# Test Anxiety with Respect
# to a Comprehensive Cumulative Assessment

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**ABSTRACT.** The objective of this study was to examine test anxiety experienced by Pharm.D. students with respect to a comprehensive cumulative exam, the Milemarker exam. The instrument used elicited responses on five domains, namely: test anxiety, academic competence, test competence, study strategies and time management strategies used by students in preparation for the Milemarker exam. The students (N = 153, response rate 72.5%) were found to be somewhat anxious with respect to the Milemarker exam. Further, students responded that they felt competent with respect to course content and made use of study strategies in studying for the Milemarker exam. They also exhibited low test competence with respect to the cumulative exam and were unable to manage their time effectively when studying for the exam. Significant correlations were obtained between test anxiety and the domains of test competence and time management. Intervention strategies aimed at reducing the test anxiety that students demonstrated, could thus be helpful to the students in preparing more effectively for the exam. *[Article copies available for a fee from The Haworth Document Delivery Service: 1-800-HAWORTH. E-mail address: <docdelivery@haworthpress.com> Website: <http://www.HaworthPress. com> © 2005 by The Haworth Press, Inc. All rights reserved.]*

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## *INTRODUCTION*

In recent years an increasing number of educational institutions, including schools of pharmacy, have adopted various assessment methods such as the use of cumulative exams to evaluate student learning and assess the quality of teaching delivered (1-3). These cumulative assessment methods have been found to be significantly correlated with traditional measures of academic performance like the GPA (4). This paper is based on one such cumulative exam, termed the Milemarker Exam, administered to Pharm.D. students at the University of Houston. The objective of this study was to evaluate test anxiety associated with this comprehensive exam.

### *Milemarker Exams*

The College of Pharmacy at the University of Houston has adopted a cumulative exam–the Milemarker, in order to assess the retention of knowledge of its Pharm.D. students and the quality of education imparted. The Milemarker exams are administered at the end of each of the first three didactic years to the Pharm.D. students. The first Milemarker was administered in the year 2000. The Milemarker exams are cumulative and comprehensive exams and contain questions relevant to information taught in previous years with emphasis given to course material taught during the current year. This annual exam uses a case based format with multiple choice questions (Milemarker I and II have five cases while Milemarker III has 6). Although, the case based format is not universally used in all courses, students get ample exposure to this format through courses by the time they give Milemarker III. The first two Milemarker exams have been formative while Milemarker III is summative and is used by the college to determine whether the student can progress into experiential rotations.

The Milemarker exams were developed by a team of faculty appointed to supervise the entire Milemarker assessment process and develop specific cases for the exams. Questions for the exams were then elicited by this team from course coordinators responsible for each course taught during that year. The number of questions collected for each course was proportional to the number of credit hours devoted to

that course during the academic year. Additional questions (50% more) were requested for each course in order to develop a question bank for the Milemarker exams. In order to improve the clarity and ensure that none of the questions were redundant, the team then evaluated these questions. This process led to the formation of a question bank from which questions are drawn for Milemarker exams each year. Finally, an Angoff process was used to set the passing requirement for each exam (5). This process required a team of faculty members to individually rate each question on the Milemarker. On average, the team of faculty members was composed of 5 members, including the faculty members who wrote the questions as well as faculty members who had knowledge in that specific topic area. Each faculty member on this panel of experts was asked to evaluate each question and give his or her best guess of the proportion of students within a hypothetical group of borderline, "minimally acceptable" students that he or she would expect to answer the question correctly (5). Based on their expertise and their judgment they indicate the difficulty level of each question by giving a score from 0-100. A score of zero meant that the individual expects all students to fail the question and similarly a score of 100 meant that all students would get it correct. Judgments from this first anonymous round were then discussed among the panelists, and faculty could then have an opportunity to revise their original estimation of the question's level of difficulty. The final individual panelist scores were then averaged to indicate an Angoff passing score for each question. The averaged Angoff score for each question was then averaged to determine the passing cut-off depending on the questions drawn out for a particular Milemarker exam during that year.

### Milemarker III Exam

This exam is administered to the third year Pharm.D. students over a two day period in April each year. It consists of 200 questions (100 per day) using the multiple choice format. The following three areas are given emphasis: Therapeutics (70%), Pharmacy Practice (15%) and Management (15%). The Milemarker exam included information covered during the first three Pharm.D. years with 70% of the questions from information covered only during the third year. As with all Milemarker exams the passing cut off score was based on the Angoff scores (5). Those who are unable to make minimum competency (meet or exceed the Angoff score) were judged to be academically deficient and were not allowed to start their clinical rotations until they retook the exam

and passed it. Students who did not pass in their first attempt (Mile-marker IIIa), could take it again prior to commencement of clinical rotations (Milemarker IIIb). Those who were still unable to meet minimum competency missed their first phase of rotations and were unable to graduate on time. Subsequently, Milemarker IIIc was administered within six weeks and Milemarker IIId six weeks after the administration of IIIc. Any student unable to pass the exam after four attempts would lose a year and could attempt the Milemarker administered the following year. The passing rate for Milemarker I and II has been low, averaging around 12%. However, these exams were formative and did not include any punitive outcomes. Milemarker III was summative and students could be held back on their rotations or could lose a year. Since these students were taking the Milemarker III exam for the first time without any previous experience or information on how to study for such exams, there level of anxiety could be higher.

## *Test Anxiety*

The focus of this paper is to examine test anxiety experienced by students in preparing for and taking the Milemarker III exam. The topic under study–test anxiety, is a widely researched area and a review of available literature on this topic reveals that it is an extremely widespread phenomenon (6).

Test anxiety has been defined as the reaction to stimuli that are associated with an individual's experience of testing or evaluative situations (7). It can thus also be defined as the reaction that students exhibit to exams (8). Two primary components with respect to test anxiety have been identified, namely a cognitive component and a emotional component (9). The cognitive component results in thoughts such as being inadequately prepared for the exam while the emotionality component leads to feelings of tension and nervousness about the task at hand.

Test anxiety has consistently been shown to predict academic performance in various studies conducted (6, 10, 11). The negative effects of test anxiety on performance can be explained by two models,the interference model or the learning-deficit model (12, 13, 14). The interference model proposes that an anxious student is disturbed or distracted during test-taking by task-irrelevant cognitions and negative thoughts (12). The learning-deficit model, on the other hand, stresses the ineffective study habits of an anxious student during preparation of the test (14). It has been reported that both models act simultaneously in an integrated manner to affect the performance of a student (10). One such

study revealed that test anxiety on a statistics exam and academic skills were negatively correlated with performance (10). Test anxiety was also reported to be negatively correlated with achievement in a study conducted on a group of Dutch children (11). A meta-analysis concluded that anxiety is usually accompanied by lower test performance (15). Studies investigating individuals with test anxiety have demonstrated that under-performance in these individuals was not because of any form of intellectual deficiency, but mainly because of their inability to take tests effectively (13, 16).

It has been seen that when test anxiety interacts with teacher evaluation practices in classrooms (low threat or high threat), such situations affect not just performance of students, but also affect student motivation (17). The study reported that students who are more test anxious were significantly more sensitive to environments in which competition was emphasized and where teacher control was evident. (17). Research also illustrates that not only does test anxiety affect performance and achievement, but it also results in poor perception of health status amongst students (18). Additionally, cognitive test anxiety which manifests itself as anxiousness over tests at various phases of the learning-testing cycle has been found to be indicative of basic processing deficiencies, namely: encoding, organization, and storage of information (19). Students who are anxious have difficulty with cognitive processes like encoding and storage of information and have been shown to develop and maintain less complete conceptual representations of course content (19, 20). Thus, test anxiety affects the learning process at stages even prior to the actual test taking period. Students with high levels of test anxiety have been known to employ less effective study strategies, are more likely to procrastinate and engage in repetitive memorization strategies (19, 20). Further, self reported study skills are negatively correlated with cognitive test anxiety (19).

Test anxiety may be a factor that affects student preparation for the Milemarker exam. Anticipation and anxiety about the exam could lead to ineffective time management, inadequate study strategies and deficiency in understanding subject matter covered by the exam. Inter-relationships between study strategies, academic competence, test competence, time management, student perceptions of assessments and performance on the exam have been demonstrated previously in the literature (21-27). Except for study strategies, all were reported to be significantly correlated with academic performance (21). Further, test anxiety was significantly correlated with performance on a statistics exam whereas study habits were not (10). In some studies that evaluated

study strategies as models of self-regulated learning concluded that self-regulation, which is an interaction between situational and personal factors, goal setting and metacognition (planning and organizing), and implementation of cognitive learning strategies (rehearsal, elaboration and organization), does influence performance (23). A report that grouped study skills into four clusters: repetition-based skills, procedural study skills, cognitive-based study skill and metacognitive skill concluded that study skills are fundamental to academic competence (25). These study strategies are developed through a period of trial and error (25, 26). It has been recommended that such self-regulated study habits may be effectively influenced by the instructors of first year students as compared to later years of a curriculum (26). Further, it has been reported that students have negative perceptions of high-stakes tests as they get older (27). As student's progress through each year of the pharmacy curriculum, their ability to manage time and their study strategies may change (26, 27, 28). Time management also requires one to make conscious decisions actively in order to better manage available time (28). Consequently, constructive study methods are those that improve time management and help develop better strategies for studying (29).

Hence, understanding the role of test anxiety and factors such as academic competence, test competence, study strategies, and time management is essential in pharmacy curriculum. The primary aim of this paper is to unravel the effect of test anxiety on academic competence, test competence, study strategies, and time management skills of pharmacy students in preparing for a cumulative assessment.

For the purpose of this study, academic competence has been defined as the proficiency of students with respect to content taught during courses over the past academic year and the ability to understand the course material to prepare for the Milemarker exam (21). Test competency is defined as how students manage and cope with the amount of study material for the Milemarker exam (21). The time management domain evaluates the ability of the students to juggle leisure and study time to prepare for the Milemarker exam effectively, while study strategies have been defined as specific techniques adopted by students when studying for the Milemarker exam (21).

## RESEARCH OBJECTIVE

The objective of this study was to examine students test anxiety with respect to the Milemarker III exam. In addition, this study also evalu-

ated the relationship between test anxiety and factors associated with test anxiety which included academic competence, test competence, time management, and study strategies with respect to preparing for the Milemarker III exam.

## *METHODS*

### *Study Design*

This study was carried out over the period of two years and included two cohorts (class of 2003 and class of 2004). The class of 2003 was the first class to attempt the Milemarker III exam in the year 2002. Students enrolled in their third year of the pharmacy curriculum were administered a questionnaire after taking their Milemarker exam. The data collected were coded and analyzed using the SAS® statistical package version 9 at a priori set significance of 0.05.

### *Survey Design*

The questionnaire elicited responses on five domains, namely: test anxiety, academic competency, test competency, time management and study strategies with respect to the Milemarker III exam (16, 21). A copy of the items included can be viewed in Appendix A.

The test anxiety domain contained ten questions which measured test anxiety with respect to the Milemarker III exam. These items were extrapolated and adapted from a previously validated and published test anxiety scale (16). The scale was pre-tested after an exam in a course to evaluate reliability and validity before it was used in this study. The items evaluated responses on a four point Likert scale with the following scale anchors: 1 = Not at all typical of me to 4 = Very much typical of me.

The instrument to measure academic competency, test competency, time management, and study strategies was adapted using a modified pre-validated and reliable scale called the SMART scale (21). The SMART scale was adapted in order to make the wording applicable specifically to the Milemarker III exam. The Likert type scale for the 20 items had the following scale anchors: 1 = strongly disagree and 4 = strongly agree. A neutral option was not given in order to force the students to take a stance on all the domains measured.

### Data Collection and Analysis

Data collection was carried out in April 2002 and April 2003. The study protocol was approved by the Committee for the Protection of Human Subjects at the University. Questionnaires were administered two days after taking the Milemarker exam and before the results were declared. The data collected were coded and analyzed using the SAS® statistical package version 9, at a priori set significance level of 0.05. Administrative databases were used to extract demographic data, cumulative GPA scores, and Milemarker scores of the two cohorts. A unique identifier number on the response sheet enabled matching of the administrative data to the responses given by the students. Consistency of the Milemarker process over the two year time frame allowed for pooling of data from the two years in order to achieve sufficient sample size. Reliability analysis was performed on each of the 5 domains to determine the Cronbach's coefficient alpha. Descriptive analysis and comparative analysis were carried out using t-tests and Spearman correlation analysis to evaluate the study objectives.

## RESULTS

A total of 153 completed questionnaires were obtained which led to a response rate of 72.5%. There was no significant difference between the Milemarker and GPA scores for responders and non-responders. Results of the demographic and descriptive analysis are given in Table 1. The mean age of the respondents was 27.1 ($\pm$ 3.8) years. A majority of the respondents were females (71%). The largest ethnic group was Asian/Pacific Islander (52.6%), a majority of respondents were single (87.6%), and had high school as their highest previous degree (61.9%). The distribution between the two years was similar with respect to demographic variables. The mean Milemarker score was 67.6 ($\pm$ 5.9) and the mean cumulative GPA was 2.9 ($\pm$ 0.4). The passing Angoff score for the Milemarker exams was 65 (0-100 range) with a first time attempt passing rate of 62.1% (2002) and 75.3% (2003), respectively.

### Anxiety with Respect to the Milemarker III Exam

Reliability of the anxiety domain revealed sufficient inter-item correlation and the Cronbach's coefficient alpha obtained was 0.92, indicat-

TABLE 1. Descriptive Analysis (N = 153)

| Variable | Measure | Result |
|---|---|---|
| Age | Mean (± SD) | 27.1 (± 3.8) |
| Sex | Male | 29.0% |
| | Female | 71.0% |
| Ethnicity | African American | 11.6% |
| | Caucasian | 26.6% |
| | Hispanic | 7.5% |
| | Asian/Pacific Islander | 52.6% |
| | Other | 1.7% |
| Marital Status | Single | 87.6% |
| | Married | 12.4% |
| Highest Previous Degree | High School | 61.9% |
| | Associate | 8.7% |
| | BS/BA | 27.6% |
| | Masters | 1.8% |

ing that the anxiety domain had high reliability. In behavioral research an alpha of 0.6 or higher is acceptable and indicates reliability of the scale used (30). The frequency distribution for the individual items, in addition to the mean scores can be viewed in Table 2. A high score on this 4 point scale indicates a higher level of test anxiety. The mean score for the test anxiety domain obtained was 2.3 (± 0.8) which indicated that students were somewhat anxious about the Milemarker III exam. A majority of the respondents said that they felt panicky or moderately panicky at the thought of taking a comprehensive exam (52.0%). In addition, 54.6% of the respondents reported that they felt anxious for an exam even when they were well prepared for it.

## *Competency Associated with Preparing for the Milemarker III Exam*

The frequency distribution and mean scores obtained after the analysis of the modified SMART scale is given in Table 3.

*Academic Competency*: For the academic competence domain, a Cronbach's coefficient alpha of 0.71 was obtained indicating sufficient reliability for this domain. The mean score was 3.11 (± 0.45) which revealed that the students were quite comfortable with the course content.

TABLE 2. Test Anxiety scores with respect to the Milemarker III Exam

| Items on Test Anxiety Scale | Mean (± SD)* | Percent Distribution (N = 152) | | | |
|---|---|---|---|---|---|
| | | Not at all typical of me | Somewhat typical of me | Moderately typical of me | Very much typical of me |
| 1. Perspiration | 1.88 (± 0.94) | 44.10 | 31.58 | 17.11 | 7.24 |
| 2. Task irrelevant thoughts | 1.82 (± 0.86) | 41.83 | 39.87 | 12.42 | 5.88 |
| 3. Panicking | 2.51 (± 1.00) | 19.08 | 28.95 | 34.21 | 17.76 |
| 4. Upset stomach | 2.11 (± 1.00) | 32.89 | 35.53 | 19.74 | 11.84 |
| 5. Increase in heart beat | 2.17 (± 1.02) | 31.58 | 32.89 | 22.37 | 13.16 |
| 6. Depression | 2.37 (± 1.03) | 23.53 | 33.33 | 24.84 | 18.30 |
| 7. Nervousness | 2.32 (± 0.98) | 22.22 | 37.25 | 26.14 | 14.38 |
| 8. Anxiety about comprehensive exams | 2.53 (± 1.10) | 20.39 | 32.89 | 20.39 | 26.32 |
| 9. Interfering thoughts during exam | 2.44 (± 1.10) | 24.34 | 29.61 | 23.68 | 22.37 |
| 10. Anxiety even when prepared | 2.66 (± 1.04) | 15.79 | 29.61 | 27.63 | 26.97 |
| Test Anxiety Score | 2.28 (± 0.77) | | | | |

*4 point scale: 1 = Not at all typical of me
            2 = Somewhat typical of me
            3 = Moderately typical of me
            4 = Very much typical of me

*Test Competency*: The reliability for the test competence domain demonstrated a Cronbach's coefficient alpha of 0.54 and relatively low inter-item correlation. The mean score was 1.98 (± 0.49) indicating that the students were not confident regarding their preparation for the Milemarker III exam.

*Time Management*: The time management domain demonstrated a Cronbach's coefficient alpha of 0.74 indicating good reliability for this domain with a mean score of 1.92 (± 0.6). The relatively low mean score indicated that students could not manage their time effectively in studying for the Milemarker III exam.

TABLE 3. Academic Competency, Test Competency, Time Management, and Study Strategies with respect to preparing for Milemarker III exam

| Items[#] | Mean (± SD) | Percent Distribution (N = 152) | | | |
|---|---|---|---|---|---|
| | | Strongly Disagree | Disagree | Agree | Strongly Agree |
| Interesting courses | 3.19 (± 0.67) | 2.0 | 9.0 | 57.5 | 31.5 |
| Enjoyed courses | 3.13 (± 0.69) | 2.0 | 11.8 | 57.2 | 29.0 |
| Understand information | 3.42 (± 0.57) | 0.0 | 4.0 | 50.0 | 46.0 |
| Manage studies | 3.07 (± 0.68) | 1.3 | 15.1 | 59.2 | 24.4 |
| Understand material | 2.74 (± 0.68) | 1.3 | 34.9 | 52.0 | 11.8 |
| **Academic Competency[a]** | 3.11 (± 0.45) | | | | |
| | | | | | |
| Confidence in preparation | 3.30 (± 0.91) | 21.7 | 36.2 | 32.9 | 9.2 |
| Ease in preparation | 1.76 (± 0.76) | 42.8 | 38.8 | 17.8 | 0.7 |
| Difficult Questions* | 1.76 (± 0.86) | 47.7 | 32.7 | 15.7 | 3.9 |
| Tension | 2.35 (± 0.81) | 13.8 | 44.8 | 34.2 | 7.2 |
| Test Preparation* | 1.74 (± 0.84) | 47.4 | 36.2 | 11.8 | 4.6 |
| **Test Competency[b]** | 1.98 (± 0.49) | | | | |
| | | | | | |
| Cramming* | 2.07 (± 0.99) | 35.5 | 32.2 | 22.4 | 9.9 |
| Combine studies/leisure* | 1.75 (± 0.82) | 45.4 | 38.1 | 12.5 | 4.0 |
| Studying regularly* | 1.60 (± 0.73) | 52.6 | 36.8 | 8.6 | 2.0 |
| Organize study/leisure time | 2.08 (± 0.80) | 23.5 | 49.0 | 22.2 | 5.2 |
| Advance preparation | 2.12 (± 0.92) | 28.7 | 39.9 | 22.9 | 8.5 |
| **Time Management[c]** | 1.92 (± 0.59) | | | | |
| | | | | | |
| Type of questions | 2.61 (± 0.90) | 15.0 | 23.5 | 47.7 | 13.8 |
| Advance Planning | 2.59 (± 0.79) | 9.9 | 30.3 | 50.7 | 9.2 |
| Group Study | 2.49 (± 1.02) | 20.4 | 29.0 | 31.6 | 19.0 |
| Mock tests | 2.24 (± 0.95) | 24.9 | 39.2 | 24.2 | 11.7 |
| Summarize material | 2.88 (± 0.81) | 7.8 | 17.6 | 55.0 | 19.6 |
| **Study Strategies[d]** | 2.56 (± 0.63) | | | | |

4 point Likert scale: 1 = Strongly Disagree 2 = Disagree 3 = Agree 4 = Strongly Agree
[#] = refer to Appendix A
* = reverse coded during statistical analysis
[a] = Cronbach's coefficient alpha of 0.71
[b] = Cronbach's coefficient alpha of 0.54
[c] = Cronbach's coefficient alpha of 0.74
[d] = Cronbach's coefficient alpha of 0.75

*Study Strategies*: The study strategy domain had a Cronbach's co-efficient alpha of 0.75. The mean score obtained was 2.56 (± 0.63). The students thus indicated that they did use certain specific study strategies in preparing for the Milemarker exam (Table 3).

### *Relationship Between Anxiety and the Domains of the Modified SMART Scale*

In order to examine the association between anxiety and the four domains measured by the modified SMART scale, Spearman correlation analysis was performed (Table 4). A negative correlation between the test anxiety domain and test competence (r = −0.25, p = 0.0022) as well as the time management domain (r = −0.20, p = 0.0108) was found. There was no significant correlation (p > 0.05) obtained between test anxiety scores with academic competence, study strategies, Milemarker scores, and cumulative GPA (Table 4).

Since the test competence domain showed a low reliability, individual item correlation was performed with test anxiety scores. It was found that items related to ease of preparation (r = −0.18, p = 0.0272), tension (r = −0.20, p = 0.0151) and test preparation (r = −0.25, p = 0.0020) were negatively correlated with test anxiety. The items related to confidence in preparation and difficulty level of questions were not correlated with test anxiety (p > 0.05).

Further, with respect to the time management domain, the following items were significantly and negatively correlated with test anxiety: cramming (r = −0.35, p = < 0.0001) and combining studies/leisure (r = −0.25, p = 0.0022).

### *DISCUSSION*

The aim of this paper was to examine the anxiety experienced by students in preparing for and in taking the Milemarker III exam, a comprehensive exam. Results demonstrated that students were somewhat anxious about the Milemarker III exam. This result was consistent with previous findings indicating some test anxiety among students in the health

TABLE 4. Spearman Correlation with Test Anxiety Scores

|  | Spearman Correlation Coefficient (N = 152) | p value |
|---|---|---|
| Academic Competency | −0.1432 | 0.0785 |
| Test Competency | −0.2463 | 0.0022 |
| Time Management | −0.2061 | 0.0108 |
| Study Strategies | −0.0079 | 0.9228 |
| Milemarker III Scores | 0.0211 | 0.8226 |
| Cumulative GPA | 0.0680 | 0.4722 |

care profession with respect to exams (31). However, the anxiety levels in our study were not very high considering the comprehensive and high-stakes nature of the Milemarker exam. Further, no correlation was obtained between test anxiety and performance as measured based on either the Milemarker III exam or the cumulative GPA scores. This was surprising given the evidence to support claims that test anxiety affects performance on exams (6, 10, 11). An explanation for this lack of relationship between anxiety and performance could be due to many factors. One possible reason could be that their anxiety scores were not as high as expected. This may be either due to their confidence in taking the exam or the effect of prior experiences from taking Milemarker I and II exams. Further, students were provided information that they would have several attempts to take and pass the Milemarker III exam thus moderating the anxiety that students might have experienced if they were informed that only one attempt would be provided to pass it. Students may have had a preemptive notion that they would all eventually be successful in passing the exam.

The negative correlation between test anxiety and the domains of test competence and time management gives credence to the notion that test anxiety might not just influence actual performance on the exam but could influence preparation for the exam and perception of students about their preparation for the exam. Since the reliability of the test competence domain was low, individual item correlation for the five items in the test competence domain provided better insight. Individual items in the test competence domain related to confidence in preparation and difficulty level of questions were not found to be correlated with test anxiety, further validating our results that students may not have high test anxiety in our study. This was not surprising since these two items were those which did not have any direct association with test anxiety. Likewise for the time management domain, items related to cramming for the exam and combining study/leisure time effectively were correlated with anxiety. Students who ended up cramming for the exam and had difficulty in efficiently allocating their study and leisure times were likely to have higher test anxiety.

Literature shows that there is a relation between academic competence, study strategies, and test anxiety (19, 20). However, since students responded that they felt competent with respect to information taught in courses during the past year, and did use study strategies to an extent, but were also somewhat anxious about the test, it was not surprising that no correlation between academic competence or study strategies and test anxiety was seen.

Results from analysis of the data showed that certain relationships between preparation for the Milemarker cumulative exam and test anxiety do exist in the sample under study. Since the aim of the exam is to assess the quality of education provided and student knowledge, it is important to improve the test taking experience for the students. This would enable a more effective process of administering the exam. Also if the issue of test anxiety is adequately addressed, it is possible that results obtained would be more indicative of the students' abilities and knowledge.

The negative correlation between test competence and test anxiety could be explained by the fact that with better time management and test preparation, students would not exhibit anxiety while taking exams (32). Inadequate time management and procrastination of study tasks lead to problems with the study material (32). With enhanced time management skills, students may not have to end up 'cramming' for exams 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 time management testing skills, nutrition, exercise, relaxations, and cognitive control provided via a stress management intervention program (33). Results of our study underlined the potential for such stress management programs in pharmacy schools to help students reduce their test anxiety. It was apparent that in spite of the fact that students had access to counselors on the university campus and in the college very few students may actually use such recourses. A one hour stress management session on techniques to develop time management skills provided to all students at least a semester before taking the Milemarker exam may be useful in the future.

Further, the Milemarker III exam was administered in April, concomitantly with exams or tests in other courses. Considering that the exam includes all the subject matter taught in the previous three years, students may not have the adequate time necessary to prepare for the Milemarker exam. Changing the date the Milemarker exams are administered may provide students adequate time necessary to prepare for the exam and make it more effective.

## LIMITATIONS

Certain limitations of this study exist and should be taken into consideration before the results are applied. A four point forced choice scale was used to measure certain variables in this study. This could

have led students choosing responses that were not indicative of their actual opinions. Further, the sample size was small and thus generalizing the results of this study to other scenarios should be done with caution. Further, the study was performed with the first two classes that experienced the Milemarker process. Results could be different once the Milemarker exam becomes an accepted norm by students.

## *CONCLUSIONS*

Students were found to be somewhat anxious with respect to the Milemarker III exam. This anxiety was correlated with the level of test competency towards the Milemarker exam and with time management skills that students utilized in preparing for it. Intervention strategies and counseling with respect to improving their perception towards the Milemarker process may help enhance their attitude towards the exam and reduce anxiety. Providing students better time management skills and an understanding of effective study strategies to reduce test anxiety may be useful in making the Milemarker exam a more effective tool to assess student knowledge retention and learning.

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APPENDIX A. Statements Used in the Questionnaire

Test Anxiety

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

Academic Competence:

1. Interesting courses: I found the courses taught during the last year interesting.
2. Enjoyed courses: I enjoyed the courses that I took during the last year.
3. Understand information: I did my best to understand the information taught in these courses.
4. Manage studies: I was able to manage my studies for the courses taught during the last year.
5. Understand material: I could easily understand the course material taught during the last year.

Test Competence

1. Confidence in preparation: I had confidence in my preparation before taking the Milemarker exam.
2. Ease in preparation: I did not find it difficult to prepare for the Milemarker exam.
3. Difficult questions: I had not expected such difficult questions on the Milemarker exam.
4. Tension: I easily coped with tension associated with taking the Milemarker exam.
5. Test preparation: I had great difficulty managing the amount of course material while preparing for the Milemarker exam.

Time Management

1. Cramming: I ended up "cramming" for the Milemarker exam.
2. Combining studies/leisure: I found it very difficult to combine my studies and leisure time while studying for the Milemarker exam.
3. Studying regularly: I found it difficult to study regularly for the Milemarker exam.
4. Organize study/leisure time: I was able to organize my study and leisure time easily.
5. Advance preparation: I started preparing for the exam well in advance.

Study Strategies

1. Type of questions: While I was studying, I regularly thought about what questions professors may ask and how they may ask exam questions.
2. Advance planning: I planed in advance for the best way of handling a study subject.
3. Group study: I reviewed course material with my colleagues while studying for the Milemarker exam.
4. Mock tests: I tested my knowledge before taking the exam by means of mock examinations, tests, asking questions, etc.
5. Summarize material: While studying, I regularly summarized the course material in my own words.