What factors determine academic achievement in high achieving undergraduate medical students? A qualitative study

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Abstract

Background: Medical students' academic achievement is affected by many factors such as motivational beliefs and emotions. Although students with high intellectual capacity are selected to study medicine, their academic performance varies widely.

Objectives: The aim of this study is to explore the high achieving students' perceptions of factors contributing to academic achievement.

Materials and methods: Focus group discussions (FGD) were carried out with 10 male and 9 female high achieving (scores more than 85% in all tests) students, from the second, third, fourth and fifth academic years. During the FGDs, the students were encouraged to reflect on their learning strategies and activities. The discussion was audio-recorded, transcribed and analysed qualitatively.

Results: Factors influencing high academic achievement include: attendance to lectures, early revision, prioritization of learning needs, deep learning, learning in small groups, mind mapping, learning in skills lab, learning with patients, learning from mistakes, time management, and family support. Internal motivation and expected examination results are important drivers of high academic performance. Management of non-academic issues like sleep deprivation, homesickness, language barriers, and stress is also important for academic success.

Conclusion: Addressing these factors, which might be unique for a given student community, in a systematic manner would be helpful to improve students' performance.

Introduction

Worldwide, only the top academic achievers in high school and pre-medical studies, filtered through an extensive screening process, make it to medical schools. Selection to Saudi medical colleges is based on cognitive tests and a structured interview by a panel of three interviewers. Interviews are conducted for those students who are successful in the cognitive tests (Abdulghani 2009). However, once the students are enrolled to the medical colleges, their performance varies widely, whereby some students manage to stay in the top band, while the others barely manage to pass; still some who cannot pass drop out of the college (Arulampalam et al. 2004). Finding out why some students perform well academically is important, as this understanding can then be used to promote the factors that contribute to high academic achievement.

The literature suggests that academic achievement of students is affected by multiple factors, including motivational beliefs and emotion, examination results, physical and emotional well-being (McManus et al. 2003; Kilminster et al. 2007). Students are positively affected by good exam results, while being negatively affected by anxiety, boredom and bad exam results (Artino et al. 2010; Abdulghani et al. 2012).

Practice points

- Academic achievement of students is affected by many factors.
- High academic achievers manipulate these factors positively in their learning process.
- Factors which positively affect the academic achievement are in general those that promote deep learning.
- Understanding and addressing these factors would help the medical students improve their performance.

Mechanism of self-regulated learning (SRL), facilitated by factors such as motivational beliefs and learning strategies, as well as participation in scheduled learning activities, are important contributors to student performance at examinations (Stegers-Jager et al. 2012). An extensive electronic literature search failed to find any study in the Gulf region that explored the perceptions of the high achieving medical students on the factors that contributed to their success at examinations.

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To fill this void at least partially, this study aims to explore the factors that help high achieving medical students to perform well at examinations.

Study context

This study was carried out in the College of Medicine at King Saud University, Riyadh, Saudi Arabia. This is the oldest college in the region, and had a discipline-based curriculum until 2007. The old curriculum was reformed to adopt a system-based integrated six-year curriculum in 2008–2009. The instructional methods of the new curriculum are based on contemporary evidence and trends in medical education including interactive lectures, student-led seminars, small group teaching, problem-based learning, e-learning and self-directed learning. The first two years of the curriculum are devoted to preclinical studies, which include the study of normal and abnormal structure and function of the human body with clinical relevance. The clinical clerkship takes place during remaining three years. Pre-clinical and clinical sciences are vertically and horizontally integrated throughout the curriculum.

Materials and methods

The study design

The nature of the study requires the generation of open and unrestricted responses from the participants supplemented with careful and selected clarification, probing and facilitation leading to in-depth analysis. Therefore, a qualitative ethno-phenominoligcal study using the principles of grounded theory, with focus group discussion (FGD) as the data collection method, was carried out. Grounded theory, unlike hypothesis driven quantitative or semi-quantitative methods, does not presuppose any particular pattern of response from the participants. Participants are encouraged to speak-up freely; interpretation of response patterns is formed during the data analysis. Individual interviews were deemed to be less preferable than FGD in this context as during the individual interview the participants might be less forthcoming in providing truthful and unrestricted answers (Fontana & Frey, 2005). Moreover, particularly in the context of medical education, FGD can be used to encourage students' voices (Lam et al. 2001) and to reveal the hidden curriculum (Barbour 2005).

Volunteer participants from the second, third, fourth and fifth years, based on their academic records, were invited for the study. The first year students were not included as they did not have their exam grades in the records. The students' exam scores were reviewed after obtaining their consent. All students who scored 85% or above in all subjects and never failed any subject, were included in the study. Focus Group-1 (FG-1) was conducted with 10 male students, and Focus Group 2 (FG-2) was with nine female students. The separation of male and female students was needed to conform to the prevalent cultural and religious norms of the country. Since FG-2 did not generate new issues, as the participants kept on dwelling on issues identified previously in FG-1, the data

S44

collection was terminated; i.e. as data saturation was achieved. FGDs were carried out primarily in English with occasional Arabic when clarifications were needed.

Conduct of FGD

Facilitators started the FGD by thanking the students, followed by a brief explanation of the study objectives. Then the discussion was initiated with the question: "What type of learning strategies in your opinion have contributed to high scores in your different course assessments?" Three facilitators facilitated discussion within each group. The students were encouraged to reflect on their learning strategies and activities during their learning and exam preparation. Students were asked to give examples if clarification was needed, and expand if they like to explain more details.

The discussion was audio-recorded with prior consent from the participants. In addition, facilitators took written notes during the discussion to clarify any issues subsequently, if necessary.

Data collection and analysis

The audio-tapes were transcribed verbatim by the first author prior to data analysis. All personal and identifiable information was removed to maintain confidentiality. Then, the researchers familiarized themselves with the data to acquire contextual sensitivity by immersing in the setting of the research. As the next steps within the framework of qualitative analysis, the researchers identified a thematic framework, coded (e.g. indexed, charted, mapped), and interpreted the data (Alhaqwi et al. 2010).

Key statements were highlighted and categorized into general themes. The audiotapes and transcriptions were further independently analyzed by the second author (A.A.). Another two researchers (K.M.S., A.F.) discussed the summaries and modified them until a consensus was reached. The findings of the analyses were then presented to the two groups of participants independently for validation. The participants were asked to modify or suggest changes to the interpretation of data. The participants had few suggestions and indicated that the summaries accurately reflected the FGDs points.

The study was approved by the research ethics committee at the College of Medicine, Research Center, King Saud University.

Results

Four main themes were derived from the qualitative data analysis: (1) learning strategies, (2) resource management, (3) motivation, and (4) dealing with non-academic problems. These themes were further sub-divided into 17 sub-themes according to the results of the discussion (Table 1).

The four main themes along with some explanations based on the students' verbatim responses (with minor grammatical corrections without change of meaning) within each sub-theme are presented below.

Table 1. Themes and sub-themes from the focus group discussion.

Themes	Subthemes
1. Learning strategies	a. Lectures attendance and early revision of topics
	b. Prioritization of learning needs
	c. Learning in small groups
	d. Deep learning
	e. Mind mapping
	f. Other sources and guidance
	g. Learning in skills lab
	h. Learning from patients
	i. Learning from mistakes
2. Resource management	a. Time management
	b. Family support
3. Motivation	a. Internal motivation
	b. Exam results
4. Dealing with non-academic problems	a. Sleep deprivation
	b. Language barrier
	c. Homesickness and stress

Theme 1: Learning strategies

(a) Lecture attendance and early revision of topics

"It is necessary to attend each lecture carefully and revise it as soon as possible just after each session".
"I read the topic and reference book just after lecture to get most of the concept about that topic. If I leave it for the weekend or for the exam I will get nothing. It is better to focus early".
"When I am revising the lecture for better understanding and deeper learning I have to go outside from objectives written in curriculum".

(b) Prioritization of learning needs

"Priorities have to be set for the subjects which I don't know completely, because totally new subject takes more time and needs more attention."
"I have to identify my learning needs which will guide me where I have to put more efforts in reading and revision."

(c) Learning in small groups

"We study as a group; we discuss the difficult features so we can clarify the difficulties from each other."
"Study in groups encourages us to study for a longer period."
"In a short time we can grasp better and study larger subjects, but the group should not exceed 4–5, otherwise there will be lots of time wastage."

(d) Deep learning

"It is very important to understand the basic concept. When I am weak in a certain subject, I have to understand the basic concepts. Memorizing (mugging up) just for the exam makes the topic even harder."
"I can't memorize information at the time of exam; I forget them too. So I have to do deep study to understand topic more."
"Tricky questions in exams cannot be answered by just memorising and superficial learning."

(e) Mind mapping

"In pharmacology lecture I need to remember dosage, formula, mechanisms of action, indications and contraindications of drugs, so that I can just retrieve them in a more recognizable way by mind mapping. I get the whole picture at the end of a particular topic by mind mapping."
"Sometimes I need to have knowledge about the whole lecture together to connect all these fragments. I really need to adopt mind mapping."
"A clinical case could be structured in our memory by mind mapping. It is an important tool for keeping things organised."

(f) Other sources and guidance

"It is up to us how we utilize resources in a positive way, either by asking the seniors or by reading in the library or by website or even asking tutors the topics which are not clear."
"Senior students usually help new students in their study. Senior students have more experience and knowledge in a simple way. I was part of 'Big brother program."

(g) Learning in skills lab

"Some basic skills like catheter insertion, suturing and others can be best practiced in the skills lab."
"Skills lab tutors are very helpful, we can learn from them at our own time without any hassles".

(h) Learning from patients

"Clinical topics cannot be learned only by studying lecture notes and books. We have to see patients as much as possible to learn clinical topics."
"We should not wait for clinical teaching from tutors only, we have to see patients with other colleagues, even some non-academic staff members are also helpful."

(i) Learning from mistakes

"If we rectify our mistakes we are able to understand the topic for life. In Foundation Block, I could not differentiate between the Gram positive and

S45

Gram negative bacteria. In a slide I identified staphylococci as Gram negative bacteria, but then I realized that the Gram negative bacteria are never blue in color."

Based on the above results it could be argued that the students who do well at exams learn from a variety of learning situations such as from lectures, small group learning sessions, skills lab sessions, peers and patients. Their main approach to learning in the above situations is deep learning as exemplified by: learning from mistakes, which essentially highlights reflective learning; and mind mapping which highlights the effective synthesis of learning. With such an approach, the students could easily prioritise their learning to learn the basic concepts thoroughly, rather than resorting to ineffective strategies such as memorization.

Theme 2: Resource management

(a) Time management

"We have our proper time management plan to speed up the studies and to avoid stress. I should know time management as well as proper enthusiasm to complete some large subjects."
"If we don't study every day and we just memorise at the last minute we have to face problems."
"As a medical student our exam is continuous and every 2–3 weeks we have an exam. If we take a little break from study, we notice that we miss a lot of lectures and we can't go back to the previous week. The major problem with the students is 'last minute study'."

(b) Family support

"Family plays a big role in helping collecting and analysing information, depending on the experience and knowledge of family members. But if the family is not educated or student is away from the family, it is of no help".

These two factors are complementary to each other. When a family could help in time-consuming activities of the student, it frees up time for the student to study. Hence, family support could contribute towards effective time management.

Theme 3: Motivation

(a) Internal motivation

"Enthusiasm is needed by the student to motivate himself/herself. Anybody else cannot tell me to do something that I am not interested in. I am the one who pushes myself towards my goals and success".
"I have to be motivated towards my goals. My inner motivation will always alert me towards my success."

(b) Exam results

"Expected exam results really push me to work harder and harder. But the problem is when I get grades that are less than what I had expected, this really puts me down, but I have to recover fast."

Since exam results could be interpreted as a source of external motivation (i.e. reward), the above two sub-themes represent the two main categories of motivation; i.e. internal and external motivation.

Theme 4: Dealing with non-academic problems

(a) Sleep deprivation

"We do have less sleep especially during our exam periods. But what I found is that enough sleep has to be taken to answer your questions in exam better, otherwise you will be confused."
"Sound and enough sleep are important to understand the subject and tackle the exam well."

(b) Language barrier

"Language barrier can be avoided by studying in groups, getting help from seniors and tutors. Because some of us are not good in English, we have to work harder to overcome this problem."
"I have seen students who are busy most of the time in translating medical terminology from Latin to English and then to Arabic to understand it. I think it is of no use, but we have to understand the concept and not the meaning of words only."

(c) Homesickness and stress

"Some of us are from outside of Riyadh. This makes us feel homesick and depressed. This could be avoided by socialization with colleagues and engaging in other activities."
"Frequent visits to the family are important to avoid homesickness, by any means we have to avoid homesickness which usually keeps us down."
"Socialization is the best means for the avoidance of depression and homesickness."
"I perform excellently under stress because I take it positively. I feel the stress in studies and anxiety in a positive way. For example, when a deadline is given for a project I try to complete it within the given period of time."

All the above three factors seem to indicate the 'lack of student preparedness'. Poor English knowledge implies that the students may not have paid prior, adequate attention to master the medium of study; sleep deprivation implies burdening oneself closer to the examination with a lot of work, rather than preparing for the examination early, and

homesickness and stress indicate that the students have not mentally prepared themselves sufficiently to study medicine.

Hence, as suggested by the above results, a model for academic success that has three sequential steps could be developed: 1. Preparing oneself before the course/exam; 2. Motivating oneself both before and during the course; 3. Using learning strategies and resources appropriately.

Discussion

A challenge for medical educators is to identify factors that lead to student success in medical school and beyond (Ericsson 2008). Significant factors identified by participants of this study as contributors to their high academic achievement include strategic learning, resource management, internal motivation and efficient management of non-academic problems. These findings resonate well with other contemporary researches.

Success at examinations was related to strategic or deep learning style (McManus et al. 2003). Though the effects of deep and superficial learning styles are inconsistent, strategic and "convergent" learning styles correlated positively with performance at the final examinations (McManus et al. 2003). Empirically, deep and strategic learning styles predicted success at final examinations, whereas surface learning predicted failure (Kleijn et al. 1994). Regular attendance to course lectures and early revision were found to be important factors for the participants' success in two recent studies (Gupta & Saks 2013; Martin et al. 2013). Mind mapping is a creative way to engage in a unique learning endeavor (Spencer et al. 2013).

Effective time management skills are essential for continued academic success (West & Sadoski 2011). Students who do not plan their time effectively run out of time before they can master the content. Therefore, providing students with assistance and support in time management should help them utilize their study time more efficiently and effectively, and this, in turn, should improve their academic performance (Salamonson et al. 2009).

Artino et al. (2010) determined that motivational belief and self-efficacy were the most important factors for high academic achievement. A study from Iran highlighted the factors associated with students' academic success including personal abilities, attitude, beliefs and motivation (Amini et al. 2008).

A local study reported high prevalence of stress among medical students, especially among the female students (Abdulghani et al. 2011). Unmanageable stress leading to depression is a serious mental health risk in student populations (Stecker 2004). Poorly performing medical students experienced a higher incidence of stress-related problems and exhibited both academic and emotional difficulties that were likely to undermine their effectiveness. Sleep disturbances, stress, anxiety and depression often coexist and holistic management of these factors are important for overall wellbeing of the students (Abdulghani et al. 2012)

Homesickness and language barriers have been identified as negative factors for student academic achievements in many studies (Lacina 2002; Ridley 2004). Salamonson et al. (2009) reported a direct correlation between low English test scores and low academic grades among first-year nursing students with English as a second language.

This study, although from a single institution, has identified several important factors that influence students' academic achievement. Some of these, such as attending lectures regularly, early revision, prioritization of learning needs, time management, better student support, can be easily promoted by the appointed student counselors. Others, such as deeper learning, learning from patients, learning in skills laboratory and mind mapping, can be encouraged through curricular changes and creating a culture of higher expectation within the school. Finally, students' emotional wellbeing can be addressed through better stress management techniques, sleep hygiene, stronger family support, and frequent visits to family. We are in the process of conducting a multi-centre study to confirm and explore these factors in greater detail and to test the preliminary model described under the results section of this study.

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