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Predictors of test anxiety in doctor of pharmacy students: An empirical study

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Abstract

The objective of this study was to analyze factors related to test anxiety among Doctor of Pharmacy students enrolled in their first three didactic years at two diverse universities. A survey-based cross-sectional study design with previously validated questionnaires was used to test the objectives at University of Houston (Texas, USA) and Howard University (Washington, DC, USA). Students indicated moderate test anxiety (2.52 ± 0.84) on a scale by comparing their normal behavior with how they felt when anxious and rating it with a scale of 1–5, with 1 being atypical and 5 being normal behavior. Around 40.1% of students indicated "family" as their support group during times of stress/anxiety. Test anxiety was negatively correlated with academic performance ($p < 0.05$), academic competence (AC), ($p < 0.05$), test competence (TC) ($p < 0.05$) and time management (TM) ($p < 0.05$). A stepwise multiple regression analysis indicated that AC and TC were the significant predictors of test anxiety ($p < 0.05$). Understanding factors that may allay test anxiety in pharmacy students is important for successful interventions in order to help them achieve academic success.

Keywords: *Test anxiety, academic performance, academic competence, test competence, time management*

Introduction

Anxiety is a basic human emotion that typically arises as a response to a perceived threat or danger (Sarason, 1980). Mild anxiety is common amongst every individual. It cautions us and prepares us for a "fight or flight" reaction (Canon, 1929). However, severe anxiety could be emotionally agonizing and may interfere with an individual's daily routine. Examinations could be one of the most intimidating events causing anxiety in students (Harris & Coy, 2003). Although, many students possess the cognitive aptitude to do well in exams, high levels of test anxiety may hinder their academic performance (Cassady & Johnson, 2002). While many correlational, meta-analysis and path analysis studies have focused on understanding the relationship between test anxiety and academic performance (Hembree, 1988, Seipp, 1991, Kleijn, Ploeg & Topman, 1994, Powell, 2004); none have studied, in depth, factors related to test anxiety in pharmacy students. Hence, the objective of this study was to identify factors associated with test anxiety among Doctor of Pharmacy students.

Test anxiety, an intricate human behavior, is a special case of general anxiety (Sarason, 1980). It is commonly defined as a set of responses to a class of stimuli that have been linked to the individual's experience of assessment and testing (Sarason, 1980). In other words, it is an apprehension experienced by test-takers before, during and after an examination because of worry, concern or fear of underperforming (Probert, 2003). A major impetus for the global research on test anxiety has been its negative relationship with academic performance (Hembree, 1988, Seipp, 1991, Powell, 2004).

Test-anxiety is a multidimensional concept encompassing dimensions such as worry, emotionality

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(Liebert & Morris, 1967) and task-irrelevant cognitions (Keogh & French, 2001). The "worry" component of test anxiety constitutes elements such as "worrying a great deal" about exams (Liebert & Morris, 1967), lack of confidence in self-ability of performance (Sarason & Sarason, 1990), and thinking about the consequences of failure (Zeidner, 1998). The emotional component, on the other hand, is composed of elements such as feeling of tension, apprehension and nervousness towards exams, which cause some students to experience somatic symptoms such as increased heart rate, feelings of nausea and sweating (Liebert & Morris, 1967, Zeidner, 1998). In addition, individuals' age, gender, ethnicity and study habits have also been found to affect test anxiety levels (Rasor & Rasor, 1998).

Another reason for test anxiety could be the perceived difficulty of the study material. As indicated earlier, test anxiety could stem from unnecessary stress related to the perception of under-performance in examinations. Academic performance has been found to be significantly associated with variables such as academic competence (AC), test competence (TC), time management (TM) and strategic studying (SS) (Kleijn et al., 1994). AC measures how a student manages his or her study load, and also assesses the student's comprehension of the study material. Additionally, it reflects whether the curriculum is interesting enough for students to enjoy classes (Topman, Klienj, Ploeg, & Masset, 1992, Kleijn et al., 1994). Thus, a student with better AC would probably demonstrate better academic performance (Kleijn et al., 1994). For this study, TC was operationally defined as how students cope with the amount of study material to be mastered for examinations (Topman et al., 1992, Kleijn et al., 1994).

TM is defined as clusters of behavioral skill sets that are important in the organization of study and course load (Lay & Schouwenburg, 1993). Excelling in academic curriculum requires effective TM strategies (Campbell & Svenson, 1992). Basic TM skills are acquired through planning in advance, prioritizing the work and adhering to the preset schedules (Walker & Siebert, 1980). One of the aspects of TM is to develop effective study habits that essentially help in managing the study load.

There are many useful study techniques that could be used by students based on the learning environment (Anderson & Armbruster, 1984, Alvermann & Moore, 1991). Such strategies include Know-Want-Learn (K-W-L) (Ogle, 1986), Survey-Question-Read-Recite-Review (SQ3R) (Robinson, 1970), summarizing and note-taking (Brown & Day, 1983, Hare & Borchardt, 1984), using graphics (Burke, 2002) and self-questioning (Anderson & Armbruster, 1984). Extensive course load and comprehensive information in contemporary academic curricula necessitate effective study strategies for academic success (Deshler et al., 2001). Maximizing academic performance is believed to be a successful balance between TM and study techniques (Kirschenbaum & Perri, 1982, Entwistle & Ramsden, 1983). However, researchers have not been able to find a strategy that could be termed as a "cure for all" students or could be followed by all students for absolute success (Anderson & Armbruster, 1984, Alvermann & Moore, 1991, Devine, 1991).

Although previous studies (Kleijn et al., 1994) have analyzed the effect of AC, TC, TM and SS on academic performance, the influence of these factors on test anxiety in pharmacy students has not been explored. Pharmacy students have shown to experience the highest psychological distress as compared to medical and nursing students (Henning, Sydney & Shaw, 1998). Hence, the objective of this study was to discover factors related to test anxiety among students enrolled in the Doctor of Pharmacy program at two diverse universities in the United States.

Methods and materials

Study design

The study utilized a cross-sectional survey design and was conducted by administering a prevalidated questionnaire to students enrolled in the first three didactic years of the four year Doctor of Pharmacy curriculum. Data were collected at two universities located in two major metropolitan cities in the United States: the University of Houston (Houston, TX) and Howard University (Washington, DC). A non-probabilistic convenient sampling procedure was used in this study. Participation in the study was voluntary, anonymous and approved by the institutional review boards.

Survey instrument

A scale that measured test anxiety was adapted from a previously validated test-anxiety inventory (Sarason, 1980). Test anxiety was measured using ten items on a five point Likert scale to rate their emotionality (Appendix 1). Previously validated items were adapted to measure AC, TC, TM and SS (Topman et al., 1992, Kleijn et al., 1994). These items were measured using a 5-point Likert scale, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree (Appendix 1). Information on variables such as age, gender, race, marital status, number of dependents, concurrent employment and study load (0–100 scale) was obtained, along with year of enrollment. Each student's cumulative grade point average (cGPA)

was obtained as an indicator of academic performance, and was measured on a scale ranging from 0 to 4. Furthermore, coping strategies used during test anxiety were also elicited from students.

Data analysis

Data were collected during March 2001–2002. Data were coded and analyzed using the SAS statistical package (Version 9.0) with *a priori* set alpha level of 0.05. Reliability analyses for the domains were carried out by calculating Cronbach's coefficient alpha. A higher score (0.7 and higher) indicated acceptable reliability of the domains measured (Kerlinger & Lee, 2000). Descriptive analyses, Spearman correlation analysis and stepwise multiple regression analyses were also conducted to evaluate the study objectives.

Results

Descriptive analyses

A total of 244 students participated in the study with a slightly higher number of students from the University of Houston (response rate year 1 = 48%, year 2 = 52%, year 3 = 52%, Total = 51%) as compared to Howard University (response rate year 1 = 52%, year 2 = 40%, year 3 = 32%, Total = 42%). Descriptive statistics with respondents' demographic characteristics can be viewed in Table I. Female students

Table I. Descriptive analysis.

Variables	Measure	Houston ($n = 135$)	Howard ($n = 109$)	Total ($n = 244$)
Age	Mean (±STD) years	27.83 (±3.58)	27.72 (±4.63)	27.78 (±4.06)
	Range	23–41	20–49	20–49
Gender	Male	24.63%	23.85%	24.28%
	Female	75.37%	76.15%	75.72%
Marital status	Single	74.63%	82.57%	78.19%
	Married	23.13%	16.51%	20.16%
	Not married but living with a partner	2.24%	0.92%	1.65%
Ethnicity	White	28.57%	3.67%	17.36%
	African Americans	9.02%	72.48%	37.60%
	Hispanic	6.77%	0.00%	3.72%
	Asian/Pacific islander	51.13%	16.51%	35.54%
	Others	4.51%	7.34%	5.78%
Dependants or children	Yes	12.78%	14.15%	13.39%
	No	87.22%	85.85%	86.61%
Concurrent employment	Working	52.99%	63.30%	57.61%
	Not working	47.01%	36.70%	42.39%
Primary support	Self-coping strategies	31.82%	21.90%	27.43%
	Family	38.64%	41.90%	40.08%
	Faculty	0.76%	1.90%	1.27%
	Classmates	13.64%	10.48%	12.24%
	Friends	9.85%	17.14%	13.08%
	Other	5.29%	6.68%	5/90%
Number of student organizations involved	First year			
	None	2.56%	42.86%	23.46%
	1	25.64%	30.95%	28.40%
	2	43.59%	19.05%	20.25%
	More than 2	28.21%	7.14%	27.89%
	Second year			
	0	24.44%	50.00%	35.44%
	1	22.22%	23.53%	22.78%
	2	31.11%	5.88%	20.25%
	More than 2	22.23%	20.59%	21.53%
	Third year			
	0	11.36%	18.18%	13.64%
	1	6.82%	9.09%	7.58%
	2	20.45%	27.27%	22.73%
	More than 2	61.37%	45.45%	56.06%

(75.72%) outnumbered male students (24.28%) in this sample. The mean (± SD) age of students was 27.78 (± 4.06) years and a majority indicated they were not married (78.19%). More than half of the participants were working (57.61%), with the average working hours (per week) being 17.06 (± 10.38) hours. Number of students with concurrent employment was higher for the third year group (60.29%) compared with students in other didactic years. The mean cGPA reported for all students combined was 3.18 ± 0.51. Most of the students perceived that the second year of their pharmacy curriculum constituted the heaviest study/course load (85.78 ± 13.17), compared with other years. Furthermore, a higher percentage of students were less active in any student organizations during their second year (35.44%), compared with students in other didactic years.

Reliability of domains

The scale that was used to measure test anxiety was reliable with a Cronbach's alpha value of 0.90 (Kerlinger & Lee, 2000) (Table II). The overall reliability coefficients for the four domains, namely, AC, TC, SS and TM were comparable to those previously reported in the literature (Kleijn et al., 1994). The reliability coefficients for each domain and mean scores for each item can be viewed in Table III. The Cronbach's coefficient alpha values for scales measuring AC (0.70), TC (0.75), SS (0.72) and TM (0.70) were adequate enough to consider these scales to be reliable for further testing (Kerlinger & Lee, 2000).

Test anxiety

In general, students in this study experienced some test anxiety (mean 2.52 ± 0.84) on a scale where 1 = "not at all typical of me", to 5 = "very much typical of me"(Table II). In addition, 70% indicated feeling somewhat anxious on the same scale, even when they were well prepared for a test. Approximately 63% indicated that they were somewhat bothered by taking exams. Further analyses indicated approximately 30–40% of the students had some test anxiety, and 10% had a high degree of test anxiety. The majority indicated that they did not have the physical symptoms, such as perspiration (75%), feelings of nausea (65%) or increased heart rate (63%). When asked where they go first to receive support and cope with the anxiety, many students indicated "family" (40.08%) followed by self-coping methods (27.43%) (Table I).

Effect of university enrolled and year of enrollment on test anxiety

For the academic year enrolled, highest test anxiety was found among second year students as compared to other didactic years (Figure 1). The mean scores for each university indicated higher test anxiety scores for students enrolled at the University of Houston (2.66 ± 0.83) as compared to students at Howard University (2.34 ± 0.83). There was no significant interaction effect between year of enrollment and the university enrolled. A two-factor, ANOVA revealed a significant effect of university enrolled ($p = 0.004$) and year of enrollment ($p = 0.002$) on test anxiety. A Scheffe test indicated significant differences in test anxiety between first and second year students ($p < 0.05$) and between second and third year students ($p < 0.05$) enrolled at the University of Houston. This difference was not significant for students enrolled at Howard University.

Table II. Reliability analysis along with mean (SD) scores and precent frequency distribution for test anxiety.

Variables*	Not at all typical of me	Not very typical of me	Somewhat typical of me	Fairly typical of me	Very much typical of me	Mean (SD)
Failure to perform better	13.50	33.76	33.76	10.97	8.02	2.66 (1.09)
Nervousness	18.14	37.13	24.05	14.77	5.91	2.53 (1.13)
Perspiration	40.68	33.90	13.98	8.47	2.97	1.99 (1.08)
Task-irrelevant cognitions	27.73	39.50	20.59	9.66	2.52	2.19 (1.03)
Panicky	18.57	32.07	24.05	16.46	8.86	2.65 (1.21)
Upset Stomach	30.38	35.02	18.57	14.35	1.69	2.22 (1.08)
Increased heart-beats	26.89	35.71	17.65	16.81	2.94	2.33 (1.13)
Depression	21.43	36.97	26.47	10.92	4.20	2.39 (1.07)
Worry	17.30	19.41	24.89	20.68	17.72	3.02 (1.34)
Anxious even when well-prepared	13.87	16.81	28.99	23.53	16.81	3.13 (1.27)

Test anxiety = 2.52 ± 0.84; Cronbach alpha = 0.90

* Refer to Appendix 1.

Table III. Reliability analysis along with mean (SD) scores and frequency distribution for AC, TC, TM and SS.

Variables† Items	Percent distribution* Strongly agree	Agree	Neutral	Disagree	Strongly disagree	Mean (SD)
AC = 3.76 ± 0.56; Cronbach alpha = 0.70						
Managing course load‡	22.73	53.72	13.64	8.26	1.65	3.87 (0.92)
Comprehension‡	9.92	45.45	28.51	14.88	1.24	3.48 (0.91)
Interest‡	15.23	57.61	17.70	8.23	1.23	3.77 (0.85)
Enjoyment‡	12.35	45.27	28.40	12.35	1.65	3.54 (0.92)
Efforts‡	29.17	48.33	15.83	6.25	0.42	4.00 (0.86)
TC = 3.04 ± 0.76; Cronbach alpha = 0.75						
Easily manage study material‡	3.32	36.51	29.88	27.80	2.49	3.10 (0.93)
Test preparation‡	3.32	23.65	31.54	35.27	6.22	2.82 (0.97)
Coping with exam tension‡	7.47	26.56	30.29	28.63	7.05	2.98 (1.06)
Difficulty with study material	3.36	26.05	30.25	34.03	6.30	3.14 (0.99)
TM = 2.82 ± 0.75; Cronbach alpha = 0.70						
Difficulty with study/leisure	12.45	34.44	23.65	24.07	5.39	2.76 (1.11)
Study regularly	9.50	36.36	20.66	26.03	7.44	2.86 (1.13)
Cramming for exams	12.55	32.64	20.08	26.36	8.37	2.85 (1.19)
Organization‡	3.35	23.85	33.89	30.54	8.37	2.83 (0.99)
Test preparation‡	7.47	29.46	25.73	30.71	6.64	3.00 (1.08)
SS = 3.46 ± 0.63; Cronbach alpha = 0.72						
Judgment of test questions‡	14.94	46.06	21.99	14.11	2.90	3.56 (1.00)
Advance planning‡	4.60	32.64	33.89	25.10	3.77	3.09 (0.95)
Review‡	15.13	42.44	20.59	16.39	5.46	3.45 (1.10)
Knowledge assessment‡	21.67	44.17	16.67	13.33	4.17	3.65 (1.09)
Summarize‡	14.94	49.38	19.92	14.52	1.24	3.62 (0.95)

* Original scores. † Refer to Appendix 1. ‡ Reverse coded during statistical analysis (Note: Mean scores reflect reverse coding).

Potential factors contributing to anxiety

Academic competence. The mean score for AC was 3.76 (± 0.56), on a five-point scale from 1 to 5, where a higher score indicates better competence. Students indicated that they were comfortable with the course content (Table III). Many students (76.45%) indicated that they were able to manage their course material and that they were enjoying the classes offered in the pharmacy curriculum (58.62%). Students enjoyed classes offered in the pharmacy curriculum when they perceived these courses to be interesting (Spearman correlation coefficient $R = 0.71$, $p < 0.05$).

Test competence. The mean (± SD) score for the TC was 3.04 (± 0.76) on a five-point scale from 1 to 5, where a higher score indicates better competence. Less than half (39.83%) of the students indicated that they could manage the amount of study material taught for an exam. Moreover, 41.49% of students indicated that they had difficulty in preparing for the exam. On an item relating to how well students coped with tension associated with exams, a mean of

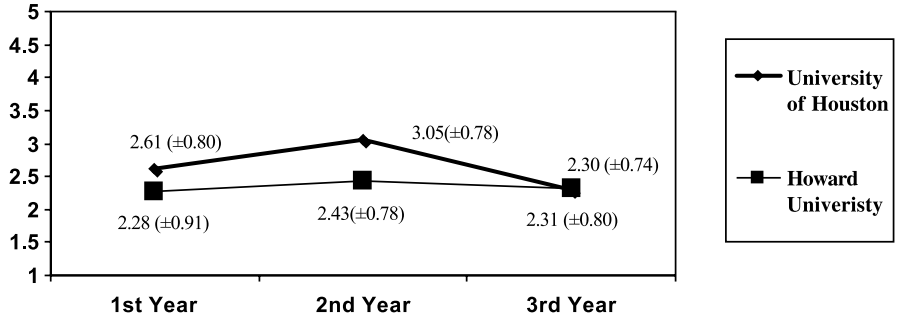

Figure 1. Mean scores for test anxiety measured by year enrolled.

2.98 ± 1.06 was obtained, indicating that students were somewhat anxious about exams (Table III).

Time management. Students indicated that they could not manage their time properly with regard to studying the pharmacy coursework (2.82 ± 0.75) on a five-point scale from 1 to 5, where a higher score indicates better TM. As many as 45.19% of students indicated ending up "cramming" for exams (Table III). Nonetheless, students also found it difficult to study regularly (45.86%). A smaller proportion, 7.47% of students strongly agreed that they always started preparing for an exam well in advance.

Strategic studying. The mean score for the SS domain was 3.46 (±0.63), on a five-point scale 1–5, a higher score indicates greater emphasis on SS. This score indicates that not many students used techniques of SS (Table III). Approximately, 64.32% of the students reported that they summarized course material while studying. Whereas, 37.24% of students indicated that they planned in advance for handling a study subject.

Factors associated with test anxiety

A Spearman correlation analysis indicated that students' test anxiety was negatively associated with their academic performance (cGPA) ($r = -0.20$, $p < 0.05$). Nonetheless, test anxiety was found to be negatively correlated with AC ($r = -0.30$, $p < 0.05$), TC ($r = -0.48$, $p < 0.05$) and TM ($r = -0.24$, $p < 0.05$) (Table IV). This indicates that to improve academic performance, test anxiety needs to be reduced.

A stepwise (forward) regression was performed to delineate the predictors of test anxiety. In this analysis, independent variables such as AC, TC, TM and SS were included in the model. The analysis indicated that TC ($R^2 = 0.22$, $p < 0.05$) and AC ($R^2 = 0.24$, $p = 0.05$) were significant predictors of test anxiety (Table IV).

Discussion

The primary objective of this study was to determine predictors of test anxiety in pharmacy students. Test anxiety is a concept that has been investigated for many years, mainly due to its proven detrimental effect on the academic performance (Hembree, 1988, Seipp, 1991). This study carried out in pharmacy students revealed some interesting results that can be applied by educational institutions to help their students excel by reducing test anxiety.

Pharmacy students in this sample experienced moderate test anxiety due to their exams. This was consistent with the previous literature indicating a conspicuous psychological distress among students in healthcare professions such as medicine, nursing and pharmacy (Henning et al., 1998). As reported in previous literature, this study also found a negative association between test anxiety and academic performance (Hembree, 1988, Seipp, 1991). Hence, interventions aimed to reduce test anxiety could improve academic performance in pharmacy students.

This study indicated significant differences between students enrolled at the two diverse universities (University of Houston and Howard University). The difference in academic curricula could be a potential factor responsible for the variation in test anxiety scores among these students. The ethnic diversity of students could also be another reason for differences in test anxiety scores in this sample. For example, University of Houston had a majority of Asian Americans, whereas Howard University had a majority of African Americans. These explanations seem plausible, and appear to be consistent with past findings within the literature of test anxiety (Nasseri, 1975, Payne, 1983, 1984). Most importantly, the mean test anxiety scores were higher for second year pharmacy students as compared to other didactic years in both the universities. The second year curriculum may be more arduous for students at these universities. This may be due to an increase in course load for second year students or due to the difficulty in comprehending the course material in this academic year. Second year students at the University

Table IV. Correlation coefficients and regression analysis to predict factors associated with test anxiety.

	Correlation analysis		Stepwise (forward) regression analysis			
Variables	Spearman correlation coefficients	Step	Beta coefficients	Multiple R^2	F ratio	*P* value
TC	−0.48*	1	−0.38	0.22	54.13	0.0001
AC	−0.30*	2	−0.23	0.24	4.92	0.042
TM	−0.24*	3	−0.14	0.25	1.71	NS
SS	−0.03	4	0.11	0.25	1.39	NS

*$p < 0.05$.

of Houston had the highest test anxiety scores. This may be due to the fact that during the study period, the second year curriculum had a seven-credit hour comprehensive integrated course in pharmacodynamics during each semester. Such high-stake courses may have led to high levels of test anxiety for students.

Most students in this study indicated that they could manage their academic course load in pharmacy school and could easily comprehend the study material. Students also indicated that they were enjoying the classes offered in the pharmacy curriculum. To reiterate, these are the factors that determine AC in students (Topman et al., 1992, Kleijn et al., 1994). Thus, students were comfortable with the pharmacy courses offered in their schools. However, the mean scores on a scale measuring TC were low, indicating that students may have found it slightly difficult to cope with the amount of study material assigned for exams. Although, there was a positive association between AC and TC, students may have found it difficult to prepare for exams and cope with exam-related tension. These results are important in understanding student perceptions regarding pharmacy course material and exams. Based on these statistics, there is a need to reassess the amount of study material allocated in an exam so that students would develop higher academic and test competency, and also gain an adequate amount of knowledge through their curriculum for long-term retention.

With the perceived unmanageable amount of study material assigned to exams, many students may find it hard to combine and organize their study and leisure time as noted by the findings of this study. Taking a break while studying is essential for relaxing and it refreshes the individual's mind to study efficiently. This is one of the strategies suggested in TM skills (Waterworth, 2003). Current pharmacy curriculums that impede students' TM skills highlight the need to reassess the amount of study material for exams to avoid an overload of work. Although, few students used some form of SS techniques to aid with their academic career, many were still struggling to manage their exam course load.

Factors affecting test anxiety

The negative association of test anxiety with academic and TC was apparent in the light of literature that emphasizes the positive association of these factors with academic performance (Topman et al., 1992, Kleijn et al., 1994). If students enjoyed the courses offered and comprehend the study material, their interest in studying would grow, possibly affecting the test anxiety factor negatively. The negative correlation between TC and test anxiety could be explained by the fact that with better TM and test preparation students would not exhibit anxiety while taking exams (Topman et al., 1992). Inadequate TM and procrastination of study tasks lead to various study problems (Topman et al., 1992). With enhanced TM skills, students may not have to end up "cramming" for examinations, thus giving them more confidence.

A previous study concluded that a lower test anxiety has been reported in nursing students who followed coping strategies related to TM testing skills, nutrition, exercise, relaxations and cognitive control provided via a stress management intervention program (Waterworth, 2003). Results of our study underlined the significance of such stress management programs in pharmacy schools, which would help students reduce their test anxiety. It was apparent that in spite of the fact that students who had access to counselors on campus and in the college (for example, University of Houston), very few students actually used such recourses. However, students were comfortable enough to name family and friends as the most important support group during times of stress and anxiety.

TC and AC were the most significant predictors of test anxiety in pharmacy students. Thus, this study emphasizes the necessity of enhancing students' AC and TC levels in order to reduce their test anxiety. As mentioned earlier, along with stress management programs, a well-structured pharmacy curriculum should also be the goal to reduce anxiety among students. At the University of Houston, initiatives have already been taken to help pharmacy students cope with exams. These students have access to an in-house student counselor who assists each student on a case-by-case basis, in addition to the help they could get from the university resources. Furthermore, the two seven-credit hour courses during the second year at the University of Houston have been split into four courses since completion of this study.

Limitations

Some limitations should be considered before applying the results obtained in this research. Because curricula across various schools are diverse, these results may not be generalizable to all pharmacy schools, as the study was limited to only two universities in the United States. Further research including more universities in the United States, as well as other international universities, may be necessary to successfully predict factors

associated with the test anxiety in pharmacy students.

Conclusions

Results of this study indicated the presence of test anxiety among pharmacy students. Furthermore, it underlined the importance of SS, TM, TC and AC in reducing test anxiety. Most importantly, TC and AC were the significant predictors of test anxiety among pharmacy students. It is imperative for students, family members and school administrators to explore avenues that allow them to be actively involved in reducing test anxiety. The ultimate aim of any curriculum is to train students effectively and efficiently without anxiety. Students should be able to enjoy their courses and take exams positively so that information is retained long term. This study emphasized the need for the effective design of both course material and curriculum to make students comfortable with test taking and to reduce test anxiety, which would in turn help them retain the information needed to achieve academic success.

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Appendix 1: Items used to measure cognitive domains on the questionnaire

Test anxiety

For the following statements please rate yourself according to how well the statements describes you

1 = Not at all typical of me; 2 = Not very typical of me; 3 = Somewhat typical of me; 4 = Fairly typical of me; 5 = Very much typical of me

1. Thoughts of doing poorly interfere with my performance on exams
2. During an examination I frequently get so nervous that I forget facts I really know
3. While taking an important exam, I perspire a great deal
4. During exams, I find myself thinking of things unrelated to the actual study material
5. I feel very panicky when I have to take an exam
6. After important tests, I am frequently so tense that my stomach gets upset
7. I usually feel my heart beating very fast during an exam
8. I usually get very depressed after taking an exam
9. I wish exams did not bother me so much
10. Even when I'm well prepared for a test, I feel very anxious about it

Please indicate your agreement or disagreement regarding the statements below using the scale provided by circling the number that best represents your opinion.

1 = Strongly agree; 2 = Agree; 3 = Neutral; 4 = Disagree; 5 = Strongly disagree

Academic competence

1. I am able to manage the academic course load in the pharmacy school so far*
2. I can easily understand course material taught in the pharmacy school*
3. I find the courses taught in the pharmacy school interesting*
4. I am enjoying the classes offered in the pharmacy curriculum*
5. I always do my best to understand the course material taught in the pharmacy School*

Test competence

1. I can easily manage the amount of study material taught for an exam*
2. I do not find it difficult to prepare for exams*
3. I can easily cope with exam tension*
4. I usually do not expect complex questions in an exam^{+}
5. I have great difficulty managing the amount of study material for exam
6. Time management
7. I find it very difficult to combine my study and leisure time.
8. I find it difficult to study regularly
9. I usually end up "cramming" for exams
10. I can organize my study and leisure time easily*
11. I always start preparing for an exam well in advance*

Study strategies

1. While I am studying, I regularly try to find out what questions professors may ask and how they may ask exam questions*
2. I plan well in advance for best way of handling a study subject*
3. I review course material with my colleagues while studying for exams*
4. I test my knowledge before taking an exam by means of mock exam, tests asking questions*
5. While studying I regularly summarize the course material in my own words*

* = reverse coded during statistical analysis to indicate that higher the score the better the outcome

$^{+}$ = item was removed from the composite scale to improve reliability.