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WEB PAPER

Medical students' and prospective medical students' uncertainties about career intentions: Cross-sectional and longitudinal studies

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Abstract

Background: Policy prompts medical students' earlier career awareness.

Aim: To explore changes and uncertainty in medical (and prospective medical) students' career intentions in a 5-year problem-based curriculum.

Methods: Six postal questionnaire surveys of medical students and one survey of prospective medical students sought career intentions from three entry-cohorts (one also seeking why they chose medicine, and one, the reason for the career intention).

Results: From the 973 (91.4%) 2001/02 admission interviewees responding, 74/189 (39.2%) of those admitted and remaining 'in-year' re-reported career intentions 5 years later (2006/07). Of the 1999 entrants (start-Year 1; end-Year 1; and mid-Year 3) and 2001 entrants (start-Year 1 and end-Year 1), 61.2–77.9% responded. Up to mid-programme, only 9.5–18.8% reported general practice, significantly more of whom described altruistic reasons for choosing medicine (2001 entrants). Tracked longitudinally, career intentions stayed relatively stable, but a small significant retreat from general practice over Year 1 predated clinical placements. From pre-admission to mid-Year 5, uncertainty decreased significantly, but 14.9% replied 'do not know' both times. Significantly more prospective students from the least affluent English or Welsh postcodes specified a career intention.

Conclusion: Many students might delay considering career intentions, particularly general practice. Socioeconomic determinants of early medical career decision making merit further study.

Introduction

The vast literature about medical career choice is generally inconclusive, and reports little specifically about how medical students' intentions change longitudinally during their studies, from the outset. Nevertheless, the policy agenda prompts earlier career awareness, for example, via undergraduate special study components (General Medical Council 2003; Independent Inquiry into Modernising Medical Careers 2008), and improvements in postgraduate medical training. Shortening and restructuring the medical career pathway and refining career intentions in the foundation years (Crockard 2004; The Departments of Health 2004) should redress the previous impression of 'lost tribes' (Dillner 1993), but avoid creating others (Independent Inquiry into Modernizing Medical Careers 2008).

The Tooke review questioned whether Modernising Medical Careers (MMC) had pushed career decision making too early in training (Independent Inquiry into Modernising Medical Careers 2008), despite MMC mostly originating from a chief medical officer's report (Donaldson 2002) acknowledging the undesirability of premature decision making. Although both reports cited longitudinal evidence (British Medical Association 1995, 2001) that 24% of entrants to the former senior house officer (SHO) grade changed their career preference at least once within 3 years, this has

Practice points

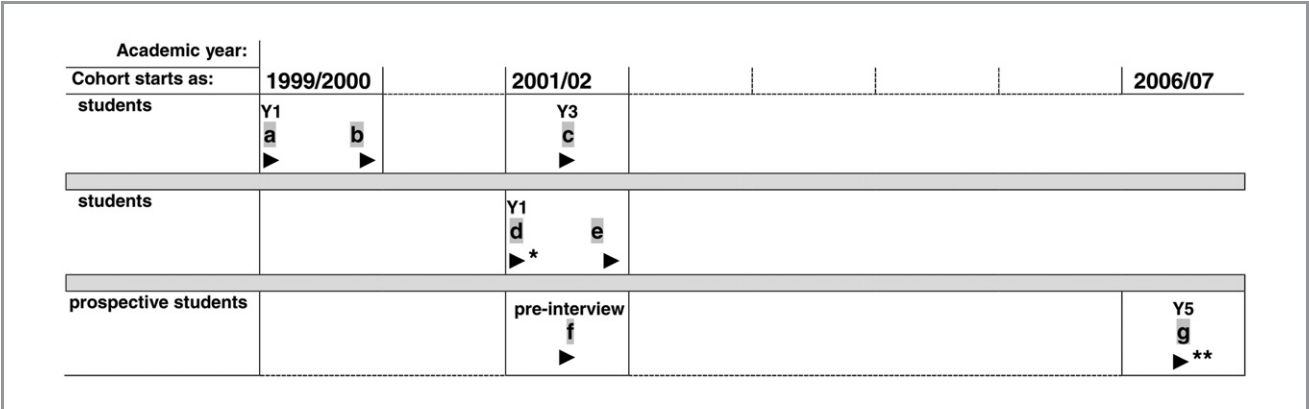
- This study showed that many medical students remained uncertain about their career intentions throughout medical school.
- Only 18% and 9–15% of prospective and junior medical students, respectively, intended entering general practice (which might associate with altruism), despite its being the main ultimate destination; and significant change away from general practice occurred even before formal clinical contact.
- Lower socioeconomic status apparently associated with prospective students specifying a career intention rather than reporting uncertainty.

arguable implications given the many potential confounders involved.

A complex web of determinants (Kiker & Zeh 1998; Newton et al. 1998) underpins medical career intentions and choice, from perceived career characteristics (e.g. lifestyle and income; Newton et al. 2005), to demography, personal values (Allen 1997; Wright et al. 2004), personality (Clack et al. 2004) and medical school experience (Grayson et al. 2001; Jordan et al. 2003). There is less published about how soon

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Box 1. Questionnaire surveys about career intentions of Liverpool medical students: The timing of the seven surveys.



Open question explored reason(s) for choosing medicine* and the reason for the stated career intention**.

contemporary medical students should (or do) formulate reasonably firm career intentions, how much change to expect (and trends) in these, and their demographic determinants. Medical students' views of their career might affect how they use their learning opportunities at medical school and how fixed their career mindset is by graduation. Persisting worldwide concerns (Katz et al. 1984; Matorin et al. 2000; Lambert et al. 2002; Newton & Grayson 2003; Ward et al. 2004; Schwartz et al. 2005) about general practice careers being unattractive to medical students and doctors pervade the literature, while health care and curriculum reforms (undergraduate and postgraduate) attempt to meet population health needs with more community-orientated health care.

Career 'epidemiology' has focused more on senior medical students (Burack et al. 1997) or doctors (Allen 1988, 1994, 1999; Lambert et al. 2003; Goldacre et al. 2004) (often junior and often cross-sectionally), with notable exceptions such as Allen (1999) and the United Kingdom Medical Careers Research Group (Allen 1999; Lambert et al. 2002; Goldacre et al. 2004). In contrast, this study explored changes and uncertainty in prospective, junior, and senior medical students' career intentions (cross-sectionally and longitudinally), in a 5-year problem-based curriculum.

Methods

Cross-sectional and longitudinal study design and approval

The career intentions of three entry-cohorts were sought using the same closed question in seven questionnaire surveys ([a–g], Box 1). Additionally, one of these surveys explored reason(s) for choosing medicine* [d] and one explored the reason for their stated career intention** [g], each using an open question.

- Five postal surveys of junior medical students:

- 1999 entry-cohort:

- ▶ Start-Year 1; ▶ end-Year 1; ▶ mid-Year 3 [a–c]

- 2001 entry-cohort:

- ▶ Start-Year 1*; ▶ end-Year 1 [d–e]

- one survey of prospective medical students (by hand, on campus before admissions interview) and one follow-up postal survey of those admitted (when senior students):

- Prospective 2002 entry-cohort:

- ▶ Pre-admission: in 2001–2002; ▶ mid-Year 5 for 2006/07 year-group** [f–g]

Chronologically, the first six datasets [a–f] came from a larger 'mixed methods' study of Liverpool medical students' learning expectations and experience in a problem-based curriculum, which the Director of Medical Studies approved. The much later, seventh survey of senior students [g] was nested within a larger mixed methods study about their personal epistemology, for which the recently formed University Committee on Research Ethics gave ethics approval (University ref. RETH000006; Faculty ref. 200609004). All the research was kept separate from official admission, curriculum and assessment procedures.

Analysis

From the closed question, analysis used simple frequencies and cross-tabulations of broad career categories, seeking trends and patterns, both in cross-sectional data across the entry-cohorts and in longitudinal data linking individuals within each of the three entry-cohorts.

The dependent variable in logistic regression (forced entry method) of the admission interviewees' career intentions was whether or not they answered 'do not know'. Independent variables used included Townsend deprivation score (Townsend et al. 1988) derived from English or Welsh home postcodes of school leavers (where –8.8 and +13.7 represent the least and most deprived wards for: unemployment, car ownership, non-owner occupation and household overcrowding; mean = 0).

From the open questions:

Prior inductive analysis of how the 2001 entrants' completed 'I chose Medicine because...' had generated broad themes (reported elsewhere; Maudsley et al. 2007), including altruism (i.e. wanting to help people, make a difference to society, or give something to Medicine). Here, cross-tabulations then used a categorical variable, comprising whether or not answers expressed this.

Inductive analysis of phrases completing 'I favour this [career intention] because...' generated broad themes from mid-Year 5 (2006/07), including from the linked subset of 2002 entrants who had kept progress with their original year-group and had responded to the pre-admission survey.

Data handling used SPSS 12.0.1, Microsoft Office Excel 2003 and StatsDirect 2.4.5 software.

Results

Response from the first six surveys [a–g]

Of the interviewees (in 2001/02) for admission, 973 (91.4%) responded [g], including 363 (37.3%) males and 787 school leavers (80.9%), reflecting the applicant pool and intake. Of the 1999 entrants, 68.0%, 61.2% and 77.9% responded postally to the three linked surveys, respectively [a–c]. Of the 2001 entrants, 71.0% responded to each survey [d–e]. There were no notable age–sex differences between responders and non-responders (data not shown).

Overview of tabulated findings (Table 1a–c)

Key findings (tabulated) related to the:

- Cross-sectional analyses (Table 1a): Hospital career intentions prevailed over general practice intentions at each time-point
- Longitudinal analyses (Table 1b): Linked (paired) data for the same individuals showed some tendency for general practice intentions to dissipate over time
- Cross-tabulation with socioeconomic status (most affluent *vs.* least affluent) (Table 1c): A statistically significant association was evident with whether a responder specified a career intention or answered 'do not know'

Career intentions: Trends and patterns in cross-sectional data

Generally, hospital consultant was the commonest reported career intention (Table 1a).

Of *answers reporting a specific intention* rather than 'do not know', between 15.5% (end-Year 1, 1999 cohort) and 22.0% (end-Year 1, 2001 cohort) of junior medical students and 26.4% of admission interviewees (whether admitted or not; *see below for further analysis of the longitudinally linked subset*) intended a general practice career.

Of *all answers, including 'do not know'*, from prospective and junior students, 9.5% (1999 cohort, end of Year 1) to 18.8% (interviewees who were subsequently admitted) indicated general practice. The interviewees' response (6–10 months ahead of possible admission) was not significantly greater than for students at entry from the other two cohorts (table footnote). Interviewees also did not differ significantly for other variables, whether subsequently admitted or not:

- age or sex
- whether or not they reported:
 - 'white' ethnic group ('home' only)
 - at least one medical parent (33/233, 14.2% *vs.* 105/722, 14.5%: Yates-corrected $\chi^2 = 0.001_1$, $p = 0.971$)
 - general practice intentions (18.8% *vs.* 125/723, 17.3%: Yates-corrected $\chi^2 = 0.20_1$, $p = 0.658$; 95% confidence interval (CI) on difference of 1.5%: –3.8% to 7.5%) compared with other answers combined
 - 'do not know' (35.6% *vs.* 233/723, 32.2%: Yates-corrected $\chi^2 = 0.76_1$, $p = 0.383$; 95% CI on difference of 3.3%: –3.4% to 10.4%) compared with a specific intention
- whether they were in the relatively affluent three-fifths on the Townsend Index ('home students', England/Wales school leavers only) [*data not shown*]

Amongst the medical students (including subsequently admitted interviewees, but not interviewees overall), females consistently exceeded males for general practice intentions [*data not shown*], but only significantly so for the 2001 cohort at entry (16.8% of 125 females; 5.4% of 74 males: Yates-corrected $\chi^2 = 4.51_1$, $p = 0.034$; 95% CI on difference of 11.4%: 2.1–19.9%). In that survey, significantly more responders who indicated altruism when describing why they chose medicine intended to be general practitioners (14/77, 18.2%) than those not showing altruism (9/114, 7.9%) (Yates-corrected $\chi^2 = 3.67_1$, $p = 0.055$; 95% CI on difference of 10.3%: 0.8–21.2%). Indicating altruism did not differ significantly between males and females [*data not shown*].

Career intentions longitudinally: Linked from start- to end-Year 1

Tracked longitudinally, most students kept the same career intentions in the early years (Table 1b). Comparable proportions in both medical student cohorts (63.5% *vs.* 72.0%, table footnote) reported the same intention at the start and end of Year 1 (Yates-corrected $\chi^2 = 1.73_1$, $p = 0.189$; 95% CI on difference of –8.5%: –20.2% to 3.0%). By mid-Year 3 of the 1999 cohort, 52.1% reported as at entry.

In both cohorts (1999 and 2001 entrants), however, changes between the main categories suggested movement, albeit non-significant, *from* general practitioner to hospital consultant or 'do not know', and *between* hospital consultant and 'do not know' (Table 1b). Both cohorts combined showed that intentions were more likely to change *from* rather than *to* general practice over Year 1, just reaching significance (19/40

Table 1a–c. Questionnaire surveys about career intentions of Liverpool medical students (1999 and 2001 entrants: At start and end of Year 1; and mid-Year 3 for 1999 cohort); and candidates on interview days (2001–2002) and mid-Year 5 (for this 2002 cohort): number (percentage).

Table 1a: Cross-sectional studies			no (%)	general practitioner (GP)	hospital doctor (consultant) (H)	community or public health doctor (consultant) or other (C, P, O)	do not know (DNK)	Total
2001/02 interviewees (of 1,064):				170 (17.7)	423 (44.0)	51 (5.3)	318 (33.1)	962† (100.1)
Of 275 subsequently admitted				45 (18.8)*	99 (41.4)	10 (4.2)	85 (35.6)	239 (100.0)
Subset of n=74 with data linking 2001/02 & 2006/07	{	pre-admission (2001/02)	12 (16.2)	29 (39.2)	3 (4.1)	30 (40.5)	74	
		mid-Y5 (2006/07)	19 (25.7)	36 (48.6)	3 (4.1)	16 (21.6)	74	
Mid-Y5, whole year-group of 2006/07 (of 317)				26 (22.6)	61 (53.0)	4 (3.5)	24 (20.9)	115‡
1999 cohort (of 228) ▪ Start-Y1				18 (11.8)	68 (44.4)	10 (6.5)	57 (37.3)	153§
(of 224) ▪ End-Y1				13 (9.5)	62 (45.3)	9 (6.6)	53 (38.7)	137 (100.1)
(of 204) ▪ Mid-Y3				23 (14.6)	82 (51.9)	6 (3.8)	47 (29.7)	158‡ (100.0)
2001 cohort (of 283) ▪ Start-Y1				25 (12.6)	86 (43.2)	11 (5.5)	77 (38.7)	199§
(of 279) ▪ End-Y1				24 (12.2)	75 (38.3)	10 (5.1)	87 (44.4)	196§

Table 1b: Longitudinal studies			Individuals give unchanged answer (%)	GP	H	C, P, O	DNK	Total
1999 cohort:								
153 } 104 paired ¶ replies	{	Start→end-Y1: 63/97 (64.9) who answered GP, H, or DNK did so both times						
		▪ GP→ n=16	7 (43.8)	4 (25.0)	0 (0)	5 (31.3)	(100.1)	
		▪ H→ n=45	3 (6.7)	32 (71.1)	4 (8.9)	6 (13.3)	(100.0)	
		▪ DNK→ n=36	1 (2.8)	10 (27.8)	1 (2.8)	24 (66.7)	(100.1)	
153 } 117 paired ** replies	{	Start-Y1→mid-Y3: 58/109 (53.2)						
		▪ GP→ n=17	5 (29.4)	5 (29.4)	0 (0)	7 (41.2)	(100.0)	
		▪ H→ n=50	6 (12.0)	34 (68.0)	3 (6.0)	7 (14.0)		
		▪ DNK→ n=42	5 (11.9)	18 (42.9)	0 (0)	19 (45.2)		
137 } 115 paired †† replies	{	End-Y1→mid-Y3: 67/107 (62.6)						
		▪ GP→ n=12	5 (41.7)	4 (33.3)	0 (0)	3 (25.0)		
		▪ H→ n=50	3 (6.0)	39 (78.0)	1 (2.0)	7 (14.0)		
		▪ DNK→ n=45	7 (15.6)	15 (33.3)	0 (0)	23 (51.1)		
2001 cohort:								
199 } 157 paired ‡‡ replies	{	Start→end-Y1: 111/149 (74.5) ¶						
		▪ GP→ n=24	14 (58.3)	2 (8.3)	3 (12.5)	5 (20.8)	(99.9)	
		▪ H→ n=62	1 (1.6)	48 (77.4)	1 (1.6)	12 (19.4)	(100.0)	
		▪ DNK→ n=63	2 (3.2)	10 (15.9)	2 (3.2)	49 (77.8)	(100.1)	

Table 1c: Cross-tabulation with socioeconomic status England & Wales residents				
2001/02 interviewees: school-leavers (range −7.6 to +12.8):		specific career intention	DNK	
▪ most affluent three quintiles§§		274 (61.2)	174 (38.8)	448
▪ least affluent two quintiles of		170 (69.7)	74 (30.3)	244
1991 Townsend scores from reported postcode		Yates-corrected $\chi^2=4.61_1$, p=0.032		692 (100.0)

Notes: All totals do not add to 100.0% due to rounding. Not all students responded each time or to each question, thus denominators differed. *18.8% vs. 11.8% (1999 cohort at entry); Yates-corrected $\chi^2=2.947$, $p=0.086$; difference 7.1%: 95% confidence interval (CI) −0.4 to 14.0. 18.8% vs. 12.6% (2001 cohort at entry); Yates-corrected $\chi^2=2.725$, $p=0.099$; difference 6.3%: 95% CI −0.7 to 13.0. A further †11, ‡1, and §2 questionnaire responder(s), respectively, omitted this question. The tabulated longitudinal data exclude the few starting in the remaining groups ('C or O'), i.e.: ¶7 leaving 97 eligible pairs tabulated, **8 leaving 109, ††8 leaving 107 and ‡‡8 leaving 149, of which: 3, 3, 4 and 2 had unchanged answers, respectively. Including these data would give all paired replies, of which 63.5%, 52.1%, 61.7%, and 72.0% were unchanged overall.

§§All three cohorts: slightly right-skewed frequency distributions; about 3/5th on negative (more affluent), 2/5th on positive scores.

In 1999 cohort, $n=90$ responded at all three points: 33, 31, and 24 gave DNK, Cochran's $Q=3.62$, $p=0.164_2$; 15, 10 and 12 gave GP, Cochran's $Q=1.73$, $p=0.422_2$. In 2001 cohort: 14 and 19 changed from DNK ↔ specific intention, McNemar exact $p=0.487$; and 10 and 4 changed from GP ↔ not GP, McNemar exact $p=0.180$.

[47.5%] vs. 8/221 [3.6%] of the 261 eligible responders, respectively; McNemar exact $p=0.05$).

Both cohorts combined also suggested that males (73/97, 75.3%) were slightly more likely than females (106/165, 64.2%) to report the same career answer (including 'do not know') over Year 1, but this was not significant (Yates-corrected $\chi^2=2.93_1$, $p=0.087$; 95% CI difference on difference of 11.0%: −0.7% to 21.9%). Males and females

did not differ significantly in answering 'do not know' in any of the surveys [data not shown].

Career intentions longitudinally: linked from pre-admission to mid-Year 5 [f–g]

Tracked longitudinally from pre-admission (2001/02) to mid-Year 5 (2006/07), 74/239 (31.0%) of the original

Box 2. Questionnaire surveys about career intentions of Liverpool medical students (mid-Year 5, 2006–2007): Comments from 18 of the 23 responders intending to be a hospital consultant, not otherwise specified ($n = 14$), or specifying more than one specialty ($n = 4$): 'I favour this [career intention] because ...'.

- 'Can focus on area of particular interest, treating pts first hand'
- 'I have really enjoyed all of my hospital rotations + enjoy working in a hospital clinical environment'
- 'I am interested in **obs + gynae and also cardio-respiratory medicine. Also I really liked A + E** – it is hard to decide now!'
- 'I don't like GP. I like the busyness [sic] of hospital medicine and also the more social aspect - more people - staff + patients'
- 'I enjoy hospital atmosphere, the pressure + 'buzz' of the job'
- 'I feel it is important to specialise in a field you [sic] most comfortable with'
- 'I have enjoyed my attachments in these areas greatly. There's always a new challenge [sic] & a plethora of information to learn' [specified: 'A&E or OBS + GYNAE']
- 'I have had the best medical experience in this'
- 'I like acute medicine'
- 'I like the fact there are many specialties [sic] in hospital medicine'
- 'I like the structure of lots of firms working both independently and together'
- 'I prefer the hospital atmosphere and patient interaction'
- 'I prefer to be a doer rather than a thinker. I like to be at the heart of things, busy and part of a team'
- 'It's always change [sic]. I like to have specialist knowledge and do research.' [specified: 'Haematology or Paediatrics']
- 'More interesting/challenging intellectual, more acute medicine'
- 'Of the opportunities [sic] to conduct my own research'
- 'variety of patients and depth of knowledge'
- 'Variety, acute nature of cases' [specified: 'Trauma & Orthopaedics or A&E or Anaesthetics']

responders who were admitted went on to re-report career intentions 5 years later (Table 1a). This was 74/189 (39.2%) of those remaining 'in-year' or intercalating, given that the pre-admission study excluded those who were interviewed earlier than 2001/02 and the follow-up study excluded those who deferred entry, suspended or terminated studies, or retook years. Overall, significantly fewer reported 'do not know' for career intention after 5 years in medical school. More changed from 'do not know' to an explicit intention compared with vice versa (19/30, 63.3% *vs.* 5/44, 11.4%, McNemar exact $p = 0.007$), and 11/74 (14.9%) reported 'do not know' for both surveys.

Although, mostly comprising 5-year students interviewed in 2001/02, the whole Year 5 of 2006/07 also included the first cohort of 4-year graduate entry programme students and others entering that year-group at different points for academic progress or other reasons. There was, however, no significant difference for general practice *versus* not, or specific career intention *versus* 'do not know', between the 74 interviewees of 2001/02 who had participated in the pre-admission survey and the rest of Year 5 [*data not shown*]. For this whole year-group, 24/115 (20.9%) reported 'do not know' for career intentions, but not significantly lower than the 29.7% in mid-Year 3 of the 1999 cohort (Yates-corrected $\chi^2 = 2.28_1$, $p = 0.131$).

Of admission interviewees expressing a specific intention, 26.4% stated general practice, compared with 28.6%, 5 years later, for the Year 5 that included most of those admitted. There was, however, no significant change in the longitudinally linked subset (28.2% *vs.* 35.9% in the $n = 39$ who expressed a specific intention both times; McNemar exact $p = 0.45$).

In this longitudinally linked subset, compared with 'non-general practice' answers (including 'do not know'), similar proportions of responders moved *away from* and *towards* general practice (3/12, 25.0% *vs.* 10/62, 16.1%, McNemar exact $p = 0.092$), although the slightly higher percentage moving away coincided with the significant movement in the other cohorts.

While only 12/74 (16.2%) indicated general practice pre-admission (similar to Year 1 figures in the preceding cohorts), 9/12 (75.0%) still expressed this same career intention 5 years later (and only 2/9 had a medical parent). Of the 6/9 commenting further, they attributed their general practice intention mostly to greater variety; flexibility/being less stressful; or, for one person, its perceived inevitability given this curriculum:

- 'I like the variety of medicine you will encounter in general practice'
- 'Variety'
- 'I like the variety, getting to know patients'
- 'I don't think I could cope with the stress of any other alternatives'
- 'I would like to combine my medical career with a family life and I think that this is the most amenable to that'
- 'This course has not equipped me to be anything other than a 'generalist''

For Year 5, overall (i.e. including the linked subset), 13/26 (50.0%) with general practice intentions invoked the above broad theme of 'flexibility/working hours and/or stability/less stress (for family life or work/life balance, as above also)', for example:

- 'Having a Good Work-Life balance is extremely important to me. I am not so concerned about the amount of pay I earn'
- 'At this time it seems the most stable career option that enables good family life & work combination'

Other answers involved: greater variety (4) (as above); getting to know patients and their needs (2); prompted by the curriculum (as above) or by MMC changes (2); always wanting to do this (1); and wanting a career in medical politics (1). Only three gave no reason.

For Year 5 overall, of those preferring hospital medicine, 38/61 (62.3%) named a particular specialty or subgroup of specialties, with most (11/38 [28.9%]) naming medical specialties (including general internal medicine/acute medicine,

cardiology, dermatology, genitourinary medicine), followed by surgical specialties (9: including general surgery, orthopaedics and trauma surgery and neurosurgery), obstetrics and gynaecology (8) and paediatrics (6). Two responders cited clinical radiology and two intensive care/anaesthetics, respectively. Of the 23/61 remaining responders, four named more than one broad specialty and 19 named none. Their reasons for hospital consultant intentions included (Box 2): enjoyable placement experience, the (busy) hospital environment and greater variety of patients/opportunities/challenges for in-depth knowledge/research. Only one responder mentioned not liking general practice.

Amongst the dataset, exceptions were two Year 5 responders intending a *community* consultant career. Both specified psychiatry and both mentioned commitment to making a difference:

- 'It is interesting: each case is unique. Not many people want to do it, so it is beneficial. I want to provide a good care service for people w/mental illness'
- 'It is the area I am most interested in and it stimulates my enthusiasm and commitment'

Career intentions *versus* socioeconomic status in cross-sectional data: Logistic regression [f]

Of 'home' school-leaving (<21 years old) interviewees with English or Welsh permanent addresses, those from the least affluent postcodes were significantly more likely to report a career intention (69.7% *vs.* 61.2%, Table 1c) than 'do not know', but no specific category predominated [*data not shown*]. Likewise, the Townsend score was the only significant independent variable ($p=0.027$) in logistic regression on 'do not know', adjusting for age, sex, ethnic group and whether a parent was medical ($n=680$), albeit with a minimal effect size at $\text{Exp}(B)=0.95$ (95% CI: 0.90–0.99). The model explained only about 1.1%–1.6% of variation in outcome (Hosmer–Lemeshow test: $\chi^2=8.63_8$, H_0 =no difference between observed and predicted, thus $p=0.374$ suggested that the model *did* fit the data). This was consistent, however, with lower affluence being associated with marginally more certainty about career intention.

Discussion

In this problem-based curriculum, while significantly more students specified a career intention near-graduation compared with pre-admission, targeted careers advice might have helped the 15% reporting 'do not know' both times. Indeed, the Tooke Report noted that medical schools should increase formal personal careers advice and mentoring (Independent Inquiry into Modernizing Medical Careers 2008). In this study, few students had general practice intentions (and significantly fewer by the end of Year 1, despite having yet to start clinical placements), but students with these from the outset mostly reported similarly in mid-Year 5. The longitudinal design increased data robustness.

Thorough epidemiological approaches should add value to a mixed methods research armamentarium, but the effort for

complex and longitudinal designs, rather than a 'bit of a study' approach, might deter researchers. Nevertheless, cross-sectional data should offset some resource and ethical constraints on the feasibility of protracted longitudinal designs. Here, this crucial interplay gave robust confirmation of similar intentions soon after or before admission in three cohorts, with the admissions process not introducing clear bias in demography or broad intentions. The striking concurrence between surveys compensated for small effect sizes and insufficient power for some subset analyses, and allowed insight into the dynamics of career intentions.

Bethune et al. (2007) also valued exploring the dynamics of gains and erosions in the undergraduate world-view of career intentions. With year-groups of only 60 (but with understandably impressive response-rates from 'in-class' completion), they tracked longitudinally over multiple time-points, strengthening evidence by comparing between cohorts. While 78% of their Newfoundland (Memorial) 1999 entry-cohort was originally 'considering' family medicine, students could give multiple answers, unlike in the Liverpool data, precluding direct comparison. Their figure became 56% before Year 3 started and 52% as Year 4 ended (pre-graduation), with only 46% considering family medicine both at the outset *and* pre-graduation. Concern about the 'hidden curriculum' pre-Year 3 prompted more Year 2 family medicine exposure.

Relatively few Liverpool medical students at entry (or prospective students) intended to be general practitioners, dropping significantly even before formal clinical placements (Year 2 onwards), where 30% of clinical placement time would be in general practice. This drop defied the selection process, problem-based learning scenarios and core themes (Year 1 onwards) promoting community orientation. Even students in a primary care orientated, problem-based curriculum might balk at how much primary care-based learning is required though, despite realizing that knowledge must extend beyond the biomedical (Draper & Louw 2007). Liverpool female medical students favouring general practice reflects the literature (Soethout et al. 2008b), but the greater female tendency to change between the broad categories over Year 1 (despite both sexes answering 'do not know' in similar proportions) might imply greater receptiveness to career counselling, more volatile dynamics, or widening horizons.

It is important to foster initial general practice intentions as they are more likely to result in that career (71% in the study of Brandt & Wright 2005). US evidence suggests that those entering generalist careers are more likely to decide before medical school (Schieberl et al. 1996) and early family medicine interest is more durable (Kassebaum & Szenas 1995). Having a medical parent may prompt a few to persist with general practice intentions (Soethout et al. 2008b), but only 2/9 here with such enduring intentions had a medical parent. While optimal undergraduate exposure should improve attitudes to general practice by final year (Henderson et al. 2002), many confounding variables will affect whether it becomes the main intention. In this study, from entry to mid-Year 3, 'hospital consultant' still dominated career intentions while general practice lost ground (in longitudinal evidence), despite entrants' main previous

personal contact presumably having been with their own general practitioner.

Postgraduate experiences influence career choice most, but 5–6 years' post-graduation, 20% of the last two Liverpool conventional curriculum cohorts still felt most influenced by undergraduate experiences (albeit mainly out with general practice) (Watmough et al. 2007). Students in an integrated problem-based curriculum with early clinical contact and simulation might identify medical role models earlier (McClean 2006), whose views shape career socialization. Of the South Australian pre-registration house officers, 21% decided during (or before) medical school (Laurence & Elliott 2007).

The UK Medical Careers Research Group found that 25% of new 1999–2000 graduates' first choice career was general practice (with Liverpool graduates choosing similarly; Goldacre et al. 2004). This is consistent with the data here (23% of Year 5), and exceeded the 1996 'low' of 20%, without reaching the 40–50% 'high' of the 1970s/1980s (Allen 1999). Knowing that few students might bring and *retain* general practice intentions (and that about one-third or more appear unsure) should prompt more creative career counselling (Leong et al. 2005) and more challenging early primary care exposure, to influence early medical socialization ('professionalization'). After these cohorts, the Liverpool programme introduced a community placement in semester 2 of Year 1, which should hopefully now be bolstering this initial interest.

The Liverpool findings inform the push for more career awareness earlier in medical education. Without this, students might not best use medical school experiences to confirm, refine, or change intentions. Others might drift beyond graduation, unprepared for suitable careers and not matching aspirations and aptitudes to manpower planning requirements, thereby incurring personal and societal opportunity costs. Those reporting 'do not know' might be actively considering several options rather than procrastinating. Separating whether students are undecided or indecisive is crucial (for facilitating an appropriate match of doctors to needed roles) but elusive (Borges 2007) and was not pursued here. Alternatively, it might be that those reporting a specific intention occupy a very wide spectrum of certainty.

Explaining mismatches between students' career intentions and population needs is important. Influences from the hidden curriculum include media hyperbole (Henderson et al. 2002) and the personal interactions in the 'informal curriculum' with older students and staff (Schieberl et al. 1996; Henderson et al. 2002), for example, via negative role-modelling and hospital-dominated work experience. Earlier and informed career decision making needs active facilitation, as students may also be unaware of how little they know about medical careers (Soethout et al. 2008a).

Two novel perspectives on the findings here are how altruism in Year 1 students links with general practice career intentions and pre-admission career uncertainty with socioeconomic status.

Altruism is a notoriously elusive concept to study (McGaghie et al. 2002), possibly only being measurable as pro-social behaviour that balances self-care with caring for others (Bishop & Rees 2007). Coulter et al. (2007) used eight items when finding medical students to be more altruistic than,

for example, law students, and female more than male students. Even from a single item here (albeit generated from qualitative data), the few entrants positively considering general practice appeared more altruistic, which has face validity. Most students will ultimately pursue general practice (despite preferring otherwise; Mahoney et al. 2004), as it accounts for approximately half the substantive National Health Service posts in England (NHS Health and Social Care Information Centre 2005), and its flexibility is very relevant to medical career decision making (Laurence & Elliott 2007).

Finding that interviewed applicants with lower socioeconomic status might specify a career intention earlier (not necessarily general practice) is notable, despite the small difference, especially if early intentions remain stable. Besides answering more specifically to be helpful, they might prioritize job security, perceiving open options as more of a luxury. Their counterparts' uncertainty might reflect relative complacency about their medical place and future career, or active contemplation of several options.

Despite the specific strengths of the longitudinal nature of the evidence, the comparative analyses between cohorts, and some mixing with qualitative data, this study only used a single self-reported item for career intention (unqualified, and possibly relating poorly to ultimate career), in one curriculum. Moreover, non-response bias could have complicated even reasonable postal response rates, and social desirability bias could have complicated the applicants' responses if, despite assurances, applicants perceived participation as compulsory or affecting their fate. Although only shortlisted applicants attending interview participated (and those not then admitted comprised diverse subgroups, namely, unselected, selected but chose elsewhere and selected but missed the qualifying academic grades), such caveats detract little from the main findings.

This study gives a valuable preliminary insight about uncertainty in student career intentions, and raises issues about the role of socioeconomic determinants and altruistic motivation in such intentions. The policy implications relate to optimizing career counselling and 'widening participation' in medical school education, and optimizing 'community-orientation' in curricula for maximum impact. Future research should, for example, track *early* career considerations against socioeconomic status and explore the implications for selection criteria (McManus 1998; Newton et al. 1998).

While reports of senior students' and junior doctors' disinclination for general practice may recur, its origins in initial medical socialization (and potential socioeconomic differentials in early decision making) deserve cautious attention. The dynamics of students' ideas about their future career intentions across their time in medical school is under-explored, yet the Tooke Report highlighted the need to know about undergraduate predictors for delayed career decision making. This study suggests that a substantial proportion of students might not give their career intentions due consideration, confirms that career counselling about general practice may well be a challenge right from the outset of medical school, and raises the under-researched issue of socioeconomic determinants of medical career decision making.

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