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**Abstract:** There is a growing concern about a future shortage of medically trained graduates interested in pursuing a career in research or academia. As yet, this has not been thoroughly investigated in the Australian setting. This study aimed to explore the career preferences of Australian medical students, and in particular, to highlight their interest in research as a career and the perceived advantages and disadvantages of such a career path.

## **Australian Medical Students' Interest in Research as a Career**

Research career intentions

### **Abstract**

#### ***Aim***

There is a growing concern about a future shortage of medically trained graduates interested in pursuing a career in research or academia. As yet, this has not been thoroughly investigated in the Australian setting. This study aimed to explore the career preferences of Australian medical students, and in particular, to highlight their interest in research as a career and the perceived advantages and disadvantages of such a career path.

#### ***Methodology/research design***

An electronic survey was designed to capture student demographics and career preferences. Students in all years were approached. Academic and administrative staff at each site sent students an email with a link to the survey embedded in the message.

#### ***Results***

Medical students at all levels of study at seven universities participated in the research, with Medical Specialty, General Practice and Surgical Specialty proving to be the three most common career choices. Interest and clinical experience/supervisors were the most influential factors affecting choice. Overall, 40% of the sample answered that they would consider a research career, primarily to advance medicine. The remaining students declined their interest in research as a career as they perceived it did not afford enough interaction with patients. Competition for training programs and trying to juggle family commitments were perceived barriers to obtaining their career goal for the majority of respondents.

Research career intentions

***Key words:*** Career preference; Medical students; Electronic survey; Research; Australia;

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## **Introduction**

In addition to the reported future doctor shortages, there is also an anticipated shortage of doctors willing to pursue research or academia (ANA Long Range Planning Committee, 2006; Pusey, 2002). Whilst there are strategies in place to alleviate the shortfall of practitioners, particularly in regional areas, there has been little recognition of the impact a shortage of academic and clinical research staff may have. This study has taken a 'snapshot' of current Australian medical students' interest in research and aims to provide information to medical schools about how research is perceived by students and what we can do to lift the profile of this aspect of medicine.

## **What do we already know?**

A review of the literature with regard to interest in research as a career revealed no Australian studies and just two American studies, both noting the decline in the number of graduates choosing careers as physician or clinician-scientists (Guelich et al 2002; Kassenbaum et al, 1995). This is despite the increased opportunities available for the physician to engage in medical research (Byrne, 2004). Expected income and levels of debt are two of the most influential disincentives for considering a research career (Dohn, 1996). Another main detractor is the lengthy, linear, model of training required to become both a clinician and a researcher, with a high attrition rate for junior clinical research faculty due to inadequate training and mentoring, barriers to funding, lack of protected time and lack of flexibility to interrupt training for family considerations (ANA Long Range Planning Committee 2006; Khadaroo & Rotstein 2002). These trends cause concern because of the potential impact this may have on the lack of clinical academics who can provide research leadership and raise the standards of service through the development of new and effective treatments (Pusey, 2002).

## **Factors which influence decision making**

One factor which may impact on the career choice of graduates is the lack of careers advice provided to students whilst enrolled in medical school, many students graduate without any careers advice at all (Dambisya, 2003). This was also echoed in the 2003 Australian Medical Workforce Advisory Committee (AMWAC) report where participants wrote that access to timely and informative career advice was needed.

## **Method**

An electronic survey was created to investigate the career preferences of medical students at all stages of their undergraduate studies, and interest in research in particular. An electronic survey was used for ease of distribution to schools across Australia. The University of Sydney Human Research Ethics Committee approved of the study and this was sufficient for several other Australian medical schools. In addition to demographic questions, students were asked about their future career preference, reasons for choosing a particular career, whether or not they would consider research as a career, reasons for viewing a research career favourably or unfavourably, factors which might influence career choice, and barriers or impediments to achieving career goals.

Of the nine medical schools contacted, across all states of Australia, seven agreed to participate, with one state not being represented in the findings. One university declined as they were conducting their own research and there were communication problems with the ethics office at the second university. One faculty member at each institution agreed to send their students an email with the information statement and a link to the survey. Two reminder notices were sent to students by their university administrative staff. The survey was hosted at

the University of Sydney and all responses were anonymous. On average, across all sites, response rates for first year students were 30%, compared with 26% each for second, third and fourth year students, 23% for fifth year students, and 18% for sixth year students. When response rates were compiled for all final year students, the average was 27%.

All responses were imported into SPSS for Windows Release 14.0 (5 Sep 2005) and coded for statistical analyses. Students could specify more than one career choice and more than one reason and influencing factor. The students' first four responses to any question were coded and used in the analyses. These responses were not expressed in order of preference.

## **Respondents**

Students from seven Australian medical schools participated, three in New South Wales, one in Victoria, one in South Australia, one in Western Australia and one in Tasmania. Two of the schools who participated were graduate-entry. All schools contained some form of Problem-Based Learning delivery, all had early clinical exposure and all had a dedicated research component within the medical program.

There were 1466 participants of whom 58% were female. The response rate was highest for first year students. Mean age was 23 (SD 4.7) and ranged from 16 to 51.

Whilst the response rate for each university was low, and varied from 16-39%, Table 1 shows that the sample's age and gender distribution was mostly representative of the medical student population at each university site, with the exception of three sites which were slightly over represented by female students.

INSERT TABLE 1 ABOUT HERE

## **Results**

### *Career choice*

Responses to ‘What is your future career preference?’ were categorised into eight areas as advocated by the UK Medical Careers group: Medical Specialties, Paediatrics, Surgical Specialties, Obstetrics & Gynaecology (O&G), Anaesthetics, Psychiatry, General Practice (GP), All Other Medical Choices (Lambert et al, 2001). The distribution of responses is illustrated in Figure 1.

INSERT FIGURE 1 ABOUT HERE

In answering the question about future career preference, students’ often specified more than one area of interest, with the most frequently mentioned choice being a Medical Specialty. This is in contrast to Lambert et al’s (2001) study where General Practice dominated, and in contrast to Wright et al’s (2006) Australian study where Surgery and Paediatrics were most common amongst first year medical students. The results in Figure 1 show that General Practice was the second most common career option. Further, of those who selected GP, 23% (80) specified that they wanted to work rurally. This trend was similar for all medical schools. Medical Specialty, GP, Surgical Specialty and Paediatrics were always listed in the top four choices – a similar result to Lambert et al’s graduate entrants and Wright et al’s (2006) incoming medical students at four Australian medical schools. Analysis of Variance tests showed significant gender differences with females significantly more likely to mention a Medical Specialty ( $F_{(1, 1461)} = 11.96, p = .001$ ), Paediatrics ( $F_{(1, 1461)} = 27.34, p < .001$ ),

Obstetrics and Gynaecology ( $F_{(1, 1461)} = 53.47, p < .001$ ), and General Practice ( $F_{(1, 1461)} = 48.9, p < .001$ ) and males more likely to specify a Surgical Specialty ( $F_{(1, 1461)} = 65.61, p < .001$ ).

### ***Reasons for choosing a career***

Several categories were created to describe the majority of students' reasons for choosing a certain area in which to practise. Interest/enjoyment (476 responses) was most frequently mentioned, followed by Variety of work (120 responses), Relationship with patients (118 responses), Affinity with skills and ability (114 responses), and Lifestyle (101 responses).

Personal, rather than service, reasons dominated responses to the question 'Why' students were interested in a particular area of practice. It is interesting that, except for 'Relationship with patients' the most commonly mentioned reasons do not appear to be especially specific to Medicine and all might be as expected of anyone's reason for choosing a career. By 'Relationship with patients', students referred to their preference in dealing with particular age groups, children for example, and wanting to have a greater level of interaction with the patient – some disciplines were chosen over others for this reason.

There were a variety of influences on career choice. Interest in the field was most frequently mentioned (by 476 students), followed by Variety of work (120), Relationship with patients (118), Type of patients (114), and Lifestyle (101).

Some of the categories influencing career choice require further explanation. For example, 'Relationship with patients' commonly expressed respondents' desire to spend time with patients, and have hands on long term contact with patients. The category of 'Type of patients' referred to students' preference to work in particular with women (e.g. "mothers and

babies”) and children (e.g. “I love working with kids”). ‘Lifestyle’ incorporated responses about ability to travel, country living, and flexibility. Interestingly, ‘Variety of work’ and ‘Relationship with patients’ was often mentioned by students who had also selected General Practice, Obstetrics and Gynaecology, or Paediatrics as their preferred career choice.

Interest in the field, variety of work, patients, and lifestyle are major influencing factors for students when deciding on a career, more so than actual clinical experiences, although it may be assumed that the clinical experience helped them to identify how much each area of medicine can fulfil their needs.

An important consideration is that despite students’ interest and the impact of various influential factors, it is not always feasible to follow the career path one first envisioned, and other factors, such as the number of training positions available, which are perhaps more causal than influential take precedence.

### ***Interest in considering a research career***

Whilst the overall level of interest in research was moderately positive, 40% of students answered yes, they would consider a research career, there was some variation between schools, gender, and year group.

INSERT TABLE 2 ABOUT HERE

The University of Sydney Medical Program (USydMP) and Flinders University are graduate entry programs, and as seen in Table 2, they do not have a significantly greater number of students interested than other schools. Having had research experience, as might be expected of graduate-entry students, can be both a positive and negative influence.

Overall, a linear regression showed that gender was a statistically significant predictor of considering a research career, ( $R = .078$ ,  $p = .003$ ,  $t = 32.94$ ) with females more likely to say yes, they were considering a research career. This supports Dohn's (1996) findings. Age was not a significant predictor.

In terms of actively considering a research career, on a school by school basis, only The University of Western Australia (UWA) had a significant gender difference, favouring females ( $\chi^2_{(1)} = 4.7$ ,  $p = .03$ ), and the USydMP, Newcastle and Monash had significant differences by year enrolled, favouring first year students ( $\chi^2_{(3)} = 8.01$ ,  $p = .04$ ;  $\chi^2_{(4)} = 12.16$ ,  $p = .03$ ;  $\chi^2_{(4)} = 10.9$ ,  $p = .03$  respectively)

To gain a better understanding of how students perceive a research career and how to encourage this in future cohorts, participants were asked why they would or would not consider this path. Table 3 highlights the main categories under which responses were coded.

INSERT TABLE 3 ABOUT HERE

The results in Table 3 show that some students have a strong inclination to work with people and may have a somewhat narrow view of what research involves. It is interesting that 'previous research experience' was cited as a reason for both those who answered yes, and those who answered no, they were not interested in considering a research career. There is also some clear interest expressed in following the clinician-scientist model, with students wanting to integrate research with part time clinical practice.

Despite the positive inclination towards research by some students, most think of research as being stuck in a laboratory all day. This is further illustrated with some student comments:

Because I chose medicine in order to have contact with people, not be locked up in a lab. If I wanted a research career I would have done biomedical science

[1414. 18 year old first year male from Monash]

I don't believe it's as interactive as a more clinical role. Would hate to be stuck in a lab all day long conducting tests

[636. 18 year old first year female from Newcastle]

I think that there is not enough interaction with patients and it has the potential to be tedious and isolating.

[111. 19 year old second year female from UNSW]

I would prefer to interact with people, and research brings images of labs and/or computers more than patients.

[1287. 22 year old fifth year male from Tasmania]

Whilst some students, through previous experience, did recognise that certain aspects of research, particularly clinical research, had patient contact, they were aware of detractors such as competing for funding and the possibility that the time and dedication to a project may reveal insignificant results. It is of concern however that the majority of respondents may be ill informed about the various aspects of research and have dismissed it without further consideration, unaware that clinical research can involve direct interactions with patients in

the clinical setting. As noted by one clinician-scientist, “a career in academic medicine is one of the most interesting and rewarding paths a doctor can take. It provides the opportunity to combine a doctor’s core role – caring for patients – with the excitement of clinical research and the rewards of teaching” (Pusey, 2002:180). Follow up studies exploring students’ views of this type of career through interviews would help to understand this further.

It is heartening to see that other students remain more altruistically focused and recognise that research can contribute to the advancement of medicine. Students who commented this way specified that they felt research was where they could make the greatest contribution to patient care:

Because I feel that I have an obligation to give something back and further the field to which I have contributed my life’s work

[417. 21 year old first year female from Sydney]

Because, most major medical advancements (curing diseases etc) are the result of medical research. I think that this is an area, where potentially you can have the greatest impact, as these breakthroughs can benefit more people than you could ever help as a clinician

[768. 21 year old third year female from Newcastle]

I believe research is the way to find answers and make real changes. Clinical practice is making changes on a small scale, whereas research has the potential to make changes on the larger scale.

[1437. 21 year old third year female from Monash]

***Barriers to achieving career goals***

Weighing heavily on all the students' minds was the realistic view that the career goal they had may not be achievable due to competition. The competition for and lack of training places was perceived to be the most common barrier in achieving their career goal (mentioned by 316 students). This barrier was followed by Juggling family commitments (260), No barriers (114), Passing exams (103), Time (89), and Money (85).

Students seem to have realistic expectations for what their future holds and are aware of the long training queue and long training track. It is not surprising therefore that 'Juggling family commitments' is one of the more commonly mentioned barriers. As might also be expected, 87% of respondents who mentioned this were female. A few more caveats need to be made about responses to this question. Firstly, when 'Passing exams' was mentioned, it referred to both medical school and specialist training college exams. Secondly, by 'Time', students mean the length of time it will take to reach their career goal, and associated with this is the 'Money' it will take to fund their training. Combined with trying to have a family it all seems insurmountable!

## **Discussion**

Although AMWAC's (2003) study found that only 20% of doctors chose their current discipline by the end of medical school training, the results of this study are enlightening as they indicate students' current perceptions at a time where faculty can introduce change to alter those views or investigate further. They also compliment Wright et al's (2006) recent study of incoming medical students in Australian medical schools. Despite the unstable nature of career preferences of medical students, the fact that 40% of students are interested in potential research careers is encouraging. Medical schools and training organisations need to build on this interest by offering alternative career pathways that will enable graduates to pursue this interest within a flexible training program. One of the main reasons for lack of student interest in research as a career option is because they believe a research career reduces interactions with people. This suggests that students need to be better educated about the diversity of careers available in the research and academic areas in addition to those available in more clinical domains. The information gathered suggests that students are not sufficiently aware of the subtleties in career choice and availability of different training pathways that may promote and support those who want to become clinician-scientists. It is possible that the questions about research may have been interpreted in a way which presents a research career as mutually exclusive from clinical practice. Many students commented however that they would be interested in conducting research in addition to, or alongside of their clinical practice, this suggests that some students are aware of such pathways. To facilitate debate on this issue and how best to channel student interest in research into practice, there needs to be more studies conducted which illustrate the effect on student interest in research as a career option. These interventions need to be aimed at increasing awareness of different career pathways involving research and how they may become clinician-scientists.

The results of this study of medical students mimic those influencing factors reported in the Australian literature. For example, the AMWAC (2003) study of medical graduates in training, and Laurence and Elliott's (2007) study of South Australian pre-registration junior medical officers. This suggests that although this study is only a 'snapshot', not much seems to have changed in terms of driving forces between medical school and training positions. As noted in the AMWAC report, "there is greater opportunity for governments, health authorities, and the medical profession to make changes to the extrinsic determinants of career choice than to the intrinsic determinants" (p.29)

The usefulness of changing the extrinsic determinants is evidenced by research which shows that career choices tend to be negative, meaning that careers are rejected because they do not have attributes which are consonant with the person making the choice, rather than positively chosen for their special suitability (Petrides et al 2004). Some of the responses to the open-ended questions in the reported study here support this claim. Some effort has been made in some specialisations however to remove this trend. The American Neurological Association (ANA) for example is providing more flexibility during residency training to increase exposure to research. They are also conducting annual courses in research for academically oriented residents and have instituted mentoring and career guidance as a priority; The ANA further suggest that three month blocks in the final year of medical school and in the PGY1 year could be incorporated to provide training in the principles of research methods within a variety of fields. Additionally, a course in clinical or laboratory-based research in PGY1 could provide further exposure at a time when junior doctors are making decisions about their career path (ANA Long Range Planning Committee, 2006). Pusey (2002) also suggests providing a structured and flexible training programme for clinical academics which involves research towards a PhD together with some clinical training.

Although the response rate from each university was not high, it is not surprising given that the survey was distributed electronically (Braithwaite et al 2003; Underwood et al 2000). The benefits of such a method, ease of distribution across Australia, outweighed the cons however. The study may have been improved by the collection of identifiable information to allow long term analyses of academic achievement and career preference. However, this may have resulted in an even more reduced response rate and looking at the relationship between achievement and career preference was never an aim. The study would be more rigorous with the inclusion of all of the medical schools in Australia and perhaps by targeting specific year groups within each course. Although it may be argued that the responses may be biased toward those who are actively considering a research career, the fact that just 40% expressed a desire to do so is evidence against this. Also, the survey was advertised with the title ‘career intentions’ and references to pursuing a research career were only made in the preamble. This study was exploratory in nature and aimed to create a ‘snapshot’ of how medical students perceived research as a career. This was achieved with the use of open-ended questions. Despite this, students may have interpreted the question “what is your future career choice” to be restricted to one option only. However, as 45% of students provided two career choices, 21% provided three career choices, and 9% provided four or more options, it is unlikely that most students felt restricted in their response. To this end, the methods of the study have met the aims intended. Moreover, due to the lack of published literature in an Australian context to compare these results with, this study provides valuable knowledge to the medical education community on which to build further, more rigorous investigations.

Further research might trial some interventions to change students’ skewed perception of what a research career entails and what the different career pathways might involve. It is especially

important that medical schools educate students about what it means to be a clinician-scientist and that most research can be undertaken in outpatient or inpatient settings. Students need to be informed that having a research career does not entail giving up clinical practice and that with further training, they can in fact become a clinician-scientist and do not have to be restricted to one or the other. This can not occur in a vacuum however, and changes must be made within individual training colleges as well to encourage this.

On a methodological note, it is important to clearly define what is meant by the questions asked of students in this area. It may be helpful for example to distinguish between 'career choice' which could refer to medicine, 'specialty preference', and 'specialty destination'. It has also been suggested that incorporating more career guidance activities into each program can be useful for the professions and students alike (AMWAC 2003).

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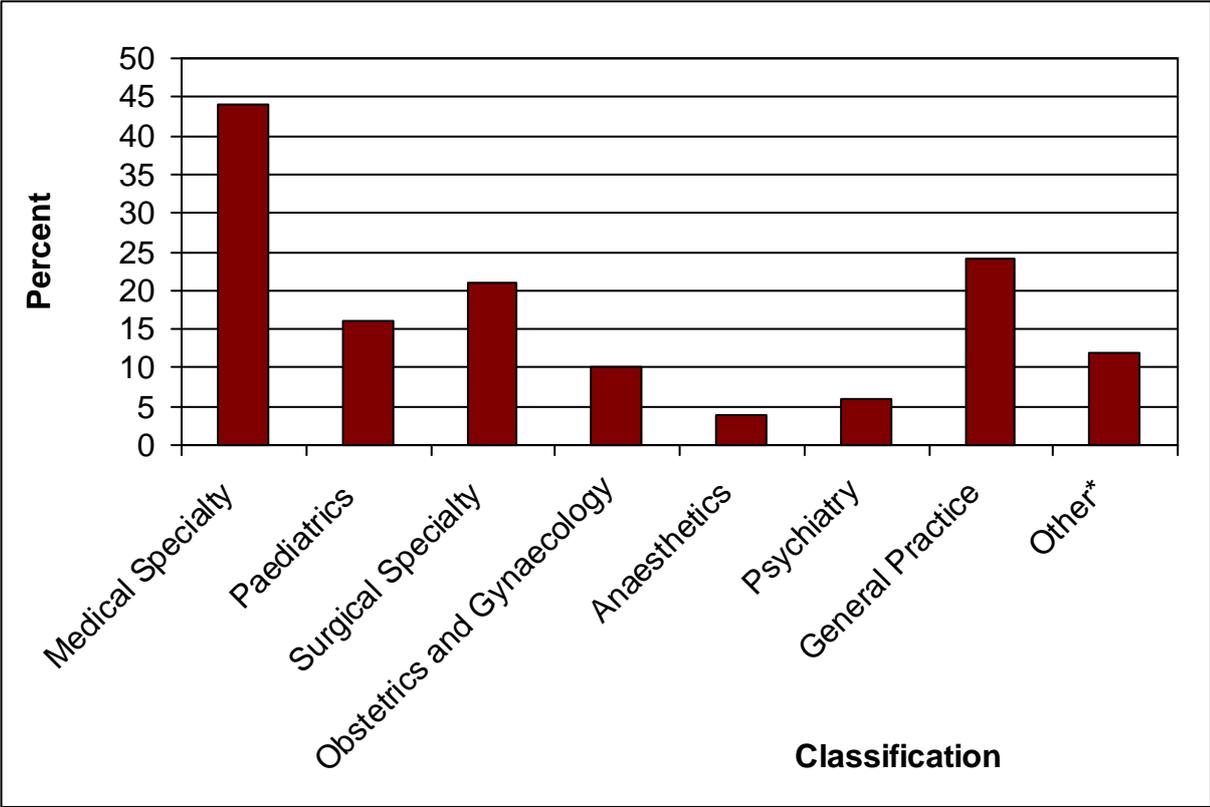
Table 1

Population and sample mean age and gender at each university

<b>University and year sampled</b>	<b>Mean age Population*</b>	<b>Mean age Sample</b>	<b>Number and % Population Female</b>	<b>Number and % Sample Female</b>
<b>UNSW</b> 2004	21.7	21.3	673 (53 %)	161 (59 %)
<b>USydMP</b> 2004	24.8	25.9	517 (55 %)	175 (55 %)
<b>Newcastle</b> 2005	20.8	22.7	274 (60 %)	97 (63 %)
<b>Flinders, SA</b> 2004	25	25.9	188 (49 %)	88 (56 %)
<b>UWA</b> 2005	21	18.5	477 (54%)	151 (57 %)
<b>Tasmania</b> 2004	19	19.9	234 (49 %)	64 (56 %)
<b>Monash</b> 2004	18	19	602 (61 %)	96 (60 %)

\* Information obtained from Committee of Deans of Australian Medical Schools

Figure 1: Medical Students' future career choice



\*Other included international health, working in developing countries, public health, genetics, sports medicine, research, and rural practice

Table 2

Interest in a research career by University

<b>Uni</b>	<b>Number and %</b>	<b>Research exposure in the course</b>
UNSW	99 (36%)	Honours by research available as an extra year at completion of MBBS  Independent Learning Project with supervision in year 3
USydMP	144 (45%)	Research based education  assignment in years 1 and 2.  Honours projects offered in years 3 and 4.
Newcastle	58 (39%)	Optional small project involving literature search, data  collection and analysis; Additional research year, equivalent of honours
Flinders, SA	54 (35%)	All students do a community research project in year 2 and  there are opportunities for research electives across a range of disciplines. A combined BMBS/PhD is available
UWA	105 (40%)	Half a day per week research option in year 4; MBBS/PhD  offered
Tasmania	48 (42%)	6 month elective on research project tied to honours
Monash	62 (38%)	Electives

Table 3

Why students are interested in research careers

<b>Why I would consider research as a career</b>	<b>Why I would not consider research as a career</b>
Only if I can integrate it part-time with clinical practice ( <i>149 mentions</i> )	I enjoy the human side more/prefer people contact ( <i>370 mentions</i> )
To advance medicine ( <i>121</i> )	Not interested/boring ( <i>182</i> )
Interesting ( <i>116</i> )	Previous research experience ( <i>91</i> )
Previous research experience ( <i>92</i> )	Prefer clinical work ( <i>73</i> )

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