Relationship Between Student Academic and Clinical Performance in Podiatric Medical Education at Des Moines University

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Background: This study was performed to determine whether a relationship exists regarding academic achievement between years 1 and 2 of podiatric medical education at Des Moines University. Furthermore, this study evaluates the relationship between academic performance in the first 2 years and clinical performance in year 3.

Methods: The academic records of four classes (2007–2010, N = 164) were examined for grade point averages and clinical performance scores using pairwise Pearson product moment correlations.

Results: Significant high correlations existed in academic performance scores between year 1 and year 2 for individual classes and pooled data. Significant low to moderate correlations were found between academic performance and clinical performance scores for individual classes and pooled data.

Conclusions: These results help define the relationship between student academic and clinical performance for podiatric medicine students at Des Moines University and suggest that nonacademic characteristics may play a pivotal role in clinical abilities. These characteristics need to be further identified and developed in the academic curriculum. There may be attributes identified that also benefit the admissions process. (J Am Podiatr Med Assoc 102(4): 314-318, 2012)

Research in podiatric medical education is somewhat limited. One area lacking in particular is assessing the relationship between student academic achievement and clinical performance in the podiatric medical school. Information exists in other health professional programs, but the data on this relationship are narrow in scope.

From a historical perspective, several early studies1-4 were published to determine the relationship between student academic performance during the first 2 years of medical school and student clinical performance during the clinical training years of the professional program. More recent studies have been published across all health-related professions designed to determine whether such a relationship exists in health professions education. Although the emphasis of these studies was on assessing undergraduate measures such as grade point averages and Medical College Admission Test scores as predictors of student clinical performance, they also evaluated the academic to clinical performance relationship.5-9

More and more medical educators believe that beyond academic achievement, noncognitive characteristics such as an individual’s personality, interpersonal skills, social consciousness, motivation, and communication skills influence the clinical success of a health professions student.2,4,5,7-9

In reviewing the literature from various health-related professions, grade point average seemed to be sufficiently reliable as an index of performance having a moderate predictive correlation with later clinical performance. The average correlation between first- and second-year performance and clinical performance was $r = 0.52$ and $r = 0.64$, respectively, for 13 consecutive classes (1951–1963) from the University of California School of Medi-
In 1974, Tidd and Conine performed a study of 285 physical therapy graduates of the Indiana University physical therapy program to investigate the relationship between academic achievement and clinical performance. Preprofessional academic achievement and performance in physical therapy courses were evaluated to determine whether any correlation existed with clinical performance. Student clinical achievement was based on clinical ratings from a composite of evaluations by clinical instructors. The results suggest that physical therapy students who performed poorly in their class work during physical therapy school also performed poorly in the clinic. Likewise, students who excelled academically were more likely to do well clinically ($r = 0.39$, $P < .001$). Achievement in physical therapy-specific courses correlated slightly higher with student clinical performance ($r = 0.43$).

A study conducted by Rheault and Shafermich-Coulson in 1988 at the University of Health Science–The Chicago Medical School identified that no such relationship exists between academic achievement in the didactic phase of a physical therapy program and clinical performance when reviewing and analyzing records of 64 physical therapy students at this institution. Academic achievement was based on all courses taken in physical therapy school during the 2-year program compared with student clinical performance during two clinical rotations. The Illinois Consortium for Clinical Education’s Physical Therapy Student Performance Report, a widely accepted measurement tool throughout all physical therapy programs in Illinois, was used to evaluate each student on cognitive and psychomotor performances. Nonsignificant correlations existed between professional academic achievement and clinical competence in physical therapy school ($r = -0.09$, $P > .05$). Consequently, we believe that other attributes may be related to clinical ability, such as problem-solving capabilities, manual dexterity, and personal attitudes.

A more recent study by Opacic in 2003 found similar results when investigating the predictive relationship between student self-efficacy beliefs, perceived outcome values, achievement expectations, academic achievement, and clinical performance in 290 physician assistant students throughout ten physician assistant programs in Pennsylvania. Opacic concluded that student success in the clinic not only depends on educational background but also on aptitude and personal characteristics such as self-efficacy. According to Opacic, self-efficacy can play a vital role in the didactic teaching, clinical teaching, and evaluation of physician assistant student performance as it reflects a student’s personal judgment, thought, and behavioral processes. The only variable found to correlate significantly with student clinical performance was self-efficacy, showing a weak correlation ($r = 0.16$, $P < .01$). Student grade point average during physician assistant school also had a weak correlation and low predictive value to clinical performance ($r = 0.11$) and was found to be nonsignificant. Opacic concluded that clinical performance is associated more with noncognitive variables than with cognitive and academic variables.

In 2009, White et al. attempted to identify the relationship between academic and clinical performance for students at the University of Michigan School of Medicine (n = 1,441). They evaluated the relationship between undergraduate grade point averages, Medical College Admission Test scores, academic achievement/success in first- and second-year courses, and faculty ratings of clinical performance in the Internal Medicine Clerkship completed by all third-year medical students. The Internal Medicine Clerkship was selected as the assessment for clinical performance because it was the longest required clerkship (3 consecutive months) and all of the students received the same standardized assessment. The results demonstrated a high correlation associated with academic success between the first and second year of medical school ($r = 0.74$, $P < .001$). The study also identified academic achievement in years 1 and 2 as having the highest positive correlation with clinical performance in the Internal Medicine Clerkship during the third year of training, most notable with academic achievement during year 2 ($r = 0.39$, $P < .001$). The study identified the positive effect that academic success has on student performance in the clinical phase of the medical school curriculum.

As previously mentioned, although limited published educational research examining academic achievement and clinical performance exists across various health-related professions, we could identify no such educational research reported for podiatric medical education. The purposes of this study were to examine the relationship between academic performance in year 1 of podiatric medical school and academic performance in year 2 and to determine whether academic achievement in the first 2 years of podiatric medical school in the Des Moines University College of Podiatric Medicine and Surgery is related to student clinical performance in year 3.
Methods

The podiatric medicine curriculum at Des Moines University is a 4-year program. The first 2 years are mainly didactic, with the emphasis in years 3 and 4 primarily being clinical. Clinical rotations in year 3 are located in the greater Des Moines area using full-time and part-time faculty. Year 4 clinical rotations occur throughout the United States using an expanded number of clinical preceptors.

Academic and clinical performance data from four cohorts (2007–2010) of podiatric medicine students (N = 202) from the College of Podiatric Medicine and Surgery at Des Moines University were included in this study. Only students completing the program in the usual and customary 4 years were included in this study (n = 164). Students taking more than 4 years to complete the program and students leaving the program for personal or academic reasons were excluded from the study. Attrition for personal and academic reasons typically occurs during year 1 of the program.

Academic achievement for the first and second years of podiatric medical school was based on individual student overall grade point average at the completion of years 1 and 2, respectively. Student grade point average reflects the overall success of courses completed during the respective year and was measured on a percentage scale.

Clinical performance in year 3 was determined by clinician ratings of student performance during clinical rotations using the third-year standardized clinical assessment tool. The evaluation tool was developed by the Office of Clinical Affairs and has been used for many years. Although no formal studies on reliability and validity have been conducted, based on faculty training, faculty comfort, students completing a common clinical curriculum, and many evaluations generated for each student during the year, the College feels that the evaluation process is well developed and reliable in assessing clinical performance. Examples of objectives that the faculty use to evaluate student clinical performance include the ability to communicate with and relate effectively to physicians, staff, and patients in a professional manner; development of a reasonable differential diagnosis and formulation of a reasonable therapeutic plan; case presentations in a concise, clear, and organized manner; and demonstration of evidence of being a self-motivated learner. Students were assessed on a 5-point scale (from 6 to 10) on ten different general objectives evaluating cognitive and noncognitive domains at each of the 12 clinical rotations completed during year 3. A rating of 6 for an objective is considered unacceptable performance for that objective. Students receiving a score of 10 exceeded expectations and had outstanding performance. Except for a 2-week community-based podiatric medicine clinical rotation, all of the students complete identical rotations during year 3 of the program, which provides a level of standardized assessment for this evaluation process. A summary grade was determined from each clinical rotation evaluation by averaging the results of each objective. The third-year overall clinical grade point average was determined by averaging the results from all of the clinical rotations.

Statistical analyses were performed using a commercially available software program (SPSS; SPSS Inc, Chicago, Illinois). Pairwise correlations using the Pearson product moment correlation procedure were run between academic and clinical performance variables for each individual class separately and on the pooled data. A P ≤ .05 was adopted throughout.

Results

Academic and clinical performance data for the student cohorts included in this study demonstrate consistency in the mean academic performance and range of scores for years 1 and 2 and for the clinical performance and range of scores in year 3 (Table 1).

A significant correlation between academic achievement and clinical performance for the Des Moines University podiatric medicine program for the classes of 2007 to 2010 was identified in the pooled data (n = 164). Significant moderate positive correlations were identified between student clinical performance in year 3 and academic performance in year 1 (r = 0.370, P < .01) and year 2 (r = 0.437, P < .01) (Table 2). Significant low to moderate positive correlations were also identified in individual classes between academic performance in years 1 and 2 and third-year clinical performance (Table 2). Academic achievement in year 2 showed a stronger relationship with student clinical success consistently for all four cohorts, suggesting that second-year academic achievement could be a stronger predictor of clinical success.

There was a very strong association between academic performance in the first and second years of the podiatric medicine program. Significant and strong correlations were consistently established across individual classes and for the pooled data (r = 0.950, r² = 0.902, P < .01), concluding that if students are academically successful in their first
year they will continue that level of achievement in the second year of the academic program (Table 3).

The 6- to 10-point clinical assessment scale from a statistical perspective does not affect the relationship between the measures. The variance and distribution of the clinical assessment measure do not change when the scale is modified to a scale from 1 to 5.

Discussion

The purposes of this study were to examine the relationship between academic performance in year 1 of podiatric medical school and academic performance in year 2 and to determine whether academic achievement in the first 2 years of podiatric medical school in the Des Moines University College of Podiatric Medicine and Surgery is related to student clinical performance in year 3. The present study supports the findings from the study by White et al.9 Low to moderate positive correlations at a statistically significant level were identified for each class, independent of one another, for the relationship between academic achievement in the first and second years of study and clinical performance in year 3. This finding was also supported by the pooled data. A conclusion that might be drawn from this is that students having a greater grasp of knowledge acquired during the first 2 years of podiatric medical school at Des Moines University are able to more aptly transition and communicate that knowledge in the clinical setting. This finding may also relate to the confidence that a student may have in approaching patients, clinicians, and staff based on greater mastery of medical knowledge presented in the first 2 years of the curriculum.

There may be academic markers from the undergraduate experience and personal skill sets common to high academically achieving podiatric medicine students who also performed well in year 3 of the curriculum that can be identified and integrated into the admissions process.

Considering the significance of early academic success to future clinical performance, these findings highlight the need for alignment with admissions criteria, the curriculum, and academic instructional support provided to students in years 1 and 2.

The low to moderate correlations found may also suggest that an opportunity exists for students who have not excelled academically in the first 2 years to excel in the clinical component of the curriculum based on noncognitive skill sets that the student is able to use in the clinical setting. The studies by Rheault and Shafernich-Coulson6 and Opacic8 support the potential positive effect that problem-solving capabilities, communication skills, and personal attitudes and characteristics such as self-efficacy have on student clinical performance. The difficulty comes in identifying specific nonacademic skill sets that enhance student clinical performance. If this can be accomplished, special programs or additions to the curriculum can be developed to

Table 1. Academic and Clinical Performance Data by Cohort for Each Year in the Podiatric Medicine Program

<table>
<thead>
<tr>
<th>Year</th>
<th>Class of 2010 (n = 53)</th>
<th>Class of 2009 (n = 45)</th>
<th>Class of 2008 (n = 39)</th>
<th>Class of 2007 (n = 27)</th>
</tr>
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<tbody>
<tr>
<td>Year 1 (%)</td>
<td>84.09 ± 5.60</td>
<td>82.64 ± 4.82</td>
<td>80.64 ± 5.46</td>
<td>83.68 ± 5.89</td>
</tr>
<tr>
<td>(75.23–96.83)</td>
<td>(75.93–93.68)</td>
<td>(67.98–92.64)</td>
<td>(74.99–96.14)</td>
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</tr>
<tr>
<td>Year 2 (%)</td>
<td>85.94 ± 4.99</td>
<td>84.79 ± 4.33</td>
<td>83.20 ± 4.72</td>
<td>85.83 ± 5.81</td>
</tr>
<tr>
<td>(76.56–96.88)</td>
<td>(77.47–94.20)</td>
<td>(77.12–93.13)</td>
<td>(76.01–96.84)</td>
<td></td>
</tr>
<tr>
<td>Year 3 (6–10 scale)</td>
<td>9.01 ± 0.28</td>
<td>8.98 ± 0.33</td>
<td>9.15 ± 0.28</td>
<td>9.19 ± 0.38</td>
</tr>
<tr>
<td>(8.43–9.53)</td>
<td>(8.17–9.64)</td>
<td>(8.64–9.82)</td>
<td>(8.20–9.82)</td>
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</tbody>
</table>

Note: Data are given as mean ± SD (range).

Table 2. Correlations Between Clinical Performance (Year 3) and Academic Performance (Years 1 and 2) in Podiatric Medical School Students for Each Cohort Separately and Pooled

<table>
<thead>
<tr>
<th>Pearson Correlation</th>
<th>All Cohorts (n = 164)</th>
<th>Class of 2010 (n = 53)</th>
<th>Class of 2009 (n = 45)</th>
<th>Class of 2008 (n = 39)</th>
<th>Class of 2007 (n = 27)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between years 1 and 3</td>
<td>0.370&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.559&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.362&lt;sup&gt;b&lt;/sup&gt;</td>
<td>0.358&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.384&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
<tr>
<td>Between years 2 and 3</td>
<td>0.437&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.638&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.445&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.428&lt;sup&gt;a&lt;/sup&gt;</td>
<td>0.423&lt;sup&gt;b&lt;/sup&gt;</td>
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</table>

<sup>a</sup><sub>P < .01.</sub>  
<sup>b</sup><sub>P < .05.</sub>
assist all students in preparation for the clinical training years and beyond.

For individual classes and for all of the classes combined, this study identified the consistency in student academic performance across the first 2 years of the curriculum, when the emphasis is primarily didactic. This is a common finding seen in similar studies conducted for other health professional programs.

To what extent faculty bias influenced the results of this study cannot be quantified. Although official class rank is not shared with clinical faculty involved in completing the clinical evaluations, faculty do participate in the delivery of the podiatric medicine specialty content of the didactic curriculum throughout the first 2 years. These same faculty also submit letters of recommendation on behalf of students in the first semester of year 3 as part of the fourth-year clerkship application process, where student class rank is frequently included in the materials submitted to faculty letter writers. A limitation of this study may be that no formal reliability or validity studies have been performed on the clinical performance evaluation instrument.

Conclusions

The results of this study help clarify the relationship between student academic performance and clinical performance in the College of Podiatric Medicine and Surgery at Des Moines University. Although this study demonstrates the correlation between academic and clinical components of the curriculum at one college of podiatric medicine, it is our hope this will stimulate thought across the podiatric medicine academic community and engage others to consider similar studies designed to help define podiatric medical education within and outside the profession. Additional studies are needed to further identify nonacademic student characteristics and qualities that enhance student performance in the clinical phase of the curriculum. Assessment tools and faculty training in evaluating student clinical performance are critical elements in the process, and future research should focus on these aspects of assessment. Findings from such studies may lead to the development of educational activities designed to enhance student clinical performance. There may be attributes identified that also benefit the admission process. Further investigation into the relationships between preprofessional academic performance and professional school academic performance and between preprofessional academic performance and clinical performance may also be beneficial to enrolling a highly qualified cohort of students.

Financial Disclosure: None reported.
Conflict of Interest: None reported.

References