



## RESEARCH ARTICLE

# Intrinsic Motivation and Learning Strategies: Their Impact on Pharmacy Students' Academic Performance and Standardized Exams

Maqual R. Graham, PharmD<sup>1</sup>, Karen L. Hardinger, PharmD<sup>2</sup>

<sup>1</sup>Associate Dean for Academic Affairs, University of Missouri – Kansas City School of Pharmacy  
2464 Charlotte Street, HSB 2313  
Kansas City, MO 64108

<sup>2</sup>Clinical Professor, Director of Assessment, University of Missouri – Kansas City School of Pharmacy  
2464 Charlotte Street, Kansas City, Missouri



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## ABSTRACT

**Objective:** To investigate the role of motivational factors and learning strategies in predicting academic success and performance on standardized examinations among pharmacy students.

**Methods:** The Motivated Strategies for Learning Questionnaire was used to assess students' motivation as well as their learning strategies. A retrospective analysis was conducted to examine the relationship between the Motivated Strategies for Learning Questionnaire scores and pre-pharmacy admission characteristics, academic performance, and scores on standardized test [Pharmacy College Admission Test, Pharmacy Curriculum Outcomes Assessment, and Pre-North American Pharmacist Licensure Examination and North American Pharmacist Licensure Examination ].

**Results:** Data from 720 students were included. Intrinsic motivation significantly correlated with GPA during semesters 3 through 5 of the pharmacy program. However, motivation scales did not show significant relationships with performance on standardized tests. Learning strategies such as metacognitive self-regulation and elaboration were commonly employed yet were not strongly correlated with grade point average or test outcomes. Resource management strategies, including time management and effort regulation, were utilized by students but did not directly predict academic success.

**Conclusion:** Intrinsic motivation plays a significant role in academic performance. Students with higher intrinsic motivation consistently achieved higher grade point averages, indicating the importance of fostering a sense of internal drive and commitment to the curriculum.

**Keywords:** Motivated Strategies for Learning Questionnaire (MSLQ), Pharmacy Education, Academic Performance, Test Anxiety, Standardized Examinations

**MESH Terms:** Pharmacy Education, Learning Strategies, Self-Efficacy, Test Anxiety, Academic Performance, Motivation, Standardized Tests, Time Management, Effort Regulation

## Introduction

As pharmacists seek to become recognized providers under Federal and State law, graduates of Doctor of Pharmacy (PharmD) programs must acquire a broad range of knowledge, skills, and abilities essential for contemporary practice.<sup>1</sup> To ensure that graduates are well-equipped to make informed therapeutic decisions that promote patient health and well-being, the PharmD curriculum should provide a strong foundation in factual knowledge. The ability to engage in a range of professional activities and tasks also allows the graduate to be an effective contributor of the healthcare team.<sup>2,3,4</sup> The overarching goal of the professional PharmD degree program is to foster student success by enabling the achievement of course objectives and curricular outcomes.<sup>5</sup> Numerous factors influence a student's ability to meet these outcomes, and considerable research has been dedicated to identifying individual student characteristics that may impact academic performance.<sup>6,7,8,9,10,11,12</sup> Understanding why some students excel academically and others struggle allows for early, proactive intervention and tailored support.

Self-regulated learning refers to students actively participating in their learning process by setting educational goals, evaluating progress, and modifying their study strategies. Self-regulated learning maximizes the degree to which learning occurs. Motivational beliefs and learning methods are two components of self-regulated learning and positively related to academic performance. A tool commonly used to assess academic motivation and learning strategies is the Motivated Strategies for Learning Questionnaire (MSLQ). This validated instrument evaluates students' intrinsic and extrinsic motivations, as well as their preferred study strategies within a course context.<sup>13</sup> The MSLQ consists of two sections: the motivation section, which measures students' goals, their perceived value of the course, self-confidence in their ability to succeed, and test anxiety; and the learning strategies section, which focuses on how students approach studying and the resources they utilize.<sup>13</sup> Previous studies using

the MSLQ have found that self-efficacy and test anxiety are significant predictors of student achievement across various educational contexts. For example, research in physical therapy and pharmacy programs has demonstrated that these factors, in combination with strategies like critical thinking, explain a substantial portion of the variance in student grades.<sup>14,15</sup> Additionally, studies in medical and dental education have shown that motivation and self-regulated learning strategies, such as task value and beliefs about learning control, are associated with academic success. However, the impact of self-efficacy and test anxiety has been shown to vary based on factors like gender, socioeconomic status, and academic ability.<sup>16,17,18,19</sup>

Students should have and faculty do have a vested interest in student success as does the Accreditation Council for Pharmacy Education (ACPE). ACPE requires pharmacy schools to ensure the selection of a qualified, diverse student body and to implement measures that support student success throughout the program.<sup>1</sup> However, recent challenges in the field, such as the discontinuation of the Pharmacy College Admission Test (PCAT), shrinking applicant pool and declining North American Pharmacist Licensure Examination (NAPLEX) pass rates, have prompted schools to explore alternative methods for assessing students' potential for academic success. While the MSLQ has been used extensively within individual courses, its broader applicability in predicting success across an entire curriculum warrants further investigation. Therefore, the purpose of this study was to examine how the MSLQ can predict pharmacy students' performance in both the curriculum and on standardized examinations.

## Methods

A retrospective analysis was conducted at a school of pharmacy within a public university. The study was deemed a quality improvement activity by the University of Missouri-Kansas City (UMKC) Social Sciences Institutional Review Board, and therefore, it was exempt from formal review. The analysis included data from the UMKC School of Pharmacy

classes of 2020 through 2024. The study compared students' MSLQ scale scores with their pre-pharmacy admissions characteristics, academic performance throughout the curriculum, and outcomes on standardized examinations, including the PCAT, the Pharmacy Curriculum Outcomes Assessment (PCOA), and the Pre- North American Pharmacist Licensure Examination (Pre-NAPLEX) and NAPLEX.

**MSLQ Administration.** Pharmacy students are required to complete the MSLQ during the first semester of their first professional year. The questionnaire comprises 81 items designed to assess both students' motivational orientation and their use of various learning strategies.<sup>3</sup> The motivation section contains 31 items that evaluate students' goals and value beliefs related to their courses. The learning strategies section includes 31 items focusing

on students' cognitive and metacognitive strategies, alongside 19 items addressing resource management.

The MSLQ measures several components of motivation, including intrinsic goal orientation, extrinsic goal orientation, task value, control beliefs, self-efficacy for learning, and performance and test anxiety. It also assesses learning strategies such as rehearsal, elaboration, organization, critical thinking, metacognitive self-regulation, time and study environment management, effort regulation, peer learning, and help-seeking behaviors. Table 1 and 2 provides a description of each scale and associated survey item. Students rate each item on a seven-point Likert scale, ranging from 1 ("not at all true of me") to 7 ("very true of me"). Items that are reversed (i.e., negatively worded) are appropriately recoded during the analysis.

**Table 1. Description of the Motivational Strategies for Learning Questionnaire – Motivation Scales**

Motivation Scales	Selected Questions
<b>Intrinsic Goal Orientation-</b> concerns the degree to which the student perceives herself to be participating in a task for reasons such as challenge, curiosity, mastery.	<ul style="list-style-type: none"> <li>The most satisfying thing for me in this course is trying to understand the content as thoroughly as possible.</li> <li>When I have the opportunity in this class, I choose course assignments that I can learn from even if they don't guarantee a good grade.</li> </ul>
<b>Extrinsic Goal Orientation</b> - concerns the degree to which the student perceives herself to be participating in a task for reasons such as grades, rewards, performance, evaluation by others, and competition.	<ul style="list-style-type: none"> <li>If I can, I want to get better grades in this class than most of the other students.</li> <li>I want to do well in this class because it is important to show my ability to my family, friends, employer, or others.</li> </ul>
<b>Task Value-</b> refers to the student's evaluation of the how interesting, how important, and how useful the task is. ("What do I think of this task?")	<ul style="list-style-type: none"> <li>I like the subject matter of this course.</li> <li>Understanding the subject matter of this course is very important to me.</li> </ul>
<b>Control Beliefs-</b> refers to students' beliefs that their efforts to learn will result in positive outcomes.	<ul style="list-style-type: none"> <li>If I try hard enough, then I will understand the course material.</li> <li>If I don't understand the course material, it is because I didn't try hard enough.</li> </ul>
<b>Self-Efficacy for Learning and Performance-</b> Expectancy for success refers to performance expectations and relates specifically to task performance. Self-efficacy is a self-appraisal of one's ability to master a task.	<ul style="list-style-type: none"> <li>I'm confident I can understand the basic concepts taught in this course.</li> <li>Considering the difficulty of this course, the teacher, and my skills, I think I will do well in this class</li> </ul>
<b>Test Anxiety-</b> refers to students' negative thoughts that disrupt performance and affective and physiological arousal aspects of anxiety.	<ul style="list-style-type: none"> <li>When I take a test, I think about how poorly I am doing compared with other students.</li> <li>I have an uneasy, upset feeling when I take an exam.</li> </ul>

Table 2. Description of the Motivational Strategies for Learning Questionnaire – Learning Strategies Scales

Learning Strategies Scales	
<i>Cognitive and Metacognitive Strategies</i>	
<b>Rehearsal</b> - Basic rehearsal strategies involve reciting or naming items from a list to be learned.	<ul style="list-style-type: none"> <li>When I study for this class, I practice saying the material to myself over and over.</li> <li>When studying for this class, I read my class notes and the course readings over and over again.</li> </ul>
<b>Elaboration</b> -help students store information into long-term memory by building internal connections between items to be learned. Elaboration strategies include paraphrasing, summarizing, creating analogies, and generative note-taking.	<ul style="list-style-type: none"> <li>I try to relate ideas in this subject to those in other courses whenever possible.</li> <li>I try to apply ideas from course readings in other class activities such as lecture and discussion.</li> </ul>
<b>Organization</b> - help the learner select appropriate information and construct connections among the information to be learned. Examples of organizing strategies are clustering, outlining, and selecting the main idea in reading passages.	<ul style="list-style-type: none"> <li>When I study for this course, I go through the readings and my class notes and try to find the most important ideas.</li> <li>I make simple charts, diagrams, or tables to help me organize course material.</li> </ul>
<b>Critical Thinking</b> -refers to the degree to which students report applying previous knowledge to new situations to solve problems, reach decisions, or make critical evaluations with respect to standards of excellence.	<ul style="list-style-type: none"> <li>I often find myself questioning things I hear or read in this course to decide if I find them convincing.</li> <li>I try to play around with ideas of my own related to what I am learning in this course.</li> </ul>
<b>Metacognitive Self-Regulation</b> - refers to the awareness, knowledge, and control of cognition. We have focused on the control and self-regulation aspects of metacognition on the MSLO, not the knowledge aspect.	<ul style="list-style-type: none"> <li>During class time I often miss important points because I'm thinking of other things.</li> <li>Before I study new course material thoroughly, I often skim it to see how it is organized.</li> </ul>
<i>Resource Management Strategies</i>	
<b>Time and study environment</b> - Time management involves scheduling, planning, and managing one's study time. Study environment management refers to the setting where the student does her class work.	<ul style="list-style-type: none"> <li>I usually study in a place where I can concentrate on my course work.</li> <li>I make sure I keep up with the weekly readings and assignments for this course.</li> </ul>
<b>Effort regulation</b> - Self-regulation also includes students' ability to control their effort and attention in the face of distractions and uninteresting tasks. Effort management is self-management, and reflects a commitment to completing one's study goals, even when there are difficulties or distractions.	<ul style="list-style-type: none"> <li>When course work is difficult, I give up or only study the easy parts.</li> <li>Even when course materials are dull and uninteresting, I manage to keep working until I finish.</li> </ul>
<b>Peer Learning</b> - Dialogue with peers can help a learner clarify course material and reach insights one may not have attained on one's own.	<ul style="list-style-type: none"> <li>I try to work with other students from this class to complete the course assignments.</li> <li>When studying for this course, I often set aside time to discuss the course material with a group of students from the class.</li> </ul>
<b>Help Seeking</b> - ability to identify someone to provide them with some assistance.	<ul style="list-style-type: none"> <li>I ask the instructor to clarify concepts I don't understand well.</li> <li>I try to identify students in this class whom I can ask for help if necessary</li> </ul>

Although the MSLQ is designed to assess motivation and strategies within a single course, pharmacy students at UMKC are instructed to respond to the items considering all required courses for the first semester. Upon completion of the questionnaire, students receive a results report. Students are then instructed to create a personalized plan for academic success addressing any areas where their scale scores were below a threshold of three. Students are required to discuss their results and plan with their faculty advisor. Individual success plans are stored in an electronic database, which is accessible to both the student and their faculty advisor.

**Statistical Analysis.** Pearson's correlation coefficient was used to examine relationships between the MSLQ scores and various academic outcomes. A p-

value of less than 0.05 was considered statistically significant. The factors analyzed included pre-pharmacy grade point averages (GPAs) in math and science, pre-pharmacy prerequisite GPA, pre-pharmacy cumulative GPA, PCAT composite score, semester GPAs in pharmacy school, course failures, delayed graduation, and scores on the PCOA, Pre-NAPLEX, and NAPLEX. For specific analyses, cases with missing data were excluded, but partial data were included when possible.

## Results

A total of 720 students graduated from the UMKC School of Pharmacy between 2020 and 2024, with 719 students completing the MSLQ and included in the analysis. Table 3 displays the mean and standard deviation for each MSLQ scale.

**Table 3. MSLQ Scale Means**

	Number	Mean	SD
<b>Motivation Scales</b>			
Intrinsic Goal Orientation	710	5.08	1.00
Extrinsic Goal Orientation	709	4.90	1.13
Task Value	709	5.50	1.05
Control Beliefs	708	5.57	0.93
Self-Efficacy for Learning and Performance	709	5.53	0.99
Test Anxiety	709	3.72	1.53
<b>Learning Strategies Scales</b>			
<i>Cognitive and Metacognitive Strategies</i>			
Rehearsal	709	4.86	1.16
Elaboration	708	4.76	1.15
Organization	708	4.55	1.33
Critical Thinking	709	3.86	1.23
Metacognitive Self-Regulation	710	4.89	0.90
<i>Resource Management Strategies</i>			
Time and study	710	5.34	0.85
Effort regulation	710	5.32	1.11
Peer Learning	707	4.05	1.52
Help Seeking	709	4.49	1.13



Motivational factors exhibited notable variability. Students rated their intrinsic motivation ( $5.08 \pm 1.00$ ) higher than their extrinsic motivation ( $4.09 \pm 1.13$ ), indicating a greater sense of internal drive toward academic achievement than external incentives. Additionally, students demonstrated a high perceived value for the material taught in the program, as reflected by their average ratings for task value ( $5.50 \pm 1.05$ ), control of learning beliefs ( $5.57 \pm 0.93$ ), and self-efficacy for learning and performance ( $5.53 \pm 0.99$ ). These results suggest that students felt confident in their ability to succeed in the program and believed their efforts would yield positive academic outcomes. Conversely, test anxiety was relatively low, with a mean score of  $3.72 \pm 1.53$ , indicating minimal distress surrounding assessments.

In terms of learning strategies, metacognitive self-regulation ( $4.89 \pm 0.90$ ), elaboration ( $4.76 \pm 1.15$ ), and basic rehearsal ( $4.86 \pm 1.16$ ) emerged as the predominant strategies employed by students. These strategies suggest that students tended to focus on self-regulation and elaborating on material to retain information. Critical thinking, defined as the application of prior knowledge to new concepts, was less commonly used, with an average score of  $3.86 \pm 1.23$ .

Regarding resource management strategies, students most frequently utilized time management and study space ( $5.34 \pm 0.85$ ) and effort regulation ( $5.32 \pm 1.11$ ). However, help-seeking strategies and peer learning were employed less often, suggesting students were more independent in managing their learning but less inclined to collaborate with peers or seek external assistance.

Pre-Pharmacy Admission Characteristics: Motivation strategies did not show significant correlations with pre-pharmacy admission characteristics (Table 4). However, certain cognitive and metacognitive learning strategies were associated with academic performance. Specifically, the rehearsal strategy was positively correlated with prerequisite math and science GPA ( $r = 0.088$ ,  $p < 0.05$ ) and negatively correlated with cumulative GPA ( $r = -0.077$ ,  $p < 0.05$ ). Critical thinking was found to correlate negatively with PCAT score ( $r = -0.085$ ,  $p < 0.05$ ). Peer learning was positively correlated with cumulative GPA ( $r = 0.078$ ,  $p < 0.05$ ) but negatively correlated for PCAT composite score ( $r = -0.101$ ,  $p < 0.01$ ).

**Table 4. Correlation of MSLQ Scale Scores with Pre-Pharmacy Admission Characteristics and Pharmacy School Performance**

	Pre-Pharmacy Characteristics				Pharmacy School Performance					
	PCAT Composite	M/S GPA	Pre- Req GPA	Cum GPA	S1 GPA	S2 GPA	S3 GPA	S4 GPA	S5 GPA	S6 GPA
<b>Motivation Scales</b>										
Intrinsic	-0.040	0.021	0.011	0.017	0.039	0.063	0.084*	0.081*	0.081*	0.078
Extrinsic	-0.011	-0.024	-0.033	-0.011	-0.030	-0.003	-0.006	-0.007	-0.007	-0.012
Task Value	-0.010	0.028	0.028	0.022	-0.012	0.001	0.008	0.009	0.034	0.022
Control Beliefs	-0.004	0.010	0.010	0.015	0.025	0.032	0.015	0.005	0.021	0.008
Self-Efficacy	-0.038	0.013	0.018	0.028	-0.040	-0.036	-0.042	-0.040	-0.016	-0.024
Test Anxiety	0.018	0.033	0.045	0.041	-0.007	0.007	0.005	0.014	-0.014	-0.012
<b>Learning Strategies Scales</b>										

<i>Cognitive and Metacognitive Strategies</i>										
Rehearsal	0.019	0.088*	0.068	-0.077*	0.021	0.013	0.001	-0.017	-0.007	-0.021
Elaboration	-0.018	0.054	0.044	0.051	0.019	0.004	-0.013	-0.017	-0.016	-0.031
Organization	-0.027	0.018	0.011	0.019	-0.029	-0.002	-0.043	-0.039	-0.043	-0.063
Critical Thinking	-0.085*	0.006	0.008	0.009	-0.050	-0.056	-0.064	-0.057	-0.044	-0.054
Metacognitive Self-Regulation	-0.021	0.071	0.056	0.067	0.009	-0.027	-0.033	-0.030	-0.031	-0.041
<i>Resource Management Strategies</i>										
Time and study space	0.039	0.020	0.006	0.014	-0.006	-0.029	-0.003	-0.014	-0.021	-0.029
Effort regulation	0.032	0.036	0.050	0.038	-0.037	-0.041	-0.004	0.004	-0.014	-0.025
Peer Learning	-0.101**	0.056	0.037	0.078*	0.019	-0.003	0.008	0.003	0.006	0.002
Help Seeking	-0.061	0.006	-0.011	0.039	-0.017	-0.049	-0.052	-0.064	-0.044	-0.043

Pharmacy College Admission Test (PCAT), Math and science (M/S), Semester (S), Grade point average (GPA)

Pharmacy School Performance: Intrinsic motivation had positive and significant correlations with GPA from semesters 3 through 5 of the PharmD program ( $r = 0.81\text{--}0.84$ ,  $p < 0.05$ ), suggesting that students who were intrinsically motivated performed better academically during the middle portion of the program. No significant relationships were found between other motivation scales (extrinsic motivation, task value, control of learning beliefs, self-efficacy, and test anxiety) and pharmacy school GPA. Similarly, cognitive and metacognitive learning strategies, as well as resource management strategies, were not significantly correlated with pharmacy school GPA.

Standardized Test Performance: Motivation scales showed no significant correlations with performance on standardized tests, including the PCOA, Pre-NAPLEX, or NAPLEX (Table 5). However, critical thinking was negatively correlated with Pre-NAPLEX performance ( $r = -0.102$ ,  $p < 0.01$ ), though no similar relationship was found for the PCOA or NAPLEX. Additionally, resource management strategies were not associated with standardized test performance.

Table 5. Correlation of MSLQ Scale Scores and Performance on Standardized Tests

	Standardized Tests		
	PCOA	Pre-NAPLEX	NAPLEX
<b>Motivation Scales</b>			
Intrinsic	0.067	0.044	-0.106
Extrinsic	-0.019	-0.014	0.008
Task Value	-0.029	0.012	-0.053
Control Beliefs	-0.021	0.033	-0.048
Self-Efficacy	-0.036	0.018	0.006
Test Anxiety	-0.001	-0.019	-0.056
<b>Learning Strategies Scales</b>			
<i>Cognitive and Metacognitive Strategies</i>			
Rehearsal	0.010	0.007	-0.044
Elaboration	-0.038	-0.044	-0.076
Organization	-0.048	-0.058	-0.073
Critical Thinking	-0.070	-0.102**	0.002
Metacognitive Self-Regulation	-0.049	-0.040	-0.037
<i>Resource Management Strategies</i>			
Time and study	-0.046	0.002	-0.094
Effort regulation	-0.022	-0.007	-0.051
Peer Learning	-0.025	-0.042	-0.022
Help Seeking	-0.020	-0.029	-0.044

Pharmacy Curriculum Outcomes Assessment (PCOA), and the Pre- North American Pharmacist Licensure Examination (Pre-NAPLEX)

## Discussion

The results of this study highlight the varying impact of motivational factors, learning strategies, and resource management on both academic performance in pharmacy school and standardized test outcomes. Although motivation did not show significant correlations with pre-pharmacy admission characteristics, certain learning strategies, such as rehearsal and critical thinking, were associated with GPA and PCAT scores, suggesting that specific cognitive and metacognitive strategies may play a role in early academic success.

In pharmacy school, intrinsic motivation emerged as a significant predictor of GPA in semesters 3

through 5, underscoring the importance of fostering intrinsic drive among students for sustained academic performance. However, other motivation scales, including extrinsic motivation, task value, self-efficacy, and test anxiety, were not significantly correlated with pharmacy school GPA. This finding suggests that intrinsic motivation, rather than external factors or perceived self-efficacy, may be more crucial for long-term success in the PharmD program.

Learning strategies, both cognitive and metacognitive, as well as resource management strategies, did not correlate with pharmacy school GPA, indicating that academic performance may be more strongly influenced by motivation than by the strategies



employed. Interestingly, the use of critical thinking was negatively correlated with Pre-NAPLEX scores, potentially pointing to an over-reliance on critical thinking strategies that may not align with the format or expectations of standardized exams. These findings suggest that while critical thinking is valuable in clinical settings, its application may not always translate effectively to standardized test formats.

In terms of standardized test performance, motivation and learning strategies were largely unrelated to performance on the PCOA, Pre-NAPLEX, or NAPLEX. This finding could suggest that standardized tests may assess a different set of skills compared to those evaluated through the MSLQ. Critical thinking was the exception, as it demonstrated a negative correlation with Pre-NAPLEX performance, possibly indicating that students who focus more on critical thinking may struggle with the test's emphasis on rote knowledge and recall.

The lack of significant associations between resource management strategies (e.g., time management, effort regulation) and pharmacy school GPA or standardized test performance suggests that while these strategies are important for students' overall academic success, they may not have as direct an impact on performance as motivation and learning strategies. This could reflect the complexity of academic success in pharmacy school, where a combination of factors beyond time management and study environment might contribute to achievement.

## IMPLICATIONS FOR STUDENT SUCCESS IN PHARMACY EDUCATION

The results of this study have several implications for improving student success in pharmacy programs. Given the positive association between intrinsic motivation and academic performance, efforts to foster intrinsic motivation among students could be an effective strategy for improving academic outcomes. Additionally, the finding that critical thinking was negatively correlated with Pre-NAPLEX performance highlights the need for tailored support

that helps students balance critical thinking with the specific skills required for standardized exams.

Furthermore, although resource management strategies like time management and effort regulation were not directly correlated with academic performance, they may still be valuable for supporting students in their daily study habits and long-term success. It would be beneficial for pharmacy programs to integrate these strategies into student success programs, helping students develop effective time management and study habits that can facilitate learning and reduce stress.

Development should focus on equipping faculty advisors with strategies to support students' intrinsic motivation and cognitive strategies. Additionally, faculty advisors could be trained to recognize when students may need more targeted interventions based on their MSLQ results, such as personalized feedback on critical thinking or time management. This could be integrated into a formalized student success plan that is regularly reassessed to ensure continuous improvement.

## LIMITATIONS

This study has several limitations that should be considered when interpreting the results. The data is drawn from a single school of pharmacy, which may limit its generalizability to other institutions and health disciplines. The study includes students from only four graduating classes, which may not fully capture the diversity of experiences and learning strategies within a broader cohort. Additionally, the last cohort of students who completed the MSLQ (Class of 2024) did so during the COVID pandemic, a time when coursework was delivered in hybrid mode, with half of required courses conducted in-person and the other half online. Lastly and most importantly, the MSLQ was used to help students identify personal characteristics that could hinder their academic performance within the PharmD curriculum rather than a specific course. Students may not have understood the directions and completed the survey based on the course the MSLQ was administered. Additionally, this broader scope may

have influenced the validity of the responses, as students' engagement with different types of learning strategies may vary between courses.

## Conclusion

The findings from this study suggest that intrinsic motivation and effective resource management strategies, such as time management and effort regulation, are important factors influencing performance in pharmacy school. While motivation and learning strategies did not significantly predict pre-pharmacy GPA or standardized test performance, addressing test anxiety, promoting intrinsic motivation, and fostering effective study strategies could support student success throughout the PharmD program. Future research should explore the broader applicability of these findings across different institutions and investigate additional factors that may contribute to student achievement in pharmacy education.

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