.033	-0.405**
Self-efficacy	27.72	6.27	0.54	0.59*	1	-	-	0.363	0.238	0.729
Attitude	33.66	0.76	0.42	0.64	0.48	1	-	-	-	-
Research Anxiety	29.56	9.87	-0.88**	-0.60*	-0.65*	0.39	1	-	-	-

* p <0.05,

** p < .01,

***p < .001

explained F (1, 8.317) = 95.69, R^2 = 0.576, p < 0.005. In model 2, academic effort along with academic support were the significant predictors with F (2, 7.239) = 80.21, R^2 = 0.798, p < 0.001. Model 2 was selected in this study as the R^2 value was higher than (79.8% explained variance) model 1. In model 2, there was a further decrease in research anxiety with significant R^2 change of 22.2% variance. The non-significant contributor (self-efficacy) was excluded automatically by the SPSS. Outlier was investigated using Mahalanobis Distance which is 8.35 and it is within the limit.

When individual coefficients were analysed to determine the strongest predictor, academic support with the standardized coefficient beta value of -0.458 was the best predictor. When analysed for the shared and unique contribution of the predictors, academic support has shared $(0.712)^2$ = 50.6%, unique $(0.633)^2$ = 40% to the dependent variable (research anxiety). Academic effort has shared $(0.702)^2$ = 49.2%, unique $(0.532)^2$ = 28.3% contribution to the dependent variable (research anxiety).

Discussion

The results indicated that, lecturers provided academic support and their friends/peers provided emotional and other support when the participants were doing research. Apart from the quality of curriculum and instructions in the classroom, effective assistance in learning and academic advice also help the students to perform in academics and research. Research focused mentoring relationships will help the students to increase their interest in research [40]. A peer-support strategy at the undergraduate level provide social and emotional support for the students [41]. Additionally, the lecturer's involvement as a research supervisor during undergraduate research has an impact on the successful completion of students' research projects.

The total mean score for academic effort indicated that students showed much interest to read literature, i.e., published research articles to understand their research, despite their lesser interest in attending classes on research methods and statistics courses. Studies have reported that hands-on activities may help or motivate students to learn research and statistics [42, 43].

The participants' ability to learn and understand research methods and their capability of gathering information from research articles using various sources are the indicators of their self-efficacy towards research. The confidence level of students to perform research activities is directly proportional to their self-efficacy towards research methods and statistics [44]. The participants mentioned that some parts of the research, such as statistical formulae, are difficult to understand. The issue of understanding statistical analysis may be a challenge for the students at undergraduate level and this issue can be overcome by learning. The majority of the pharmacy related research use methods to quantify phenomena, associations or relationships between variables. Therefore, understanding various statistical procedures employed is important to interpret the findings [45].

The participants' attitude towards research indicated their positive outlook on research. Studies have shown that, students are more likely to put effort into studying research methods and statistics when they possess a positive attitude towards the subject [46, 32]. Most students were reported that they are under stress, while doing research. Non-availability of resources to cope with a perceived situation can result in stress of an individual's perception [47]. A key mechanism for educational institutions to minimise student stress is to provide appropriate resources on research tools and materials. Most participants mentioned that research is not an essential component of their professional career. Therefore, structured programmes and strategies focusing to provide positive views on research must be developed and implemented in curricula.

The participants are anxious about research and findings. Anxiety in any learning activity may affect students' achievement [48]. One of our earlier studies found that an excessive demand of writing research related documents was one of the reasons to reject academic career [49]. As the students struggle with writing research related documents, it may trigger their anxiety towards the course and they may find the course difficult. This may lead to a negative attitude towards research. Hu et al., (2007), reported that students' research experiences have a significant effect on their learning process [50]. Writing research proposals and grant applications are not part of the undergraduate student's repertoire in their curriculum [49]. This may also lead them to be anxious about research. Academic anxiety is experienced by students of all academic levels at some time [51, 52]. Those students who performed well in class also have suffered from test anxiety at some time [53]. Peers and lecturers can help those students who have anxiety towards research by helping them understand the learning process. Studies have shown that academic support, academic effort, and self-efficacy are significantly and negatively correlated with research anxiety [45, 54–57]. However, in this study, self-efficacy did not moderate the effect of the research anxiety. A similar report was published by Barrows et al., who reported the association between students' anxiety and their lower academic performance [58].

Based on the results from this study, the academic support and academic effort were the significant contributors to reduce research anxiety. Academic performance of students has been found to be improved for those who seek and receive academic support. Academic support helps the students to develop higher self-expectations, a greater sense of self-perceived control of academic outcomes for future academic success [59]. At the same time, increasing academic effort on a task by students may partially or completely divert the effects of anxiety [60, 61].

The finding also showed that there is no relationship between pharmacy students' attitude towards research and their research anxiety is contrary to a study by Kritikos et al., (2015) which showed a positive relationship between student attitude and anxiety towards research [62]. The exact reason for this difference in results is unknown. A possible reason for this contradiction may be due to the current scenario in Malaysia, where the focus of undergraduate pharmacy education is more towards pharmacy practice, and research is not a primary career choice [63]. The fresh graduates prefer to get a job in hospitals and community pharmacy where they will able to practice. The willingness of fresh graduate to enter into research holds the key to the future pharmacy research initiatives in Malaysia. While pharmacy research is normally associated with industry and academia, a sound pharmacy education system which emphasis on research and skills needed in research as well as partnership in research will surely bring forth tremendous progress to the pharmacy profession in Malaysia.

Limitations

As with all studies relying on voluntary participation, results can be biased. As a self-administered questionnaire was used in this study, social desirability bias can occur in the results which is inevitable.

Conclusions

This report reveals that academic support, academic effort, and self-efficacy are negatively correlated with pharmacy students' research anxiety. Academic support was the predominant factor to reduce research anxiety among pharmacy students. Therefore, implementing a pharmacy curriculum which emphasis on research and skills needed in research may bring change in students' attitude towards research and their self-efficacy to deal with their anxiety towards research.

Acknowledgments

Author Contributions

Conceptualization: MKM.

Data curation: KR.

Formal analysis: AMT.

Funding acquisition: SLC.

Investigation: MJA.

Methodology: MWY.

Project administration: KR.

Resources: MKM.

Software: KR.

Supervision: MKM KR.

Validation: KR.

Visualization: KR MMK.

Writing – original draft: MKM KR.

Writing – review & editing: MKM KR.

References

1. Murray MD. Implementing pharmacy practice research programs for the management of heart failure. Pharmacy World & Science. 2010; 32(5):546–548.

2. Scaria V. Whisking research into medical curriculum: the need to integrate research in undergraduate medical education to meet the future challenges Calicut Medical Journal. 2004; 2 (1): e1

3. Bond C. Pharmacy Practice Research: Evidence and Impact. Pharmacy Practice Research Methods 2015:1–24.

4. Rosenbloom K, Taylor K, Harding G. Community pharmacists' attitudes towards research. International Journal of Pharmacy Practice 2000; 8:103–110.

5. Stewart DC, Maclure K, Bond CM, Cunningham S, Diack L, George J, et al. Pharmacist prescribing in primary care: the views of patients across Great Britain who had experienced the service. International Journal of Pharmacy Practice 2011; 19:328–332. https://doi.org/10.1111/j.2042-7174.2011.00130.x PMID: 21899612

6. Peterson GM, Jackson SL, Fitzmaurice KD, Gee PR. Attitudes of Australian pharmacists towards practice-based research. Journal of Clinical Pharmacy and Therapeutics 2009; 34:397–405. https://doi.org/10.1111/j.1365-2710.2008.01020.x PMID: 19583672

7. Bower P, Wallace P, Ward E, Graffy J, Miller J, Delaney B, et al. Improving recruitment to health research in primary care. Family Practice 2009; 26:391–397. https://doi.org/10.1093/fampra/cmp037 PMID: 19549623

8. Mason KK. Multicultural Education: Issues and Perspectives (Book). Multicultural Perspectives 2006; 8:57–58.

9. Dunn DS, Dilalla LF. Mentoring Undergraduates in Research. The Oxford Handbook of Undergraduate Psychology Education 2015.

10. Houlden RL, Raja JB, Collier CP, Clark AF, Waugh JM. Medical students' perceptions of an undergraduate research elective. Medical Teacher 2004; 26:659–661. https://doi.org/10.1080/01421590400019542 PMID: 15763861

11. Frishman WH. Student Research Projects and Theses. Heart Disease 2001; 3:140–144. PMID: 11975783

12. Devi V, Abraham RR, Adiga A, Ramnarayan K, Kamath A. Fostering research skills in undergraduate medical students through Mentored Student Projects: Example from an Indian medical school. Kathmandu University Medical Journal 2012; 8.

13. Somers CL, Wang D, Piliawsky M. Effectiveness of a Combined Tutoring and Mentoring Intervention With Ninth-Grade, Urban Black Adolescents. Journal of Applied School Psychology 2016; 32:199–213.

14. Abrams HG, Jernigan LP. Academic Support Services and the Success of High-Risk College Students. American Educational Research Journal 1984; 21:261.

15. Aslam F, Shakir M, Qayyum MA. Why Medical Students Are Crucial to the Future of Research in South Asia. PLoS Medicine 2005; 2.

16. Stewart EB. School Structural Characteristics, Student Effort, Peer Associations, and Parental Involvement: The Influence of School- and Individual-Level Factors on Academic Achievement. Education and Urban Society 2007; 40:179–204.

17. Peng SS, Wright D. Explanation of Academic Achievement of Asian American Students. The Journal of Educational Research 1994; 87:346–352.

18. O'connor EJ, Chassie MB, Walther F. Expended Effort and Academic Performance. Teaching of Psychology 1980; 7:231–233.

19. Carbonaro W. Tracking, Students' Effort, and Academic Achievement. Sociology of Education 2005; 78:27–49.

20. Tobias S. Anxiety research in educational psychology. Journal of Educational Psychology 1979; 71:573–582.

21. Kaur G. Academic Anxiety of Adolescents in Relation Academic Achievement. PsycEXTRA Dataset.

22. Bard CC, Bieschke KJ, Herbert JT, Eberz AB. Predicting Research Interest Among Rehabilitation Counseling Students and Faculty. Rehabilitation Counseling Bulletin 2000; 44:48–55.

23. Mallow J, Kastrup H, Bryant FB, Hislop N, Shefner R, Udo M. Science Anxiety, Science Attitudes, and Gender: Interviews from a Binational Study. Journal of Science Education and Technology 2010; 19:356–369.

24. Tsai H-M, Cheng C-Y, Chang C-H, Liou S-R. Attitudes Towards Research Scale. PsycTESTS Dataset.

25. Naing C, Wai VN, Durham J, Whittaker MA, Win NN, Aung K, et al. A Systematic Review and Meta-Analysis of Medical Students' Perspectives on the Engagement in Research. Medicine 2015; 94.

26. Duguet A, Mener ML, Morlaix S. The Key Predictors of Success in University in France: What Are the Contributing Factors and Possible New Directions in Educational Research? International Journal of Higher Education 2016; 5.

27. Yeşilyurt E. Academic Locus of Control, Tendencies towards Academic Dishonesty and Test Anxiety Levels as the Predictors of Academic Self-efficacy. Educational Sciences: Theory & Practice 2014.

28. Forester M, Kahn JH, Hesson-Mcinnis MS. Factor Structures of Three Measures of Research Self-Efficacy. Journal of Career Assessment 2004; 12:3–16.

29. Alfaro EC, Umaña-Taylor AJ, Bámaca MY. The Influence of Academic Support on Latino Adolescents' Academic Motivation. Family Relations 2006; 55:279–291.

30. Hren D, Lukic IK, Marusic A, Vodopivec I, Vujaklija A, Hrabak M, et al. Teaching research methodology in medical schools: students' attitudes towards and knowledge about science. Medical Education 2004; 38:81–86. PMID: 14962029

31. Al-Kuwaiti A. Health science students' attitude towards research training programs in the Kingdom of Saudi Arabia: Reliability and validity of the questionnaire instrument. Journal of Family and Community Medicine 2014; 21:134. https://doi.org/10.4103/2230-8229.134775 PMID: 24987284

32. Remes V, Helenius I, Sinisaari I. Research and medical students. Medical Teacher. 2000; 22(2):164–167.

33. Salgueira A, Costa P, Gonçalves M, Magalhães E, Costa MJ. Individual characteristics and student's engagement in scientific research: a cross-sectional study. BMC Medical Education. 2012; 12(1).

34. Khan MU, Hassali MAA, Ahmad A, Elkalmi RM, Zaidi STR, Dhingra S (2016) Perceptions and Practices of Community Pharmacists towards Antimicrobial Stewardship in the State of Selangor, Malaysia. PLoS ONE 11(2): e0149623. https://doi.org/10.1371/journal.pone.0149623 PMID: 26901404

35. Bitbol M. Making Sense of Non-Sense in Physics: The Quantum Koan. Enactive Cognition at the Edge of Sense-Making 2014:61–80.

36. Rickards G, Magee C, Artino AR. You Can't Fix by Analysis What You've Spoiled by Design: Developing Survey Instruments and Collecting Validity Evidence. Journal of Graduate Medical Education 2012; 4:407–410. https://doi.org/10.4300/JGME-D-12-00239.1 PMID: 24294413

37. Hair JF. Multivariate data analysis. Upper Saddle River, NJ: Prentice Hall. 2006.

38. Sullivan GM, Artino AR. Analyzing and Interpreting Data from Likert-Type Scales. Journal of Graduate Medical Education. 2013; 5(4):541–542. https://doi.org/10.4300/JGME-5-4-18 PMID: 24454995

39. Bishop RM, Bieschke KJ. Applying social cognitive theory to interest in research among counseling psychology doctoral students: A path analysis. Journal of Counseling Psychology 1998; 45(2):182–188.

40. Kiersma Mary E., Hagemeier Nicholas, Chen Aleda M. H., Melton Brittany, Noureldin Marwa, and Plake Kimberly S.. A Graduate Student Mentoring Program to Develop Interest in Research. American Journal of Pharmaceutical Education 2012; 76:6

41. Cuseo JB. Comprehensive academic support for student during the first year of college. In: Kramer GL, Associates. Student academic services: An integrated approach. San Francisco, SF: Jossey-Bass;2003: 271–310.

42. Nolen SB. Learning environment, motivation, and achievement in high school science. Journal of Research in Science Teaching. 2003; 40(4):347–68.

43. Pintrich PR. A Motivational Science Perspective on the Role of Student Motivation in Learning and Teaching Contexts. Journal of Educational Psychology. 2003; 95(4):667–686.

44. Li LKY. A study of the attitude, self-efficacy, effort and academic achievement of CityU students toward research methods and statistics. Discovery-SS Student E-Journal. 2012; 1:154–183.

45. Hassali MA, Fahad S, Farooqui M, Khan TM. Scope of Mix-method studies in Pharmacy Practice Research. Indian Journal of Pharmaceutical Education and Research, 2015; 49(2):93–98

46. Bakar KA, Tarmizi RA, Mahyuddin R, Elias H, Luan WS, Ayub AFM. Relationships between university students' achievement motivation, attitude and academic performance in Malaysia. Procedia—Social and Behavioral Sciences. 2010; 2(2):4906–4910.

47. Akpinar O. Turkish adaptation, validity, and reliability of The Domestic Violence Coping Self-Efficacy (DV-CSE) measure. PsycEXTRA Dataset.

48. Gold J. Anxiety, conflict, and resistance in learning an integrative perspective on psychotherapy. Journal of Psychotherapy Integration. 2005; 15(4):374–383.

49. Maharajan MK, Rajiah K, Shanmugavelu S. Predictors and factors associated with academic career decision-making among pharmacy students. Pharmacy Education. 2017; 17. Available at: <http://fipcc.com/pharmacyeducation/article/view/491/420>.

50. Hu S, Kuh GD, Gayles JG. Undergraduate research experiences: Are students at research universities advantaged? Innovative Higher Education. 2007; 32:167–177.

51. Dobson, C. Effects of academic anxiety on the performance of students with and without learning disabilities and how students can cope with anxiety at school (Master's thesis, Northern Michigan University). 2012. Retrieved from https://www.nmu.edu/education/sites/DrupalEducation/files/UserFiles/Dobson_Cassie_MP.pdf

52. Deb S, Strodl E, Sun J. (2015). Academic stress, parental pressure, anxiety and mental health among Indian high school students. International Journal of Psychology and Behavioral Sciences, 2015; 5(1): 26–34

53. Bensoussan M. Alleviating Test Anxiety for Students of Advanced Reading Comprehension. RELC Journal 2012; 43:203–216.

54. Perepiczka M, Chandler N, Becerra M. Relationship Between Graduate Students' Statistics Self-Efficacy, Statistics Anxiety, Attitude Toward Statistics, and Social Support. The Professional Counselor 2011; 1:99–108.

55. Vitasari P, Wahab MNA, Othman A, Herawan T, Sinnadurai SK. The Relationship between Study Anxiety and Academic Performance among Engineering Students. Procedia—Social and Behavioral Sciences. 2010; 8:490–497.

56. Dobson C. Effects of academic anxiety on the performance of students with and without learning disabilities and how students can cope with anxiety at school [Master's thesis]. Northern Michigan University. 2012.

57. Robotham D. Stress among higher education students: towards a research agenda. Higher Education 2008; 56:735–746.

58. Barrows J, Dunn S, Lloyd C. Anxiety, Self-Efficacy, and College Exam Grades. Universal Journal of Educational Research 2013; 3:204–208.

59. Smith JB, Walter TL, Hoey G. Support programs and student self-efficacy: Do first year students know when they need help? Journal of the Freshman Year Experience. 1992; 4:41–67.

60. Sun G, Zhang L. Processing Efficiency Theory to Attentional Control Theory: New Perspective for Anxiety-performance Relationship in Sport Psychology. Advances in Psychological Science 2013; 21:1851–1864.

61. Rajiah K, Saravanan C. The Effectiveness of Psychoeducation and Systematic Desensitization to Reduce Test Anxiety Among First-year Pharmacy Students. American Journal of Pharmaceutical Education 2014; 78:163. https://doi.org/10.5688/ajpe789163 PMID: 25525278

62. Kritikos VS, Saini B, Carter S, Moles RJ, Krass I. Factors influencing pharmacy students' attitudes towards pharmacy practice research and strategies for promoting research interest in pharmacy practice. Pharmacy Practice 2015; 13:587. https://doi.org/10.18549/PharmPract.2015.03.587 PMID: 26445620

63. Hasan SS, Chong DWK, Ahmadi K, Se WP, Hassali MA, Hata EM, et al. Influences on Malaysian Pharmacy Students' Career Preferences. American Journal of Pharmaceutical Education 2010; 74:166. PMID: 21301600