4-2016

Self-Reported Study Habits for Enhancing Medical Students' Performance in the National Medical Unified Examination

Amr Idris
University of Kentucky, amr.idris@uky.edu

Tareq Al Saadi
Damascus University, Syria

Basel Idris
University of Kentucky, basel.edris@uky.edu

Bisher Sawaf
Syrian Private University, Syria

Mhd. Ismael Zakaria
Syrian Private University, Syria

See next page for additional authors

Click here to let us know how access to this document benefits you.
Follow this and additional works at: https://uknowledge.uky.edu/internalmedicine_facpub

Part of the Medical Education Commons

Repository Citation

Authors

Amr Idris, Tareq Al Saadi, Basel Idris, Bisher Sawaf, Mhd. Ismael Zakaria, Mahmoud Alkhatib, and Tarek Turk

Self-Reported Study Habits for Enhancing Medical Students' Performance in the National Medical Unified Examination

Self-reported study habits for enhancing medical students' performance in the National Medical Unified Examination

Amr Idris[1,2], Tareq Al Saadi[3], Basel Edris[2,3], Bisher Sawaf[1], Mhd. Ismael Zakaria[1], Mahmoud Alkhatib[3], Tarek Turk[3]

[1]Department of Internal Medicine, Syrian Private University, [3]Department of Internal Medicine, Damascus University, Damascus, Syrian Arab Republic, [2]Department of Internal Medicine, University of Kentucky, Lexington, Kentucky, USA

ABSTRACT

Background: The National Medical Unified Examination (NMUE) is currently required for graduation, joining postgraduate medical training, and practicing medicine in Syria. **Objective:** To investigate self-reported study habits that correlate with high performance on the NMUE. **Methods:** First through 3rd year residents at the three main hospitals in Damascus, Syria, were asked to complete a retrospective cross-sectional survey investigating their study habits and previous scores. **Results:** Significantly higher score was associated with >15 study h/day and allocating 1–40% of study time for practicing questions. Mean NMUE score was not significantly different in relation to preparation months for examination or for those who reported spending all their time studying alone compared with spending any amount of time in a group setting. Scores of 231–240 on the Syrian scientific high school exam correlated with significantly higher NMUE performance compared with fewer scores, except scores of 221–230. For every 10 point increase in medical school cumulative grades, the NMUE score increased 3.6 (95% confidence interval 2.5–4.8). **Conclusion:** The NMUE score was significantly affected by hours spent studying per day, number of practice questions completed, percentage of study time allocated for doing questions, Syrian scientific high school exam scores, and the cumulative medical school class grades. It was not significantly affected by preparation months or studying in a group setting. More studies are needed to further describe and investigate the factors that might affect performance in the NMUE.

Key words: Medical examination, medical students, National Medical Unified Examination

INTRODUCTION

Medical education in the Syrian universities consists of a 6-year educational program. In the first 3 years, students take basic sciences-related subjects. The 4th and 5th years are for the clinical subjects, while the 6th year is dedicated solely for clinical training in the university hospitals.

Admission to the medical schools in Syria is based on the scores of the Syrian scientific high school exam, which is a standardized exam that has a maximum score of 240. The cut-off score for admission to one of the Syrian medical school differs by the medical school and varies from year to another depending on the number of the applicants.

At the end of the program, students are required to pass a standardized medical test called the National Medical Unified Examination (NMUE) or the Syrian national medical examination in order to graduate and obtain a

Address for correspondence: Dr. Amr Idris, Faculty of Medicine, Syrian Private University, P.O. Box 36822, Damascus, Syrian Arab Republic.
E-mail: amr.idris@uky.edu

doctor of medicine degree. This exam is also required for those who graduate from foreign medical schools to obtain a license to practice medicine in Syria.[1] To be eligible for taking the NMUE, students have to fulfill all the requirements in their medical schools, including completing the 6-year medical education program and passing exams of all medical subjects in that program. NMUE has a minimum passing score of 60%. The average of subjects' scores of each year is the score of that year. The cumulative medical school class grade is calculated by averaging the scores of the first 5 years of study. The final graduation score is calculated by averaging the cumulative medical school class grade and the NMUE score.

The NMUE consists of two parts. The first part is a practical exam in which students are interviewed by committees of professors. The interviews cover all the essential medical specialties, including internal medicine, surgery, pediatrics, obstetrics and gynecology, ophthalmology, ear nose and throat, and dermatology. The interviews can be done at the ending of each corresponding rotation throughout the 6th year of medical school or right before the second part of the NMUE. Each interview has a mark out of 30, and an average of 18 is needed for passing this part and being eligible to take the second part. The score of this part is not added to the final NMUE score, and thus we did not investigate it in our study. The second part is a 2-day paper-based multiple-choice examination. It tests the principles of clinical science and includes 240 questions in total. The 1st day of the examination focuses on internal medicine, pediatrics, dermatology, and laboratory medicine. The 2nd day focuses on surgery; obstetrics and gynecology; ear, nose, and throat; and ophthalmology. In each day, students are asked to answer 120 Arabic-written questions covering the material being tested on that day, and they are allowed to have 120 min to complete the questions in each exam day. The minimum passing score is 60%. Passing the first practical part gives the student four chances to pass the second paper-based part. If one failed all those four chances, he is required to repeat the first practical part in order to be eligible again. Examination committees broadly representing the medical professions prepare the material to be tested in the exam. The committees comprise recognized experts in their fields and include members from all seven Syrian medical schools.[1] The center for measurement and evaluation in higher education provide a students' guide to NMUE explaining the objectives and the nature of the NMUE, and listing the knowledge and skill areas that are covered by the NMUE. This guide also contains some examples about the NMUE questions to familiarize the students with the exam.[2]

The NMUE is conducted 3 times/year. Medical students are given the choice to take the test on one of three separate test occurrences during the year. The exact dates of the test occurrences are decided by the Syrian Ministry of the Higher Education and may change from year to year but roughly fall into March, August, and November of each year. Most of the Syrian medical schools' final-year ends in June or July; making the test in August the first chance for the majority of medical students to pass the NMUE.[1] Students usually have about 3 months between the end of the 6th years rotations and the NMUE to prepare. However, many students begin their preparation for the NMUE from the beginning of the 6th year, giving them about 1 year to complete their preparation. The test should be taken in one of the four centers that cover most of the areas in Syria. These test centers are Aleppo (North region), Lattakia (West region), Homs (Middle region), and Damascus (South region). The students should take the NMUE at the same time during the exam day in all the test centers.

After successfully graduating from the medical school, the new doctors can apply for doing a residency and postgraduate training in the university hospitals that are related to the Ministry of Higher Education or in the community hospitals that are related to the Ministry of Health. Acceptance for residency depends on a special score that is calculated depending on the final graduation score and the NMUE score. The cut-off value differs according to the kind of hospitals (university or community hospital), the location of the hospital, and the number of the applicants each year. Thus, competitive postgraduate positions require high scores.

Passing the NMUE and getting high scores are important to Syrian medical students as it will affect their academic and professional future. While passing the exam is needed to graduate, a high score is essential in order to get a spot in a competitive postgraduate position. The exam is considered challenging for many medical students. There are different opinions about the ideal preparation for the exam, leaving many students unsure how to prepare for it. Little is known about what predicts a higher score. For example, many students argue that the general academic performance in medical school would guarantee a high NMUE score. However, there are instances where a student can excel academically in medical school and yet cannot achieve a passing score on the NMUE. On the other hand, there are students who have academic difficulty in medical school but pass the NMUE with a high score. Any knowledge that can further describe the best way for students to prepare for this examination would be of a tremendous benefit

to all test takers. The primary objective of this study is to characterize the self-reported study habits that medical students used during preparation for the NMUE and to determine which of these reported habits, if any, correlate with a higher passing score.

METHODS

Study design

In May 2015, a retrospective, cross-sectional, self-administered survey regarding the habits of studying for the NMUE was given to the subjects.

Participants

The study cohort consisted of medical residents in their 1st, 2nd, and 3rd year postgraduate training, who passed the NMUE between 2012 and 2015.

Data collection

We chose three random days in May 2015 to collect the data at three main hospitals in Damascus: Al-Mowasat Hospital, Children's Hospital, and Damascus Hospital; a day for each hospital. The questionnaire was distributed during the morning report sessions, and the participants were asked to return the completed surveys by the end of the morning report session in which the questionnaires were handled to them.

Before the distribution of the questionnaire, the objectives of the study were explained to the participants, along with information about how the data would be processed. Any question or concern they had about the survey had been answered. They were informed that their participation was voluntary and anonymous and that ultimately the results of this research might be published in one of the medical journals. Participants were asked to provide their scores and to estimate their study habits based on their memories, which may have resulted in a recall bias that is discussed in the limitation paragraph of the discussion section.

The questionnaire

We used a self-completed questionnaire that consisted of nine questions written in Arabic language. The questions asked about the university from which the participant was graduated, the scores of the Syrian scientific high school exam, the cumulative medical school class grades, and the scores of the NMUE. The questionnaire also contained questions about study habits that students had used in their preparation for the NMUE, including the average number of studying hours per day, the total period of preparation (in months), the total number of practice questions completed, the percentage of preparation time

that was spent doing practice questions, and the percentage of preparation time that was spent studying in a group setting. The questions about tests scores were open-ended questions, while questions about university and study habits were multiple-choice questions. Table 1 contains an English translated copy of the survey.

Participants were told that answers for the total study months, study hours, number of study questions, and use of study groups should be provided based on their best estimates and their memories because there is no other reliable source for this kind of information. For the total study months, they were asked to estimate the period during which they focused their study toward only the NMUE.

The used questionnaire was not piloted. It was modeled on a survey that was used in a previous study that had a similar design to our study and was conducted to assessing the self-reported study habits in those who took the United States Medical Licensing Exam (USMLE) Step 1 exam.[3] A thorough comparison between the NMUE and the USMLE Step 1 exam can be found in the discussion section.

Statistical analysis

Data were coded, entered, and analyzed using the Statistical Package for Social Science version 20.0 (SPSS, Chicago, IL, USA). Measures of the central tendency were calculated for continuous variables and expressed as a mean ± standard deviation (SD). In order to assess overall differences in score by study habit answer groups, a one-way analysis of variance was performed. To assess score differences between two specific answer choices, bonferroni *post hoc* test was used. Tests were considered significant when $P < 0.05$. Finally, we used linear regression analysis with point estimates and confidence intervals in order to assess the NMUE score change per every 10 points change in the Syrian scientific

Table 1: English translated copy of the survey used in this study
Question
1. What was the university that you graduated from?
2. What was your score in NMUE?
3. Please estimate the average number of hours per day that you spent studying for the NMUE
4. How long was your preparing for the NMUE?
5. Please estimate the number of practice questions that you completed during your NMUE preparation
6. Approximately what percentage of your test preparation was spent doing practice questions?
7. Please estimate the percentage of time you spent studying in a group setting
8. What was your score in the Syrian scientific high school exam?
9. What was your cumulative class grade during your medical school (during the first 5 years of medical school)?
NMUE: National Medical Unified Examination

high school exam score and in the cumulative medical school class grade.

Ethical issues

The study obtained an oral approval from the officials of the hospitals in which the data collection took place. All procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008.

RESULTS

Respondents

A total of 258 medical residents responded to the survey, 12 of them were excluded because of incomplete responses.

National Medical Unified Examination score

The mean and SD of NMUE scores for all of the participants were 69.5 and 7.4, respectively. The mean NMUE score for the Damascus University graduates was significantly higher compared with the total mean NMUE score for all other participants. The average score of the graduates from the Kalamoon University Faculty of Medicine, Syrian Private University, and foreign medical school were significantly lower than the total mean NMUE score for all participants. There was no significant difference in the average NMUE score for the University of Tishreen Faculty of Medicine and Al-Baath University Faculty of Medicine from the total mean NMUE score.

Hours spent studying

The residents estimated spending a mean (SD) of 7.8 (3.62) h/day studying for the examination. The mean NMUE score was significantly higher in respondents who reported studying for more than 15 h/day compared with 0–3 h/day, 4–7 h/day, 8–11 h/day, and 12–15 h [Table 2]. There was a significant difference in respondents who reported studying 12–15 h/day compared with 0–3 h/day, 4–7 h/day, and 8–11 h/day. However, the mean NMUE score was not significantly different between residents who reported studying 0–3 h, 4–7 h, and 8–11 h/day [Table 2]. The effect of the hours spent studying on the NMUE score was significant ($P < 0.01$) [Table 2].

Months of preparation

On average, the residents estimated spending a mean (SD) of 4.36 (3.08) months to prepare for the examination. The mean NMUE score was not significantly different between residents who studied 0–3 months, 4–7 months, 8–12 months, and more than 1 year [Table 2]. The effect of the number of preparation months on the NMUE score was not significant ($P = 0.21$) [Table 2].

Practice questions

The respondents estimated completing a mean (SD) of 1700 (1380) practice questions during their NMUE preparation. The mean NMUE score was higher in graduates who reported completing 1–2000 practice questions compared with those who completed 2000–4000 [Table 2]. The mean NMUE score was higher in those who reported completing more than 4000 practice questions compared with those who completed 2000–4000, but there was no difference between those who completed <2000 questions and those who completed more than 4000 questions. The effect of the number of practice questions completed on the NMUE score was significant ($P < 0.001$) [Table 2].

The mean (SD) study time that was spent doing practice questions was 33.57 (22.53) h. Allocating 1–40% of study time for practice questions was associated with a significant increase in the mean NMUE score when compared to allocating 41–80% of study time for that purpose. The effect of the percentage of study time allocated for doing questions on the NMUE score was significant ($P = 0.019$) [Table 2].

Group studying

The participants estimated that they spent a mean (SD) of 26.01% (27.3) of their study time in a group setting. There was no significant difference in the mean NMUE score based on the frequency of group studying ($P = 0.47$) [Table 2]. There was no significant difference in the score for those who reported spending all of their time studying alone compared with spending any amount of time in a group setting.

Syrian scientific high school exam

The mean (SD) Syrian scientific high school exam score for all of the participants was 228.98 (11.22). The mean NMUE score was significantly higher in respondents who had Syrian scientific high school scores between 231 and 240 compared to those with scores <220 [Table 2]. However, there was no significant difference between respondents who had scores between 231 and 240 and those with scores between 221 and 230. There was no significant difference in the mean NMUE score between respondents who had Syrian scientific high school exam score between 221 and 230 and those that scored <200, between 200 and 210, and between 211 and 220. The effect of the Syrian scientific high school exam scores on the NMUE score was significant ($P < 0.001$) [Table 2]. Analyzing the data revealed that for every 10 point increase in the Syrian scientific high school exam score, the NMUE score increased by 3.7 points (r = 0.37, $P < 0.0001$).

Cumulative medical school class grades

The mean (SD) cumulative medical school grades for all of our participants were 75.07 (7.6). The effect of the

Table 2: The relation between National Medical Unified Examination score and study habits, Syrian scientific high school exam score and cumulative medical school class grades

Variable: Mean (SD)	n=246	Mean score NMUE (SD)	P
Number of hours spent studying per day		Total: 7.8 (3.62)	0.0029
A. 0-3	A. 24	A. 66.47 (6.37)	A versus B >0.05
B. 4-7	B. 100	B. 68.62 (6.44)	A versus C >0.05
C. 8-11	C. 86	C. 69.03 (6.93)	A versus D <0.001
D. 12-15	D. 26	D. 73.11 (8.03)	A versus E <0.0001
E. >15	E. 10	E. 79.8 (10.37)	B versus C >0.05
			B versus D <0.001
			B versus E <0.0001
			C versus D <0.05
			C versus E <0.0001
			D versus E <0.05
Number of preparation months		Total: 4.36 (3.08)	0.21
A. 0-3 months	A. 118	A. 69 (8.05)	A versus B >0.05
B. 4-7 months	B. 90	B. 70.31 (6.51)	A versus C >0.05
C. 8-12 months	C. 32	C. 70 (7.37)	A versus D >0.05
D. >1 year	D. 6	D. 64.5 (0.54)	B versus C >0.05
			B versus D >0.05
			C versus D >0.05
Number of questions completed		Total: 1700 (1380)	<0.0001
A. 0	A. 0	A. 0	-
B. 1-2000	B. 158	B. 70.03 (7.19)	B versus C <0.001
C. 2000-4000	C. 44	C. 66.68 (6.37)	B versus D >0.05
D. >4000	D. 44	D. 70.38 (8.49)	C versus D <0.05
Percentage of study time doing questions (%)		Total: 33.57 (22.53)	0.019
A. 0	A. 0	A. 0	-
B. 1-40	B. 175	B. 69.98 (7.38)	B versus C <0.05
C. 41-80	C. 64	C. 68.1 (6.98)	B versus D >0.05
D. 81-100	D. 7	D. 69.85 (10.66)	C versus D >0.05
Percentage of study time in group (%)		Total: 26.01 (27.3)	0.47
A. 0	A. 79	A.70.16 (7.6)	A versus B >0.05
B. 1-40	B. 101	B. 69.76 (6.96)	A versus C >0.05
C. 41-80	C. 58	C. 68.29 (8.12)	A versus D >0.05
D. 81-100	D. 8	D. 68.25 (4.62)	B versus C >0.05
			B versus D >0.05
			C versus D >0.05
Syrian scientific high school exam		Total: 228.98 (11.22)	<0.0001
A. <200	A. 8	A. 61.12 (9.28)	A versus B >0.05
B. 200-210	B. 13	B. 63.38 (4.17)	A versus C >0.05
C. 211-220	C. 23	C. 65.87 (5.17)	A versus D >0.05
D. 221-230	D. 27	D. 67.7 (5.64)	A versus E <0.0001
E. 231-240	E. 175	E. 71.08 (7.31)	B versus C >0.05
			B versus D >0.05
			B versus E <0.001
			C versus D >0.05
			C versus E <0.001
			D versus E >0.05
Cumulative medical school class grades (%)		Total: 75.07 (7.6)	<0.0001
A. 60-70	A. 47	A. 64.42 (4.1)	A versus B <0.0001
B. 70.1-80	B. 155	B. 69.8 (6.96)	A versus C <0.0001
C. 80.1-90	C. 44	C. 74.93 (7.01)	B versus C <0.0001
D. Above 90	-	-	-

P value is considered significant when it is <0.05. NMUE: National Medical Unified Examination, SD: Standard deviation, *n*: Number

cumulative medical school class grades on the NMUE score was significant ($P < 0.001$) [Table 2]. Table 2 shows that the mean NMUE score was significantly higher in respondents who had cumulative medical school grades between 80% and 90% compared to 70.1–80.1% and 60–70%. Similarly, the mean NMUE score was significantly higher in respondents who had cumulative medical school grades between 70.1% and 80.1% compared to 60–70%. For every 10 point increase in the cumulative medical school class grade, the NMUE score increased by 3.6 points [Figure 1] ($r = 0.36, P < 0.0001$).

DISCUSSION

To our knowledge, this is the first study that investigates the study habits for the NMUE in Syria. Describing the study habits that correlate with a high score on the NMUE will
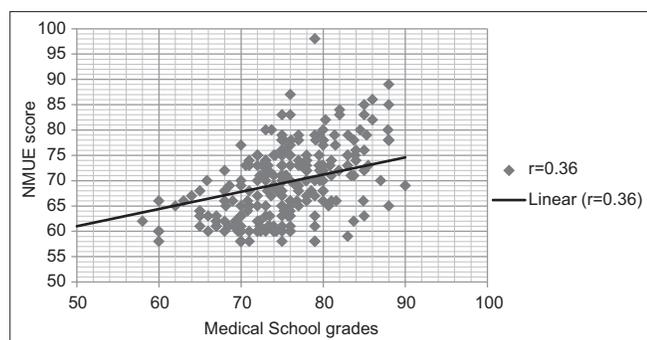
Figure 1: The relationship between the cumulative medical school class grades and the National Medical Unified Examination scores. The figure represents the participants National Medical Unified Examination score in relation to their medical school grades. The straight line shows that the average National Medical Unified Examination score increases by 3.6 points (r = 0.36, *P* < 0.0001) for every 10 point increase in the average cumulative medical school class grade for participants. NMUE: National Medical Unified Examination

be a great benefit to medical students who prepare for this exam in the future.

Students use many resources to prepare for the NMUE; some students depend on notes written by other senior students to prepare for the NMUE, while others review the clinical curriculum which they studied during the 4th and 5th years of the medical school. Sometimes, students attend courses and lectures organized by other senior students or by professors and are covering some clinical subjects of the NMUE. In addition, there are some students who prepare for the international medical exams, like USMLE or Professional and Linguistic Assessments Board, while they prepare for the NMUE, and they depend on studying materials for those international exams to pass the NMUE. Differences in the preparation materials were considered out of our study's scoop and were not investigated.

Effect of hours spent studying and months of preparation

A previous study showed that the quantity of study time has no relationship to exam performance and that increased study time may lead to loss of efficient studying and increased fatigue.[4] That concept did not match the results of our study regarding hours spent studying per day; significantly higher NMUE scores were associated with increased number of hours spent studying per day when that number exceeded 11 h. On the other hand, comparing NMUE scores of the participants through the number of months they spent preparing for the exam did not yield any significant differences.

Although learning medicine involves a considerable amount of memorization, the need to spend many hours studying each day in order to get a high NMUE score may indicate that the students are depending on memorization in their

preparation. Following this theory, we may conclude that the NMUE itself may be promoting cramming and memorization rather than deep learning and obligating students to spend upward of 12–15 h for optimum results. These results also indicate that even after 6 years in medical school, students still have to spend long hours preparing for the graduation exam (the NMUE); suggesting ineffective learning modalities acquired during that period. The lack of a relationship between the number of months of preparation time and NMUE scores can be explained by the nature of the exam and the differences in learning capacity among students. In addition, longer study durations may be associated with increased forgetfulness, while shorter durations may limit incorporating more study materials in preparation.

Effect of practice questions

The importance of practicing questions for exams has been well described in the literature. Studies demonstrated that having a test right after reading a passage leads to better long-term retention than repeatedly studying the passage.[5] Furthermore, getting tests along with corrective feedback is associated with significantly improved performance.[6,7] Using practice questions for exam preparation may be particularly helpful. This activity promotes the skills needed for memory retrieval during the exam and enhances retention on both explicit and implicit memory tests.[8]

Participants in this study varied widely in the number of practice questions practiced during the preparation for the NMUE. There was no significant difference in NMUE scores between those who estimated completing between 1 and 2000 practice questions and those who estimated completing more than 4000 practice questions. However, participants in both of these groups had significantly higher NMUE scores compared to those who estimated completing between 2000 and 4000 practice questions. In addition, the data revealed that specifying 1–40% of the study time for practicing questions is associated with higher NMUE scores than specifying more than that time for questions. Nevertheless, no other relationships were revealed regarding the time specified for practicing questions. These data suggest there is no clear relationship between practicing questions and scores on the NMUE and apparently contradicts the facts demonstrated in previous studies about practicing questions for exams.[5-8] One possible explanation for these results is that practicing fewer questions, and thus spending less time on that activity will provide a greater time for memorizing materials for the exam and will thus lead to higher scores. This explanation supports the idea that success on the NMUE depends on memorization to a greater extent than depending on other learning skills like problems solving, which can be achieved by doing practice questions.

The questions that are being practiced by the students are mainly derived from the NMUE exams that were conducted in previous years. Considering that the NMUE might include some repeated questions from past exams, completing more than 4000 questions would potentially increase the chance of facing the same questions in the real exam, leading to a higher score. Further investigations and thorough research about confounding factors may be necessary to increase the knowledge about the role of practice questions in preparation for the NMUE.

Effect of group studying

Studying in a group setting is a preferable study habit for some students. While some studies found it to be associated with higher performance,[9] participants in our study who reported spending any amount of time studying in a group setting did not have a significantly higher NMUE score than those who studied alone all the time. The lack of a significant positive effect for group studying may be caused by inefficient studying methods in study groups, which may involve wasting time with peers and lack of organization.

Effect of Syrian scientific high school exam and cumulative medical school class grades

The relationship between the Syrian scientific high school exam and the NMUE in Syria can be compared with the relationship between the Medical College Admission Test (MCAT) and the USMLE Step 1 in the United States. The Syrian scientific high school exam and MCAT are required for admission into medical school in Syria and the United States, respectively. Several studies suggested that MCAT scores are the best predictor of passing Step 1.[10-13]

In our study, data revealed that the higher the Syrian high school exam score, the higher the NMUE score. However, the differences were significant only between Syrian high school exam score of 231–240 and scores <220. These results indicate that having a score >220 in the Syrian high school exam does not significantly affect the academic performance in the NMUE.

A similar relationship was revealed between the cumulative medical school class grades and the NMUE scores, where higher NMUE scores are associated with cumulative medical school class grades. This finding is logical considering that the NMUE covers most of the subjects that were taught during medical school, so having a good academic performance in medical school, reflected by higher cumulative medical school class grades, will lead to higher MNUE scores.

Limitations

Our study did not investigate other possible influential factors such as learning capacity, differences in preparation materials, and motivation of students. Such factors are more difficult to assess and usually possess some ambiguity among participants. However, it would definitely be beneficial to evaluate such variables in future studies. The recall bias may be one of the major limitations to our study since residents were questioned after up to 3 years from taking the NMUE and there might a different range of recalling bias between the 1st, 2nd, and 3rd year residents depending on how recently they took the exam. We did not gather data about how recent the residents have took the NMUE, and we did not account for the differences in the period between taking the NMUE and the time of the study. In addition, the results of our study are based on the participants' estimations that can be very subjective, necessitating cautious interpretation of the results.

Although the NMUE is a standardized exam which scores should ideally be comparable across different occurrences, differences in the difficulty between exams may represent a confounding factor that affect the results. We included participants from the major university hospitals in only one city in Syria. Although these participants originally came from different medical schools across the country and outside Syria, residents in other cities in Syria may have different characteristics. This potential selection bias may limit the generalizability of the results.

CONCLUSION

Among the investigated factors and study habits, significantly higher NMUE scores were associated with spending more than 15 h/day studying and spending 1–40% of study time practicing questions. The total number of months spent preparing for the exam and studying in groups did not have any relationship to the NMUE score.

The relationship of the number of questions practiced to the NMUE score was not clear and needs to be investigated in future studies. The NMUE score was positively proportional to the cumulative medical school class grades and Syrian scientific high school exam.

Conflicts of interest

There are no conflicts of interest.

REFERENCES

1. Dashash M. National Medical Unified Examination for Syrian and Foreign Medical Schools. The Center for Measurement & Evaluation in Higher Education. Available from: http://www.cme-edu.net/English/. [Last retrieved on 2015 Apr 16].

2. The Center for Measurements and Evaluation in Higher Education. Your Guide to National Medical Unified Examination (NMUE). The Center for Measurements and Evaluation in Higher Education. Damascus, Syria; 2014.

3. Kumar AD, Shah MK, Maley JH, Evron J, Gyftopoulos A, Miller C. Preparing to take the USMLE step 1: A survey on medical students' self-reported study habits. Postgrad Med J 2015;91:257-61.

4. Plant A, Ericsson KA, Hill L, Asberg K. Why study time does not predict grade point average across college students: Implications of deliberate practice for academic performance. Contemp Educ Psychol 2005;30:96-116.

5. Roediger HL, Karpicke JD. Test-enhanced learning: Taking memory tests improves long-term retention. Psychol Sci 2006;17:249-55.

6. Kang SK, McDermott KB, Roediger HL. Test format and corrective feedback modulate the effect of testing on memory retention. Eur J Cogn Psychol 2007;19:528-58.

7. Kiewra KA, Benton SL. The effects of higher-order review questions with feedback on achievement among learners who take notes or receive the instructors' notes. Hum Learn 1985;4:225-31.

8. Roediger HL 3rd, Gallo DA, Geraci L. Processing approaches to cognition: The impetus from the levels-of-processing framework. Memory 2002;10:319-32.

9. Sokolove P, Marbach-Ad G. The benefits of out-of-class group study for improving student performance on exams: A comparison of outcomes in active learning and traditional college biology classes. J Excell Coll Teach 1999;10:49-67.

10. Julian ER. Validity of the medical college admission test for predicting medical school performance. Acad Med 2005;80:910-7.

11. Koenig JA, Sireci SG, Wiley A. Evaluating the predictive validity of MCAT scores across diverse applicant groups. Acad Med 1998;73:1095-106.

12. Kleshinski J, Khuder SA, Shapiro JI, Gold JP. Impact of preadmission variables on USMLE step 1 and step 2 performance. Adv Health Sci Educ Theory Pract 2009;14:69-78.

13. Donnon T, Paolucci EO, Violato C. The predictive validity of the MCAT for medical school performance and medical board licensing examinations: A meta-analysis of the published research. Acad Med 2007;82:100-6.