

RESEARCH

The attitudes of medical students to research

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Background. The workforce of 'physician-scientists' is ageing and decreasing in numbers. The responsibility to combat this trend rests on future generations of healthcare professionals and it is therefore valuable to evaluate medical students' attitudes towards research.

Objective. To establish the attitudes of University of Cape Town (UCT) medical students towards research and to investigate the factors influencing these attitudes.

Methods. An anonymous, cross-sectional, self-administered questionnaire was administered to medical students from years 1 to 6 studying medicine at UCT in 2011. Questions were primarily closed-ended and consisted of Likert scales.

Results. Out of a population of 1 195 medical students, 733 were sampled (63%); 65% were female, 53% were preclinical students (years 1 - 3) and 47% were in their clinical years (year 4 - 6). Overall, 61% of students had a positive attitude towards research and 74% felt that participation in research was important to their medical school education; 22% had been involved in voluntarily extracurricular research, 4% had presented at a scientific meeting and 3% had published in peer-reviewed journals. A number of perceived barriers to student research were identified including a lack of adequate training, time and research opportunities.

Conclusion. Students believed that research was important and had a positive attitude towards it. However, few had been involved in voluntary research and produced work worthy of presentation and/or publication. Addressing identified barriers and improving students' attitudes may begin to reverse the trend in declining numbers of physician-scientists.

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Clinical research can be defined as the intent to pursue the understanding of the mechanisms, detection, progression and reversal of disease.^[1]

The main stakeholders of clinical research are the so-called 'physician-scientists': clinicians who are engaged in both the scientific method and clinical application.^[2-5] The workforce of physician-scientists actively involved in clinical research is ageing and decreasing in number.^[1,6,7] This is a phenomenon that has been noted on global and local fronts since the early 1990s.^[1,7] Some of the proposed reasons for this decline include a lack of effective training programmes, unattractive career-pathing, and inadequate exposure to research before career paths are chosen.^[1,8,9]

The early introduction of research-focused programmes into medical schools, as well as the encouragement of student participation in research, fosters favourable attitudes towards academically focused careers among medical students.^[4,5,6,11] Scaria^[4] introduced the 'four I's' framework, which acts as a base upon which one can explain the current poor interest among medical students towards research. The barriers highlighted in this model show a lack of initiative (exposure, experience and knowledge), impulse (time and competitive environment), incentive (presentation/publication opportunities and acknowledgement) and idols (supervisors).^[4,5,11-15]

The diverse burden of disease within South Africa^[1,10] requires physician-scientists to emerge out of future generations of healthcare professionals.

Objective

To review the attitudes of medical students from the University of Cape Town (UCT) to research as well as to identify barriers which might be addressed to improve students' attitudes.

Methods

The study was approved by the Ethics Committee of UCT Faculty of Health Sciences (ref. no. 251/2011).

The study population was defined as UCT medical students, from years 1 to 6, in the year 2011. Participants were sampled at whole class lectures where they were presented with a paper copy of a questionnaire which they had to complete within 15 min.

Through a self-administered questionnaire, information was obtained on the following: basic demographics, interest in specialising, extent of previous research involvement, general attitude to research, and factors influencing attitudes to research.

Research involvement included (i) voluntary; extracurricular research – projects pursued by students in their own time, excluding two compulsory research modules in the current curriculum (i.e. a one-month 'special studies' project in the 2nd year, which entails conducting a very basic study and serves as a practical introduction to research) and an epidemiology and health promotion project forming part of the public health block in 4th year; (ii) publications and conference presentations (both voluntary, extracurricular research and projects forming part of the compulsory research modules mentioned above).

Factors influencing attitudes to research were assessed by presenting students with a list of statements which were identified from the literature as well as by the researchers, and then asking them to express the extent to which they agreed or disagreed with these. Responses were recorded either as yes/no or using a 5-part Likert scale. The latter was used to investigate the extent to which participants agreed or disagreed with a number of statements related to attitudes to research, where 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree.

Statistical analysis was performed using OpenEpi (version 3.01) with $p < 0.05$ being considered statistically significant. Categorical variables were compared using the χ^2 test.

Results

Demographics

There were 1 195 medical students enrolled in years 1 - 6 in 2011. Of these, 733 were sampled, giving a response rate of 63%. Of those sampled, 65% were female. A total of 53% were preclinical (year 1 - 3) and 47% were in their clinical years (year 4 - 6). The distribution of participants by year of study is shown in Fig. 1. The mean age of participants was 21 years (range 17 - 31).

Overall attitude to research

There was very little difference in attitude to research between preclinical and clinical respondents with almost equal proportions feeling positive (61% v. 61%, respectively), neutral (28% v. 31%, respectively) or negative (11% v. 8%, respectively) (Fig. 2). There was no statistically significant difference in terms of year of study (preclinical v. clinical) and attitude to research. There was also no difference between gender (male v. female) and overall attitude to research (positive v. negative).

Interest in specialising

Of all participants, 94% were interested in specialising, with no statistically significant difference between preclinical and clinical respondents, including those who perceived entry into their specialty to be competitive. There was no statistically significant difference in the numbers of respondents who perceived entry into their chosen specialty to be competitive and those that did not, and their attitude to research. The same comparison between preclinical and clinical students yielded a similar non-significant result.

Research involvement

As shown in Fig. 3, 23% of respondents reported prior involvement in voluntary, extracurricular research (excluding the two compulsory research modules included in the current curriculum), with no significant difference between preclinical and clinical respondents (11% v. 12%, respectively).

Of the students, 5% had presented their work (as voluntary, extracurricular projects as well as projects forming part of the compulsory research modules in the curriculum) at a national or international conference, with no significant difference between preclinical and clinical students. Students who had been involved in voluntary, extracurricular research were significantly more likely to report that they had presented at a conference ($p < 0.001$).

Of all respondents, 3% had published their work in a peer-reviewed journal (which included both voluntary and compulsory projects). Significantly more clinical than preclinical respondents had published their research ($p < 0.001$). Students who had been involved in voluntary, extracurricular research were significantly more likely to have published ($p < 0.001$).

An analysis of the data, comparing previous involvement in research and overall attitude to research, yielded the following results: significantly more students who had previously been involved in voluntary, extracurricular research had a positive overall attitude to research. ($p < 0.05$); significantly more students who had presented at a conference had a positive attitude to research ($p < 0.05$). There was no significant difference in terms of having published and attitude to research.

Other factors influencing attitudes to research

A number of other factors potentially impacting attitudes to research were identified. Fig. 4 shows both preclinical and clinical students' responses to these factors while Fig. 5 compares the responses of students who had been involved in voluntary, extracurricular

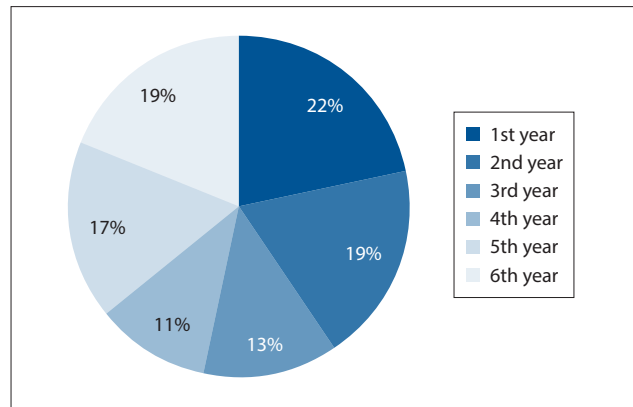


Fig. 1. Distribution of participants by year of study.

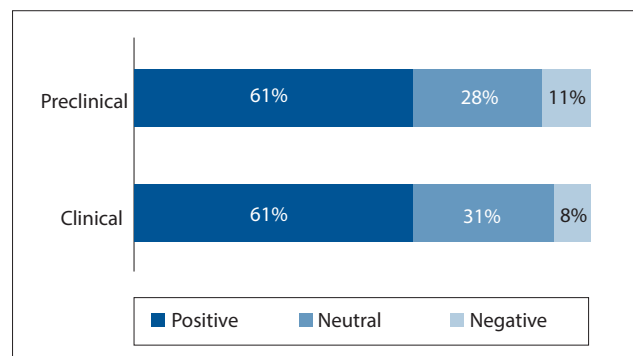


Fig. 2. A comparison of the overall attitude to research between preclinical (years 1 - 3) and clinical (years 4 - 6) respondents.

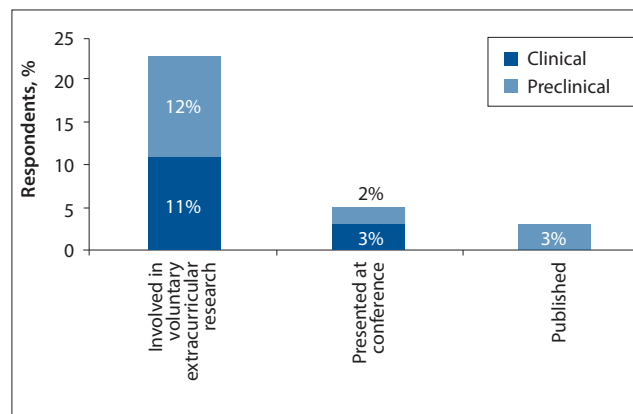


Fig. 3. Respondents' previous research involvement.

research with those who had not. Responses were initially recorded using a 5-point Likert scale and then simplified to a 3-point scale (Figs 4 and 5).

Both preclinical and clinical students' attitudes to a number of other factors, which could potentially affect attitude to research, were assessed. The same was done for students who had been involved in voluntary extracurricular research v. those that had not. A large portion of the responses were recorded as 'neutral', where students chose neither to agree nor disagree with the statement or were 'unsure' that they had enough knowledge to respond (Figs 4 and 5). By comparing the numbers of students actually agreeing and disagreeing with each statement, a number of conclusions could be made.

As is shown in Fig. 4, 77% of preclinical and 71% of clinical students agreed that research is an important part of their medical school educations and more students than not felt that they would

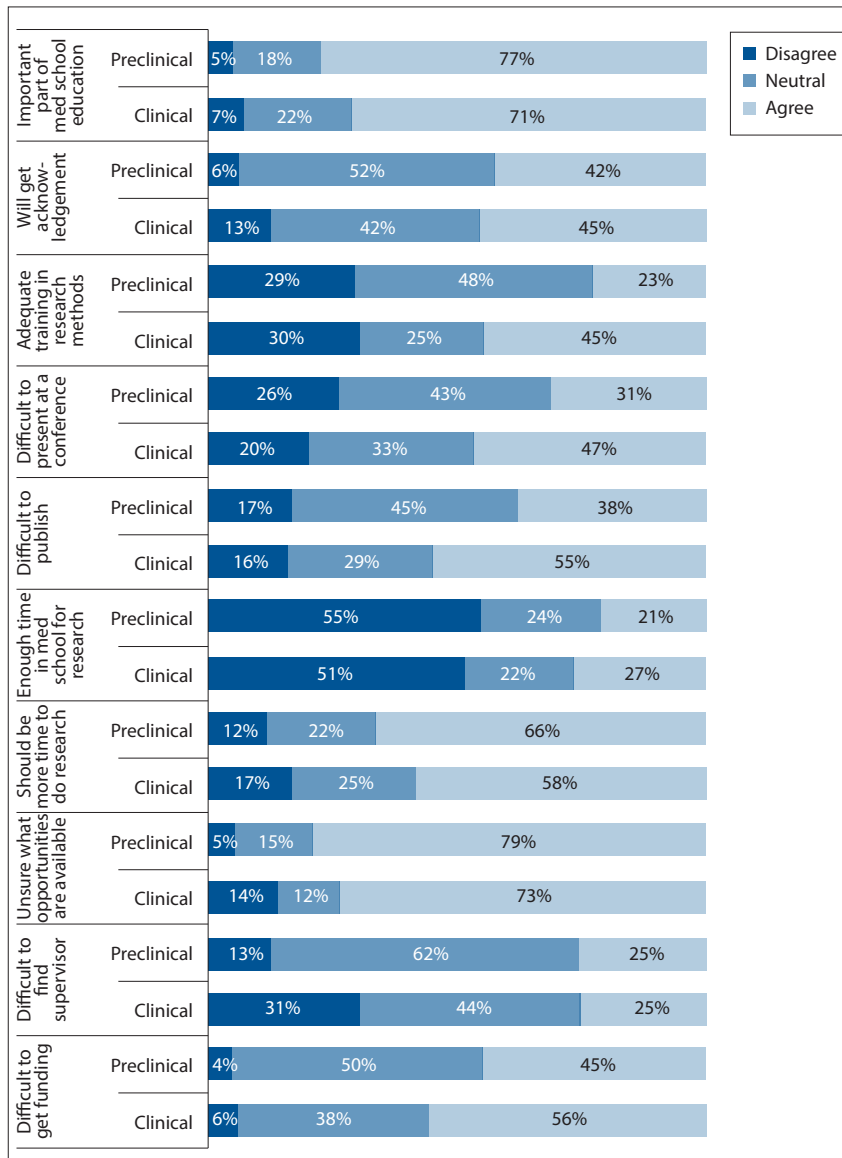


Fig. 4. Other factors potentially affecting (preclinical v. clinical) respondents' attitudes to research.

get deserved acknowledgement for their participation in research. As Fig. 5 shows, slightly more students who had been involved in voluntary research felt this way.

The vast majority of students (73% clinical and 79% preclinical) (Fig. 4) felt that they lacked knowledge of what research opportunities were available. Many students were eager to get involved in research, but did not know where to start or how to go about performing a study. This was especially true for preclinical students. This was mirrored by the fact that, although the percentage is smaller (66%), the majority of the group that had actually been involved in voluntary research were still unsure about what opportunities were available (Fig. 5). As only 77% of students had not been involved in voluntary, extracurricular research, a large portion of both clinical and

preclinical students responded 'neutral' to the question of whether it is difficult to find a supervisor or funding. A slightly greater proportion of the students who had been involved in voluntary research disagreed that it was difficult to find a supervisor, although again, the majority were unsure (52%).

Discussion

Of the total population of students, 63% (n=733) were sampled, making this the largest study of its kind. Of the participants, 65% were female, reflecting the underlying demographic of the university where the female to male gender balance is currently 60:40. There were almost equal numbers of preclinical and clinical students, representing the UCT medical school population fairly.

Encouragingly, the majority of preclinical and clinical students were positive about

research (each 61%) with relatively few manifesting an outright negative attitude (11% v. 8%, respectively). Despite this, only 23% of students had actually been involved in voluntary, extracurricular research. It was of concern that very few students had translated either their voluntary extracurricular research, or their work during the compulsory research modules, into material worthy of presentation at a scientific meeting or publication in a peer-reviewed journal (4% v. 3%, respectively). To put this into perspective, Siemans *et al.*^[5] showed that 70% of 4th-year participants had presented at either national or international forums. Cursiefen and Altunbas^[16] further showed that 28% of the total research output in a particular medical school had medical student involvement, which included 7.8% of the articles having medical students as 1st authors.

In the Siemans *et al.*^[5] study, of those students interested in applying for a competitive specialty programme, 43% of 2nd-year participants and 47% of 4th-year participants had prior research experience. In the current study, most of the participants (94%) were interested in specialising and the majority (73%) believed that entry into their specialty programme was competitive. As research undertaken adds weight to the *curriculum vitae* and is indeed, in some parts of the world, essential for entry into a specialist programme, it would seem logical that students viewing entry into their specialty of choice to be competitive would feel more positively about research. The results of the current study, however, did not show this.

Previous exposure has been identified as a factor affecting student attitudes to research.^[4-6,11,12] Only 11% of preclinical and 12% of clinical students had been involved in voluntary, extracurricular research. A comparison between the students who had been involved in voluntary research and the remaining 77% of students who had not, showed that the aforementioned group had a more positive attitude to research ($p < 0.05$). A reason for this could be that students who pursued voluntary research were able to choose a topic of specific interest and to set the pace of their work, as opposed to the compulsory modules where the research topic, supervisor, a group of students to work with and a deadline for completion of the project is prescribed. Those students (5% of participants) who had ever presented at a conference had a more positive attitude to research, having enjoyed the opportunity to present their work and enter into discussion with

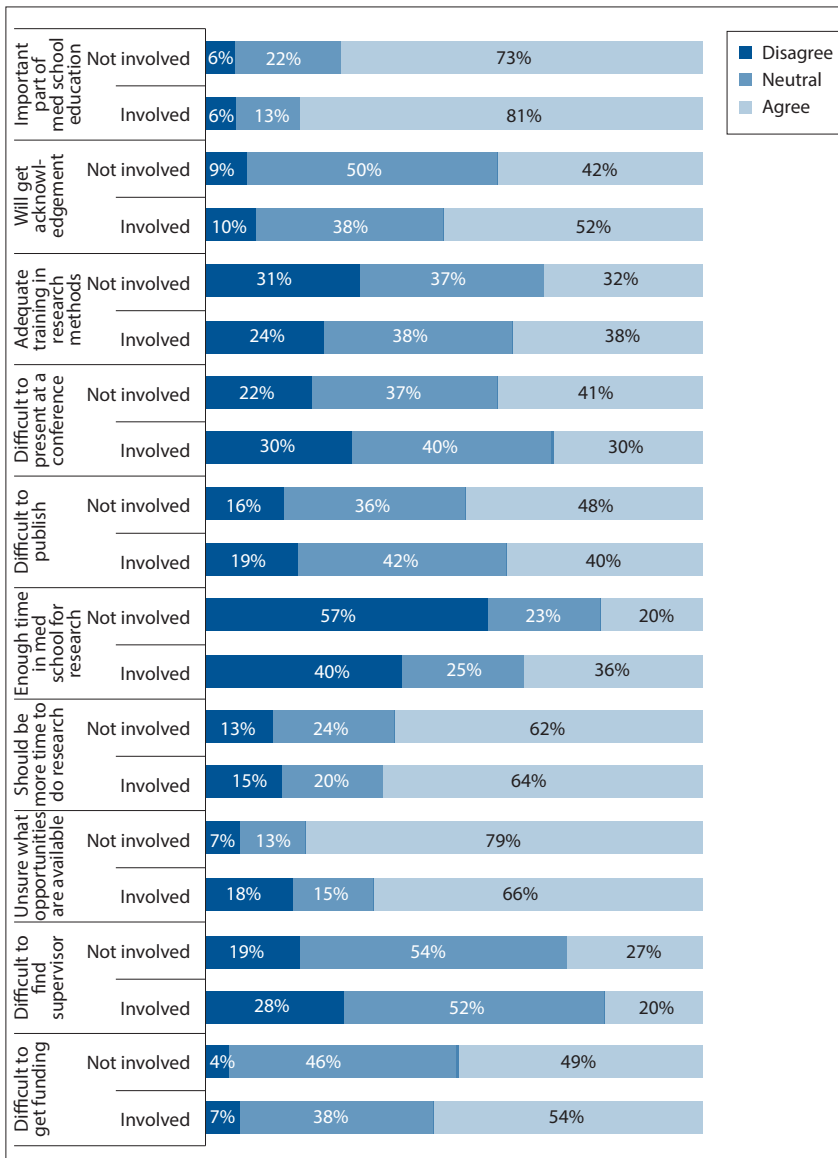


Fig. 5. Other factors potentially affecting respondents' attitudes to research (previously involved in voluntary, extra-curricular research v. not)

colleagues with similar interests. Those (3%) who had published a paper did not have a more positive attitude to research (again this included both extracurricular and compulsory projects). The reasons for this are not clear.

Significantly more students who had been involved in voluntary, extracurricular research had presented at a conference and published ($p < 0.001$). The reasons for this could be similar to why these students had a more positive attitude to research (as discussed above).

It is the authors' opinion that medical school is the ideal place for students to acquire the necessary skills to conduct proper research, as they are in a teaching environment with exposure to academic role models. It is therefore of concern that only

45% of the 'more senior' clinical students felt that there is adequate training in research methodology. Most clinical students also felt that it is difficult as a student to present their work at a scientific meeting or publish in a peer-reviewed journal. Fewer students who had been involved in voluntary research felt that it was difficult to present at a conference or publish (Fig. 5). A reason for this could be that significantly more students who had been involved in voluntary research had actually presented or published and were thus familiar with what the process demands, i.e. those who had gone through the process thought it was less difficult than those who had not. However, even in this group, only 30% of students thought it wasn't difficult to present, and 19% thought that it wasn't difficult to publish. It is not implausible to

suggest that students might be less likely to want to get involved in research during medical school, or indeed after graduating, if they do not feel that they have the required knowledge and skills to design and run a project, as well as present or publish it.

Demonstrating the barriers mentioned by Scaria,^[4] 51% of clinical and 55% of preclinical students did not believe that there was enough time to allow for research, with 58% of clinical and 66% of preclinical students stating that there should be more time allocated in the curriculum to research (Fig. 4). One remarkable difference is that even though both groups thought that there should be more time for research, more students who had been involved in voluntary research felt that was enough time in the curriculum to allow for research (Fig. 5). In this group, 40% thought there was not enough time for research and only 36% thought that there was. At the time of the current study, the only possible time in the UCT curriculum that students had to pursue their own research interests was an elective block during their 5th year, which was only 4 weeks in duration. Personal research interests can only be pursued after hours on top of an already heavy academic load.

Study limitations

A large proportion of students responded 'neutral' to a number of statements designed to evaluate 'other' factors potentially affecting attitudes to research (Figs 4 and 5). It is likely that a large proportion of these students were 'unsure', especially the preclinical students who just hadn't had enough exposure to research to have an opinion on those statements. Unfortunately, the questionnaire was not designed with this option, resulting in a very high proportion of 'neutral' responses. This made statistical analysis of the relationships between various factors impossible to interpret in a meaningful manner and the data from this section are therefore reported and discussed based on proportions alone.

Conclusion

In recent years there has been a marked decline in the number of physician-scientists who are ultimately responsible for bringing scientific discovery to clinical practice. This decline is largely precipitated by a lack of interest in research among medical students.

Students at UCT perceive research to be important, have a positive attitude towards it and want to get involved in research activities. However, not many have actually been involved in voluntary research and

very few have produced work worthy of presentation or publication. Perceived barriers that were identified in this study include a perceived lack of training, time and opportunities. Addressing such factors and improving student attitudes might begin to reverse the local trend in declining numbers of physician-scientists.

It is clear from the literature, however, that this is a global problem. Deans, academic staff, faculties and students in all centres must endeavour to work together to create medical school environments that encourage, acknowledge and foster passion for clinical research, as this is the only way to begin to reverse this universal and worrying trend.

The authors offer the following recommendations to improve student attitudes to research: encourage students to get involved in voluntary, extracurricular research; improve training in research methodology, which should include training on how to present at a scientific meeting, as well as on writing up and submitting a paper for publication; ensure that there is enough time in the curriculum allocated to pursue voluntary research interest; and enable greater access to research opportunities through finding/generating suitable projects, making students aware of these and helping them engage in the research process.

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Appendix 1. Study questionnaire

DEMOGRAPHICS					
Age:		Gender:		Year of study:	
INTEREST IN SPECIALISING					
Are you interested in specialising?				<input type="checkbox"/> YES	<input type="checkbox"/> NO
If yes, how competitive do you perceive entry into your speciality programme?		<input type="checkbox"/> Not competitive	<input type="checkbox"/> Competitive	<input type="checkbox"/> Very competitive	<input type="checkbox"/> Don't know
PREVIOUS AND CURRENT INVOLVEMENT IN RESEARCH					
Have you ever been involved in a voluntary extracurricular research project?				<input type="checkbox"/> YES	<input type="checkbox"/> NO
Have you ever presented a project at a national/international conference?				<input type="checkbox"/> YES	<input type="checkbox"/> NO
Have you ever published a paper in a peer-reviewed journal?				<input type="checkbox"/> YES	<input type="checkbox"/> NO
GENERAL ATTITUDES TOWARDS RESEARCH					
Generally, how do you feel about medical/clinical research?	<input type="checkbox"/> Very negative	<input type="checkbox"/> Negative	<input type="checkbox"/> Neutral	<input type="checkbox"/> Positive	<input type="checkbox"/> Very positive
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
I feel that participation in research is an important part of my medical school education.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe it is hard, as a medical student, to present my work at a non-medical school forum, e.g. a conference.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe it is hard, as a medical student, to publish my work in a non-medical school journal.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe there is enough time in medical school to do research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel there should be time set aside in the medical school curriculum to pursue research interests.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe there is adequate training in research methodology in medical school.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I believe it is difficult as a medical student to find a research supervisor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I do not know what research opportunities are available.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel that I will get deserved acknowledgement for my contribution to the research (such as authorship or opportunity to present).	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I feel it is difficult as a medical student to attain adequate funding for research.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>