RESEARCH

Multiple Mini-Interview Performance Predicts Academic Difficulty in the PharmD Curriculum

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Objective. To identify admissions variable prognostics for academic difficulty in the PharmD curriculum to use for admissions determinations and early identification of at-risk students.

Methods. Retrospective multivariate analysis of 2008-2012 admission data were linked with academic records to identify students with academic difficulty (ie, those with Ds, Fs, delayed progression). The influence of prepharmacy grade point average (GPA), composite Pharmacy College Admission Test (PCAT) score, multiple-mini interview (MMI) score, age, credit hours, state residence, and prior degree on academic difficulty was estimated using multivariate logistic regression.

Results. Students' (n=587) prepharmacy GPA, composite PCAT score, mean MMI score, and age were 3.6, 72.0, 5.5, 22.8 (SD=4.14 years), respectively. Students having a GPA <3.25, PCAT score <60th percentile, or MMI score <4.5, were approximately 12-, 7-, and 3-times more likely, respectively, to experience academic difficulty than those with a GPA ≥ 3.75, PCAT score >90, or MMI score of 5-6.

Conclusion. Using GPA, PCAT, and MMI performance can predict academic difficulty and assist in the early identification of academically at-risk PharmD students.

Keywords: multiple mini-interview, MMI, academic difficulty, interview, predict

INTRODUCTION

The admissions process in colleges and schools of pharmacy continues to be competitive. For admission committees, this translates to difficult decisions for selecting the best candidates to succeed in the program and ensure academic progression for admitted students. Accreditation standards from the Accreditation Council for Pharmacy Education (ACPE) mandate that the school's system of monitoring student performance provide for early detection and intervention leading to successful corrective action in cases of academic difficulty (ie, early intervention).¹

Early intervention, which can potentially improve progression, also presents the school's student performance monitoring system with the challenge of identifying students at academic risk early so that successful corrective actions can be implemented. The admission committee can serve as an important component of

a school's early intervention efforts. Pharmacy program admission committees typically evaluate candidates based on cognitive measures such as prepharmacy grade point average (GPA), Pharmacy College Admission Test (PCAT) scores, in addition to personal statements, written essays, letters of reference, and a standardized onsite interview.² Collectively, these efforts evaluate candidates' verbal communication skills, understanding of the pharmacy profession, commitment to patient care. They also attempt to assess students' potential for success in the professional degree program and the profession.

Studies demonstrate prepharmacy GPA and PCAT scores are predictive of student success.³⁻⁶ In addition to these cognitive measures, noncognitive qualities including communication skills, empathy, ethical behavior, and professionalism also demonstrate a strong correlation with outcomes in doctor of pharmacy (PharmD) programs.^{7,8} Other noncognitive qualities, including intellectual curiosity, leadership, emotional maturity, motivation, industriousness, should also be assessed during the admissions process.⁹ However, these additional noncognitive

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qualities are difficult to evaluate in a standard interview. Applicants often rehearse responses to standard questions, thereby making it difficult to obtain a genuine and accurate assessment of such qualities. Instituting methods to evaluate noncognitive qualities during the admissions process may also yield data useful in the timely identification of students with potential to experience academic difficulty and thus facilitate early intervention to improve progression.

The multiple-mini interview (MMI) process is one method that enables programs to evaluate applicants for noncognitive qualities in a standardized manner. First developed at McMaster University College of Medicine, the MMI consists of multiple abbreviated encounters ranging from case-based scenarios to standard interview questions.¹⁰ Data show the reliability of the MMI when used during the interview process.^{7,8,11} Since 2008, the UAMS College of Pharmacy has used the MMI in addition to GPA and PCAT to evaluate applicants in the admissions process.¹²

Given the reliability of the MMI and the extensive use of this method at our institution, the primary objective of this study was to determine the influence of the MMI, in addition to typical cognitive measures (eg, prepharmacy GPA, PCAT scores), on subsequent academic difficulty in the PharmD curriculum.^{7,13,14} A secondary objective of this study was to identify and analyze additional variables with the potential of being independent predictors of academic difficulty.

After successfully pilot testing with a small group of volunteer applicants in 2007, full implementation of the MMI as the only onsite interview method used in the admissions process occurred in 2008.¹⁴ The MMI is conducted in a clinical skills center comprised of multiple interview rooms and equipped with overhead communications and digital video recording capabilities. Trained interviewers including standardized actors, college of pharmacy faculty members, and third and fourth professional year student pharmacists conduct the MMI encounters. Specifically, the interviewers are trained in MMI structure, intent, and scoring. To mitigate interviewer bias, interviewers are asked to identify any candidates they know prior to starting the MMI. If they do, an alternate interviewer is used for that encounter. All encounters are digitally recorded for further performance analysis, if needed.

Each candidate completes four encounters in an MMI. Automated overhead announcements guide applicants through the MMI process by alerting them when to begin each interview and when to move on to the next station. Applicants are given two minutes of preparation time before each encounter. From 2008-2009, each

encounter lasted eight minutes. Starting in 2010, the duration was decreased to five minutes. The encounters are scored using evaluation forms that include interviewer instructions, a 7-point Likert scale (1=unsatisfactory to 7=outstanding) assessment, and space for interviewer comments. Items assessed via the Likert scale include communication, (eg, strength of discussion, suitability for the profession), and overall performance for the encounter.

The overall scores are summarized for the admissions committee and presented as the mean overall score across all four encounters. This results in a minimum possible score of one and a maximum possible score of seven for evaluation. In the comment section, the interviewers may document their thoughts or concerns regarding each applicant. The trained interviewers score MMI encounters in real time immediately following the interview during the 2-minute preparation, while they await the next applicant encounter. Interviewers may adjust their scores before turning the evaluation forms in at the end of the interview day.

The goal of instituting the MMI was to develop a comprehensive interview process that would provide the opportunity to evaluate traditional interview topics (eg, knowledge of the pharmacy profession) and noncognitive qualities, which are more difficult to capture with the traditional interview (eg, empathy and ethics). Therefore, faculty members identified topics (empathy, ethical decision making, rapport, communication, and suitability for pharmacy) and developed MMI encounters to address what they considered most relevant to the admissions process. In addition, as part of continual quality improvement, faculty members involved with the MMI process reviewed case performance annually.

METHODS

This study protocol was determined to be exempt from human subject research by the UAMS Institutional Review Board. This retrospective, multivariate analysis included admissions data from academic years 2008-2012. Applicants who participated in the MMI process from 2008-2012 and enrolled in the college were evaluated in this study. De-identified student admissions and academic data were obtained from the college registrar and the associate dean for student affairs for the study period. Study identification numbers were assigned in a progressive manner for all years evaluated.

Data obtained for potential evaluation included information available to the admissions committee for each year in the study period such as age, gender, race, hometown, rurality (rural, metropolitan, urban), and state of residence. All admissions data was continually updated

by the director of admissions until fall enrollment in the college. In addition, prepharmacy admissions data included undergraduate GPA upon admission (ie, prepharmacy GPA), degree (none, bachelor of science [BS], bachelor of arts [BA], master's, doctorate); composite PCAT scores, and total undergraduate hours. Following enrollment into the college, study data included difficulty in individual courses, academic dismissal from the college (yes or no), college admission year, MMI scores (communication, overall performance, case, interviewer concern), college student progression (delayed graduation, summer school, dismissal), and study identification number.

All occurrences of academic difficulty in the professional curriculum (didactic and experiential) were quantified for evaluation. Academic difficulty was defined as earning a final course grade of D or F, attending summer school, repeating an academic year, and academic or administrative dismissal (dismissal for academic or nonacademic reasons). The de-identified admissions data were linked with the professional curriculum academic transcripts. All academic work in the professional curriculum completed prior to January 2014 was assessed to identify measures of academic difficulty. This means that for students admitted after fall 2011 measures of academic difficulty were not assessed for all four professional years of study.

Covariates used in the multivariate analysis included: admission year (2008-2012), age, degree, prepharmacy GPA (4.0 scale), rurality, MMI score (mean overall performance), PCAT (percentile composite score), state of residence, and total undergraduate credit hours. Scores collected for each applicant's MMI included overall performance score on the encounter, the communication checklist, and whether the standardized interviewer had any concerns about the applicant. The MMI score reported to the admissions committee and used for this analysis was the mean of the overall performance evaluation points from each case. Applicant prepharmacy GPA, updated prior to enrollment into the college, based on all completed undergraduate coursework was used, as well as applicant's highest PCAT composite score. To assess rurality, hometowns were separated into rural, metropolitan, and urban categories using the 2010 United States Census data.¹⁵ Covariates collected but not analyzed in the multivariate analysis included race, gender, hometown, county of residence, undergraduate school, MMI communication score, MMI case score, and MMI interviewer concerns.

Frequency and means of all study covariates and outcome measure were calculated. To identify useful categorizations of continuous key study measures (prepharmacy GPA, MMI, composite PCAT score), quantiles of these

measures were examined. Unadjusted associations between study covariates and academic difficulty were assessed using chi-square tests. A multivariate logistic regression model was used to identify the influence of prepharmacy GPA, composite PCAT score, MMI score, age, undergraduate credit hours, state residency, rurality, and degree earned prior to beginning the professional pharmacy curriculum as independent predictors of academic difficulty. Models with linear and nonlinear quadratic terms were initially estimated to check for nonlinear effects of prepharmacy GPA, composite PCAT score, and MMI scores on academic difficulty. Based on these models and the distribution of prepharmacy GPA, composite PCAT score, and MMI score, the following categorizations were made: prepharmacy GPA <3.00, 3.00-3.24, 3.25-3.49, 3.50-3.74, ≥ 3.75 ; composite PCAT score <45, 45-59, 60-74, 75-89, ≥ 90 ; MMI score <4.5, 4.5-4.9, 5-5.9, ≥ 6 . To assess the models ability to discriminate between students who do and do not encounter academic difficulty, the C statistic was estimated.

RESULTS

Five hundred eighty-seven applicants were included for evaluation from admission years 2008-2012. For all years in the analysis, the mean age was approximately 23 years, mean prepharmacy GPA was 3.57, mean composite PCAT score was 72, and the mean MMI score was 5.54 (Table 1). The average number of undergraduate credit hours prior to admission was approximately 129, with 41% of these students having no degree, 55% having a bachelor degree, and 3.9% having graduate degrees. In our institution, 26.8% of all students met the criteria of academic difficulty during the evaluation period, with 26.4% earning Ds, 6.8% earning Fs, 6.5% repeating a year, and a 1.5% rate of academic dismissals. Ultimately, the rate of students having delayed graduation in the program was 7.5% over this 5-year period.

In the unadjusted comparisons (Table 2), the MMI score was significantly associated with academic difficulty ($p < 0.01$), with 34% of students scoring less than 4.5 experiencing academic difficulty compared to approximately 24% of students who scored between 4.6 and 5.9 on the MMI. Prepharmacy GPA was significantly associated with academic difficulty ($p < 0.01$), and the rate of academic difficulty was highest (42.6%) when prepharmacy GPA was between 3.00-3.24 compared to 8.3% when it was greater than 3.75. Composite PCAT scores were also significantly associated with academic difficulty ($p < 0.01$) with students scoring below the forty-fifth percentile experiencing academic difficulty 38.1% of the time compared to 9.9% of students with a composite PCAT score at or above the ninetieth percentile

Table 1. Student Demographics, Admission Characteristics, and Academic Difficulty (n=587)

Demographic Variables	n (%)	
Male	213 (36.4)	
Arkansas Residents	543 (92.5)	
Hometown Classification		
Rural	226 (38.5)	
Metropolitan	252 (42.9)	
Urban	109 (18.6)	
	Mean (SD)	Range
Age (years)	22.83 (4.1)	19-55
Academic Variables		
GPA	3.57 (0.3)	2.62-4.0
PCAT	71.98 (14.1)	33-99
MMI Scores		
Overall	5.54 (0.7)	2.5-7
Communication Only	5.58 (0.8)	2.25-7
Case Score Only	5.51 (0.7)	2.22-7
Undergraduate Hours	129.31 (37.5)	63-283
Degree Status	n (%)	
No Degree	264 (45.0)	
Bachelor's Degree	300 (51.1)	
Graduate Degree	23 (3.9)	
Academic Difficulty	158 (26.9)	
Final Grade of D	155 (26.4)	
Final Grade of F	40 (6.8)	
Academic Dismissals	9 (1.5)	
Repeat Academic Year	38 (6.5)	
Delayed Graduation	44 (7.5)	
Summer School Students	8 (1.4)	

experiencing academic difficulty. In-state residents experienced more academic difficulty (28.2%) compared to out-of-state residents (11.4, $p=0.016$). Age trended towards significance ($p=0.067$) with older students experiencing higher levels of academic difficulty than younger students. Year of admission, hometown population density, and undergraduate or graduate degree status were not significant in the unadjusted analyses.

The multivariate logistic regression results are reported in Table 3. Six students were excluded from the multivariate analysis because of missing covariates. Those students scoring below a 4.5 on the MMI were approximately three times more likely (95% CI [1.5 - 6.1]) to experience academic difficulty than those students scoring between 5 and 5.9 (referent). Prepharmacy GPA significantly predicted academic difficulty across all ranges tested (<3.0 , 3.00-3.24, 3.25-3.49, 3.5-3.74, ≥ 3.75) and those with prepharmacy GPAs less than 3.25 were more than 10 times as likely to experience academic difficulty than those with prepharmacy GPAs > 3.75 . Other factors that significantly increased the risk

of academic difficulty were lower composite PCAT scores and those without a prior degree. Those with a PCAT score less than the fifty-ninth percentile were more than six times more likely to experience academic difficulty, those with a bachelor's degree were about half as likely, and those with a graduate degree were about one fifth as likely to experience academic difficulty. This model discriminated academic difficulty well with a C statistic of 0.787.

DISCUSSION

The evolving health care delivery models and the changing role of pharmacy practitioners have resulted in more emphasis being placed on noncognitive skills in the professional pharmacy curriculum.¹⁶ Consequently, academic pharmacy is focusing additional emphasis on patient-centered communication and the ability of students to contribute effectively to a team-based approach to health care.^{17,18} Studies demonstrate the MMI is capable of discriminating noncognitive qualities not captured by prepharmacy GPA and the PCAT.^{12,19}

The 4-station MMI used in this process examined an applicant's ability to communicate effectively, support an argument, and to demonstrate empathy and ethical decision making.¹² The validity of cognitive measures such as prepharmacy GPA and PCAT scores to consistently predict academic performance in a variety of curriculums is well documented in the literature.³⁻⁵ This is the first paper to establish the MMI as a significant predictor of academic difficulty and further validates its usefulness in helping to select applicants for admission to a PharmD program.

Approximately 27% of students met our definition of academic difficulty. We defined academic difficulty as one or more Ds or Fs obtained in the professional curriculum, delayed progression, or academic or administrative dismissal. The predominance of students experienced academic difficulty by obtaining one or more Ds (n=155; 26.4%) in the pharmacy curriculum. Less common qualifiers for academic difficulty included students receiving a grade of F (40 students or 6.8%) in one or more course(s), and students who were dismissed (nine students or 1.5%) during the 5-year study period. These academic difficulty totals resulted in 44 students, or 7.5% experiencing delayed graduation. The results of our multivariate analysis demonstrate that the MMI score, in concert with GPA and PCAT scores, could improve our ability to identify at-risk students earlier in the PharmD curriculum.

The PCAT is intended to measure an applicant's cognitive preparedness for the pharmacy curriculum. Our data demonstrating a correlation between composite PCAT score and experiencing academic difficulty during the professional pharmacy curriculum are consistent with

Table 2. Unadjusted Comparisons of Admissions Characteristics and Academic Difficulty (n=587)

	n (%)					p value
GPA	< 3.00	3.00-3.24	3.25-3.49	3.50-3.74	3.75-4.00	< 0.0001
Academic Difficulty	11 (37.9)	20 (42.6)	60 (41.4)	52 (28.1)	15 (8.3)	
No Academic Difficulty	18 (62.1)	27 (57.5)	85 (58.6)	133 (71.9)	166 (91.7)	
Totals	29 (4.9)	47 (8.0)	145 (24.7)	185 (31.5)	181 (30.8)	
PCAT	< 45	< 60	< 75	< 90	≥ 90	< 0.0002
Academic Difficulty	8 (38.1)	37 (41.1)	52 (24.3)	54 (28.3)	7 (9.9)	
No Academic Difficulty	13 (61.9)	53 (58.9)	162 (75.7)	137 (71.7)	64 (90.1)	
Totals	21 (3.6)	90 (15.3)	214 (36.5)	191 (32.5)	71 (12.1)	
MMI Score	< 4.5	< 5.0	< 6.0	≥ 6.0		< 0.0001
Academic Difficulty	18 (34.0)	22 (24.7)	74 (24.0)	44 (32.4)		
No Academic Difficulty	35 (66.0)	67 (75.3)	235 (76.1)	92 (67.7)		
Totals	53 (9.0)	89 (15.2)	309 (52.6)	136 (23.2)		
State of Residence	Out of State	In-state				0.016
Academic Difficulty	5 (11.4)	153 (28.2)				
No Academic Difficulty	39 (88.6)	390 (71.8)				
Totals	44 (7.5)	543 (92.5)				
Age (years)	< 21	21-23	24-29	≥ 30		0.067
Academic Difficulty	28 (20.7)	84 (26.5)	30 (31.6)	16 (40.0)		
No Academic Difficulty	107 (79.3)	233 (73.5)	65 (68.4)	24 (60.0)		
Totals	135 (23.0)	317 (54.0)	95 (16.2)	40 (6.8)		
Admission Year	2008	2009	2010	2011	2012	0.074
Academic Difficulty	38 (33.6)	36 (30.0)	26 (21.7)	35 (29.9)	23 (19.7)	
No Academic Difficulty	75 (66.4)	84 (70.0)	94 (78.3)	82 (70.1)	94 (80.3)	
Totals	113 (19.3)	120 (20.4)	120 (20.4)	117 (19.9)	117 (19.9)	
Hometown Classification ^a	Rural	Metropolitan	Urban			0.076
Academic Difficulty	64 (28.4)	74 (29.8)	20 (18.5)			
No Academic Difficulty	161 (70.2)	174 (71.6)	88 (81.5)			
Totals	225 (38.7)	248 (42.7)	108 (18.6)			
Degree	None	Bachelor's	Graduate			0.69
Academic Difficulty	75 (28.4)	78 (26.0)	5 (21.7)			
No Academic Difficulty	189 (71.6)	222 (74.0)	18 (78.3)			
Totals	264 (45.0)	300 (51.1)	23 (3.9)			

^a(n=581) Six students were deleted because of lack of hometown information

findings of other researchers.⁴ Likewise, our data demonstrating a correlation between a certain threshold prepharmacy GPA and experiencing academic difficulty in the professional pharmacy curriculum are also consistent with findings of others who have demonstrated similarly strong correlation between the two. Moreover, Charupatanapong and colleagues noted that not only is prepharmacy GPA the best predictor of overall success for the first three professional years, but it remained the most powerful predictor regardless of student demographic variables.²⁰ Our data also found prepharmacy GPA to be the most powerful predictor of academic difficulty. However, composite PCAT score was nearly as powerful a predictor. Our research further validates the usefulness of prepharmacy GPA and composite PCAT scores in providing early detection of potential for academic difficulty. More importantly, it also provides evidence that these

cognitive measures should not be relied upon as the lone predictor(s) of academic difficulty, as methods like the MMI that measure noncognitive traits are also predictive and can augment early detection strategies currently in place to monitor student performance.

Given the emphasis on the professionalization of students, schools of pharmacy must select applicants who are excellent communicators, demonstrate the ability to work with a team, and understand the importance of an interprofessional team.¹⁶ While properly structured and standardized single interview processes provide a consistent and reliable method to assess qualitative and, in some cases, noncognitive traits, the MMI increases the reliability and validity of interview scoring.² The MMI is the only validated method to assess these noncognitive attributes in applicants, which provides admission committees with a reliable method to assess communication, ethical

Table 3. Adjusted Odds Ratios of Admission Characteristics on Academic Difficulty (n=581)^a

Covariate	OR	CI
GPA		
<3.00 vs ≥3.75	10.6	(3.55-31.8)
3.00-3.24 vs ≥3.75	11.7	(4.7-29.2)
3.25-3.49 vs ≥3.75	8.6	(4.4-17.1)
3.50-3.74 vs ≥3.75	4.5	(2.34-31.8)
MMI Score		
<4.5 vs 5.0-5.9	3.02	(1.50-6.1)
<4.5-4.9 vs 5.0-5.9	0.87	(0.46-1.62)
≥6.0 vs 5.0-5.9	1.47	(0.85-2.54)
PCAT Score		
<45 vs ≥90	6.7	(1.78-25.4)
45-59 vs ≥90	7.2	(2.65-19.3)
60-74 vs ≥90	2.77	(1.01-7.0)
75-89 vs ≥90	4.1	(1.63-10.3)
Age (years)		
21-23 vs <21	1.04	(0.54-1.99)
24-29 vs <21	0.86	(0.34-2.19)
≥30 vs <21	1.71	(0.59-5.0)
Undergraduate Hours ^b	1.01	(0.99-1.02)
State of Residence		
Out-of-state vs In-state	0.42	(0.14-1.25)
Degree Status		
Bachelor's vs None	0.52	(0.28-0.97)
Graduate vs None	0.21	(0.05-0.89)
Admission Year		
2009 vs 2008	0.55	(0.29-1.04)
2010 vs 2008	0.61	(0.31-1.19)
2011 vs 2008	0.64	(0.34-1.24)
2012 vs 2008	0.33	(0.16-0.69)
Hometown Classification		
Metropolitan vs Rural	0.92	(0.58-1.48)
Urban vs Rural	0.54	(0.28-1.04)
C statistic=0.79		

^aSix observations were deleted due to missing values (hometown)

^bThis model is a continuous measure based on each additional hour of credit

decision-making, empathy, and other noncognitive traits less reliably assessed in a traditional single interviewer setting. Because professional curriculum and 2016 ACPE Standards also emphasize such traits, MMI results can also be used to predict academic difficulty in the professional curriculum.^{1,13}

Our data also establish the usefulness of examining an applicant's educational history to predict academic difficulty. Similar to the predictive ability of prepharmacy GPA, composite PCAT score, and MMI scores, a bachelor's degree, and even more so, a graduate degree significantly reduced the risk academic difficulty in the PharmD curriculum. Although the unadjusted comparison between students with no degree, a bachelor's degree,

or a graduate degree did not reach significance, students who earned a bachelor's degree prior to admission to pharmacy school were nearly two times less likely to experience academic difficulty, and students with graduate degrees prior to admission were nearly five times less likely to encounter academic difficulty compared with those students with no prior degree.

Although this was significant in the adjusted odds ratio, we acknowledge there are other factors regarding academic history that should be considered, but were not collected or not evaluated during this study. Most notably, the credit-hour burden per semester during prepharmacy coursework could be examined, as this is a likely indicator of students' academic load and their ability to be successful in the demanding PharmD curriculum. Other factors evaluated in previous studies include total credit hours achieved, math/science GPA and math/science PCAT scores.

Another characteristic that predicted academic difficulty in our study was state of residence. In-state students experienced more academic difficulty than out of state students ($p=0.016$). Although this finding was significant, the majority of the college's students are in-state residents. Approximately 9% of our student body consists of out-of-state students, and historically only highly qualified nonresidents are invited for an interview and considered for admission to the college. Likewise, demographic characteristics (race, gender, socioeconomic factors) need to be examined in future studies to determine if these play a role in performance on the MMI, as well as their impact on experiencing academic difficulty in the pharmacy curriculum.

Despite the significance of our findings, we recognize several limitations to this evaluation. Because MMI, prepharmacy GPA, and composite PCAT score are used in our admissions determinations, we could not observe the academic performance of the entire field of pharmacy applicants. This skewed the analysis to those with relatively higher scores on these measures, resulting in relatively few students who had particularly low GPAs, PCAT scores, or MMI scores.

We also did not have the full academic performance of across all years of the curriculum for students admitted in the latter cohorts. This was partly controlled for in the multivariate models by including the admission year. We did find that those admitted in the last cohort were less likely to experience academic difficulty, which may be attributed to less opportunity among students to encounter one of the factors defining academic difficulty. In addition, student performance on academic vs noncognitive skills was not evaluated separately as it related to academic difficulty.

There could be a difference in performance in the didactic curriculum vs the experiential curriculum as it relates to students' MMI score. Further analysis could determine if the MMI can successfully predict difficulty in both academic skills and noncognitive skills. Differences in MMI scores were not compared for the nine (1.5%) students who were dismissed compared to the 44 (7.5%) delayed-progression students, and these dismissed or delayed students were not compared to the other students who met the criteria for academic difficulty.

Another limitation is that our validated MMI process is comprised of only four cases, whereas other investigators suggest that the ideal number is at least seven.²⁰ Whether using more cases will improve the ability of MMI scores to predict academic difficulty is unknown, but we are exploring the feasibility of expanding to seven cases in the future.

Finally, we note the importance of continuous quality improvement as it relates to the usefulness of our MMI data for our professional pharmacy program. In addition to comparing communication skills across the curriculum with the MMI and objective structured clinical examinations, we can also examine noncognitive skills critical to successful practitioners like empathy and clinical decision making on the P4 summative examination and in introductory pharmacy practice experiences and advanced pharmacy practice experiences.¹⁸

The data allow us to predict success in the curriculum and on the summative examination based on performance of noncognitive skills on the MMI. To this end, the admissions committee plans to implement "flags" for applicants who were enrolled despite falling below a certain threshold on the MMI. By establishing these thresholds, we can identify students at enrollment who are at risk for academic difficulty in the curriculum and tailor early intervention plans to address their needs.

CONCLUSION

This validated MMI process is a useful tool in identifying students at risk for academic difficulty in the professional pharmacy curriculum. Using MMI performance score in concert with prepharmacy GPA, PCAT, and educational history could facilitate the early identification of candidates most likely to succeed in the curriculum and those at risk of academic difficulty and potentially in need of early intervention once enrolled in a school or college of pharmacy.

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