How Valid is the MCAT Score in Predicting Success in Medical School for High Performing Masters Students?

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Introduction

The MCAT’s ability to predict success in medical school has been contradictory and unclear

- Some of the studies that addressed this debatable value of the MCAT are
  - Vancouver and colleagues (1989): significant correlations between the MCAT score, USGPA and students’ performance in the preclinical years of medical school
  - Evan and Wen (2005): MCAT is of limited value in predicting global academic performance in medical compared to uGPA
  - Donnon et al (2007): MCAT provides only a small to moderate value in assessing students’ readiness for medical school
  - Dixon (2012): the biological MCAT score had the highest correlation among preadmission variables with the above indicated board tests.
  - Dunleavy et al (2013): both MCAT and overall GPA have to be taken into consideration in predicting success in medical school
  - Lynch et al. (2009): no correlation between the UKCAT scores and students’ performance in the first year of medical school
  - Eskander et al (2013): not all medical schools require an MCAT score. MCAT scores are more reflective of wealth than preparedness which compromises the validity of the exam as a standardized measure for admissions to medical schools
There is a need for another admission parameter

Post bac:

- *Giordani et al (2001)*: regardless of their low uGPA and low MCAT scores, student who completed a post-bac program demonstrated competency that was consistent with that of traditional matriculants.
- *Reeves et al (2008)*: students who completed the post-bac program at TCOM had an overall GPA higher than those of their classmates in the first year of medical school.
- *Keith and Hollar (2012)*: 86% of the students who received the pre-medical intensive course have successfully earned MD degrees “despite having significantly lower MCAT scores and undergraduate GPA compared to all United States medical school applicant: MCAT scores had little relationship with student’s success”.

It appears that the performance on any type of post-bac or pre-medical school preparatory program is a better predictors of success in medical school than the MCAT score.
Purpose of the Study

• TUNCOM- offers a masters program from which students who qualify can matriculate to the osteopathic medical school.
  – Majority of the first year courses: Anatomy, medical biochemistry, physiology, and histology
  – The same assessments (same exam questions)
  – Ranked within the OMS1 students
  – If within the top 50%, offered guaranteed seat as long as the MCAT requirement is met

Which admission parameter should be given more weight when admitting *high performing masters students*?

1. MCAT Score
2. Graduate GPA
Study Design

• Sample:
  – Five cohorts (MHS10 - MHS14) of students who were admitted (DO14-DO18)
  – A total of 39 participants
  – 26 out of the 39 students were high performing students
    • GPA of 3.35 or higher at the end of the MHS academic year
  – 33 out of the 39 students earned the required MCAT scores or higher for admission to the College of Osteopathic medicine

• Tools of Study:
  – All statistical analysis were performed using built-in data analysis function in Microsoft Excel, Sigma Plot, and R-software
Data obtained from registrar's office and de-identified:
- GPAs earned at the end of the MHS program
- MCAT scores
- GPA earned at the end of OM 1
- GPA at the end of OMS 2
- COMLEX score Step 1
- COMLEX score Step 2

Statistical Analysis
- Analysis of Variance (ANOVA) was used for the GPAs, COMLEX 1 and COMLEX 2 scores of participants from each cohort
- Normally distributed data were further analyzed using Pearson Product Moment Correlation Coefficient, r and P values were reported
- Non-normally distributed data were further analyzed using Spearman’s Rank Correlation Coefficient, $r_s$ and $P_s$ values were reported
Formulas

- For the purpose of graphic display, the MCAT scores and the COMLEX scores were converted to a 4 point scale using the following formulas:

\[
\text{Actual MCAT Score} \times 4 = \frac{\text{Actual MCAT Score}}{45} \times 4
\]

\[
\text{Actual COMLEX Score} \times 4 = \frac{\text{Actual COMLEX Score}}{999} \times 4
\]
Results

• For all participants, we looked into the correlation between:
  • The MCAT score and OMS1 GPAs & OMS2 GPA
  • The MCAT score and COMLEX 1 & 2 scores
  • The GPAs earned at the end of the MHS program and OMS1 GPA, OMS2 GPA,
  • The GPAs earned at the end of the MHS program and COMLEX 1 & 2 scores
OMS GPA vs MCAT Score

Fig 1. OMS1 GPA vs MCAT Score: there is **no significant correlation** between the MCAT score and OMS1 GPA ($P_s=0.825$)

$$r_s = 0.037$$

Fig 2. OMS2 GPA vs MCAT Score: there is **no significant correlation** between the MCAT score and OMS2 GPA ($P_s=0.679$)

$$r_s = 0.077$$
OMS GPA vs MHS GPA

Fig 3. OMS1 GPA vs MHS GPA: there is a significant correlation between the MHS GPA and OMS1 GPA (P=0.0003)

Fig 4. OMS2 GPA vs MHS GPA: there is a significant correlation between the MHS GPA and OMS2 GPA (P=0.0001)
COMLEX Score vs MCAT Score

Fig 5. COMLEX 1 Score vs MCAT Score: there is no significant correlation between the MCAT scores and COMLEX 1 scores (P=0.599) with $r = 0.116$.

Fig 6. COMLEX 2 Score vs MCAT Score: there is no significant correlation between the MCAT scores and COMLEX 2 scores ($P_s=0.631$) with $r_s = -0.116$. 
Fig 7. COMLEX 1 Score vs MHS GPA: there is a significant correlation between the MHS GPA and COMLEX 1 scores ($P=0.0010$)

Fig 8. COMLEX 2 Score vs MHS GPA: there is a significant correlation between the MHS GPA and COMLEX 2 scores ($P=0.0124$)
Fig 9. Comparisons of MCAT, GPA, OMS1, and OMS2 scores for MHS students from each cohort. There is no significant difference in any performance among MHS students from different cohorts ($P_{MCAT} = 0.515$, $P_{GPA} = 0.061$, $P_{OMS1} = 0.090$, and $P_{OMS2} = 0.565$). There is a consistent relationship between the performance in MHS program and the performance in the first and second years of Medical School.
Results with focus on high performing students

For High Performing MHS Students (HPS) only, we looked into the correlation between:

- The MCAT score and OMS1 GPAs, OMS2 GPA
- The MCAT score and COMLEX 1 & 2 scores
- The GPAs earned at the end of the MHS program and OMS1 GPA, OMS2 GPA,
- The GPAs earned at the end of the MHS program and COMLEX 1 & 2 scores

* High Performing MHS Students: students who earned a minimum GPA of 3.35 at the end of the masters program
Fig 10. This graph demonstrates that there is **no significant correlation** between the MCAT scores and the OMS1 GPA ($P_s = 0.436$).

Fig 11. This graph shows that there is **no significant correlation** between the MCAT scores and the OMS2 GPA ($P_s = 0.544$).
GPAs of High Performing MHS Students vs OMS GPA

Fig 12. This graph reveals a high correlation between the GPAs of high performing MHS students and their OMS 1 GPAs ($P_s = 0.000226$)

Fig 13. This graph shows a high correlation between the GPAs of high performing MHS students and their OMS 2 GPAs ($P = 0.00089$)
Fig 14. This graph demonstrates that there is no significant correlation between the MCAT scores and the COMLEX 1 scores ($P_s = 0.928$).

Fig 15. This graph shows that there is no significant correlation between the MCAT scores and the COMLEX 2 scores ($P_s = 0.639$).
Fig 16. This graph demonstrates **a significant correlation** between the GPAs of high performing MHS students and their COMLEX 1 scores (P=0.0202)

Fig 17. This graph demonstrates that there **no significant correlation** between the GPAs of high performing MHS students and their COMLEX 2 scores (P=0.401)

This lack of correlation may be due to a low sample
Consistency of Performance With Focus on HPS

Fig 18. Comparisons of MCAT, High MHS GPA, OMS1, and OMS2 GPAs for MHS students from each cohort. There is no significant difference in any performance among MHS students from different cohorts ($P_{MCAT} = 0.149$, $P_{High GPA} = 0.229$, $P_{OMS1} = 0.974$, and $P_{OMS2} = 0.851$). There is a consistent relationship between the GPAs of High Performing MHS students and their performance in the first and second years of Medical School.
Discussion and Conclusion

• There is no significant correlations between the MCAT score, even when it high, and the performances in the preclinical and clinical years of medical school
  
  – These results contradict the early findings by Vancouver and colleagues, which presented the MCAT as a predictor of success
  
  – As noted by Keith and Hollar, Giordani et al, and Reeves et al, the incorporation of an additional parameter in admission such as performance in a post-baccalaureate (post-bac) or the MHS program would be more indicative of successful completion of medical school
Discussion and Conclusion

• The exposure to disciplines taught in medical school that students gain in the MHS program makes the performance in this program a better indicator of success than the MCAT score.

• Although we were not able to find a significant correlation between the GPA of HPS and the score on COMLEX 2, due to small sample, it is safe to conclude that high performing MHS students tend to do better in both the pre-clinical and clinical years of medical school.

• It is advisable that admissions committee at medical schools re-evaluate the admissions criteria for high performing MHS and/or post-bac students by giving more weight to the GPA earned in these programs compared to the MCAT and uGPA.
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References

• Will be provided upon request:

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Thank you!

Any questions?