The academic underperformance of medical students from ethnic minorities

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I, Katherine Woolf, declare that the work presented in this thesis is my own. Chris McManus wrote the first draft of a journal paper based on the Chapter 6 study, and Chapter 6 was revised in line with that paper. Where other information has been derived from other sources, I confirm that this has been indicated in the thesis.

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A Level	Advanced Level
ASME	Association for the Study of Medical Education
BMA	British Medical Association
BMJ	British Medical Journal
CONSORT	Consolidated Standards of Reporting Trials
DfES	Department for Education and Skills
DH	Department of Health
DWP	Department for Work and Pensions
EM	ethnic minority
EMQ	Extended Matching Questions
GCSE	General Certificate of Secondary Education
GHQ-12	General Health Questionnaire – 12 item version
GMC	General Medical Council
GP	General Practitioner
HADS	Hospital Anxiety and Depression Scale
HESA	Higher Education Statistics Agency
JRF	Joseph Rowntree Foundation
LIWC	Linguistic Inquiry and Word Count
MBBS	Batchelor of Medicine and Surgery
MCQ	Multiple Choice Questionnaire
MEQ	Modified Essay Question
MRCGP	Membership of the Royal College of General Practitioners
MRCP(UK)	Membership of the Royal College of Physicians(United Kingdom)
NEO-PI-R	NEO Personality Inventory Revised
NHS	National Health Service
O Level	Ordinary Level
OSCE	Objective Structured Clinical Examination
OSPE	Objective Structured Practical Examination
PDS	Professional Development Spine
PMETB	Postgraduate Medical Education Training Board
RCGP	Royal College of General Practitioners
RCP	Royal College of Physicians
RCT	Randomised Controlled Trial
SBA	Single Best Answer
SEM	Structural Equation Model
SPQ	Study Process Questionnaire
SPSS	Statistical Package for the Social Sciences
SSC	Student Selected Component
UCAS	Universities and Colleges Admissions Service
UCL	University College London
UCLH	University College London Hospital
UK	United Kingdom
YCS	Youth Cohort Study

Peer reviewed publications arising from work relating to this thesis

Woolf K, Cave J, Greenhalgh T, Dacre J. Ethnic stereotypes and the underachievement of UK ethnic minority medical students: A qualitative study. *BMJ* 2008;337:a1220

McManus IC, Woolf K, Dacre J. The educational background and qualifications of UK medical students from ethnic minorities. *BMC Medical Education.* 2008. 8 (21). Highly accessed.

Woolf K, Cave J, McManus IC, Dacre J. 'It gives you an understanding you can't get from any book'. The relationship between medical students' and doctors' personal illness experiences and their performance: a qualitative and quantitative study. *BMC Medical Education.* 2007, 7:50. Highly accessed.

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Abstract

Medical students from ethnic minorities underperform academically compared to their white counterparts. The reasons for this ethnic gap in attainment are unclear.

This thesis presents a series of quantitative and qualitative studies, conducted with UCL Medical School students, which aimed to answer the following research question "which factors influence the differential performance of ethnic minority and white medical students in undergraduate assessments?"

The first study explored the reliability and magnitude of the ethnic gap in attainment in Years 1, 2 and 3 of UCL Medical School. Results showed that within Years the gap was reliable over time, and that it was greatest in Year 3.

The second study used a questionnaire to examine whether demographic and psychological factors might mediate the statistical relationship between ethnic group and academic performance in Years 1 and 3. Results showed that whilst ethnic minority and white students did differ on a number of factors, this could not explain the entire ethnic gap in attainment.

The third study used qualitative interview methods to explore how Year 3 medical students and clinical teachers perceived the factors affecting learning and teaching in the clinical environment, including ethnic group. Results showed that some clinical teachers and students held negative stereotypical views about Asian medical students. Three hypothesised mechanisms for how stereotyping might negatively affect Asian students' performance in examinations were generated.

The fourth study experimentally investigated the effects of a social intervention designed to minimise some of the hypothesised negative effects of stereotyping and narrow the ethnic gap in attainment. Results showed that the intervention did narrow the gap as predicted, but unexpectedly this was due to changed performance in the white rather than the ethnic minority group.

These results are discussed in terms of the complexities of research involving ethnicity and the multi-factorial nature of the influences on learning at medical school.

Chapter 1. Ethnicity and academic attainment: What is the problem?

> "The odds of an Asian student obtaining a good degree are half of those of a white student obtaining a good degree, and the odds of a black student obtaining a good degree are only a third of those of a white student obtaining a good degree. These figures are […] stable over time and seem to be an endemic characteristic of UK higher education."
> (John Richardson, 2008)

> "This is the world in which […] everything influences everything else, where nothing succeeds like success and nothing fails like failure"
> (The Plowden Report, 1967)

Summary of Chapter 1

UK medical students from ethnic minorities tend to underperform in medical school examinations compared to white students. The reasons for this gap in attainment are unclear. However the situation is similar to that found in other areas of Higher Education (HE), where whites are more likely that any other ethnic group to achieve first class or upper second class degrees. It is also similar to the pattern of attainment in school-level examinations, where certain ethnic minority groups also underachieve. The underperformance of medical students from ethnic minorities is a problem, not just for the medical students and medical schools in which they are taught, but also for society in general.

The aims of this thesis are firstly to systematically investigate the influence of different factors on performance in undergraduate medical assessments, specifically those which mediate the effects of ethnicity on medical school attainment; and secondly to provide a resource to facilitate a greater understanding of the ways in which medical student ethnicity affects attainment in undergraduate assessments. The research question this thesis seeks to answer is "which factors influence the differential performance of white and ethnic minority medical students in undergraduate assessments?"

Introduction

This opening chapter begins by explaining what the reader can expect from the thesis: the aims and research question are stated, and an overview of the content is sited in the theoretical underpinnings and assumptions of the thesis. Next, the extent of the problem of the ethnic gap in attainment in UK medical school examinations is described in a literature review, and a meta-analysis of the results of the review is conducted. The review of ethnic differences in medical education is then set in the context of the literature on ethnic differences in attainment in compulsory and Higher Education in general. Possible explanations for the ethnic gap in attainment are then evaluated to identify gaps in the research area. The chapter ends with an explanation of the importance of studying ethnic differences in medical educational attainment.

Thesis aims and research question

There is little quantitative research specifically exploring issues surrounding ethnicity and performance in medical education. Most of the available data on the subject come from projects designed to answer questions not specifically related to ethnicity, but which include ethnic group as a variable, for example in the predictors of academic performance (e.g. Ferguson, James & Madeley, 2002; Lumb & Vail, 2004; Yates & James, 2007). This is probably because ethnic differences in attainment can be difficult to research. Taboos surrounding research which uses the concepts of "ethnicity" and "ethnic differences" (Bhopal, 1997) can make it challenging to obtain data related to ethnicity from organisations (see Esmail, 2001 for a description of the problems he encountered). It can also be difficult to obtain good quality data related to ethnicity from individuals, because issues of a socially-sensitive nature can produce socially desirable, i.e. biased, responses. Furthermore, once data have been collected, their analysis and interpretation need to be carefully communicated to avoid upsetting or offending stakeholders and readers. To add to these problems, ethnicity is a complex variable (Senior & Bhopal, 1994). It is associated with many other variables, and some of those such as socioeconomic class or health can themselves be very complex.

Descriptive studies showing the presences of an ethnic gap in attainment are important. However they leave unanswered questions about why ethnic differences in medical education might exist, and what might influence how or when ethnic differences develop.

This thesis takes both a descriptive and a inferential approach to the issue of ethnic differences in attainment in medical education. It aims are to:

1. Systematically investigate the influence of different factors on performance in undergraduate medical assessments, specifically those which mediate the effects of ethnic group on medical school attainment

2. Provide a resource to facilitate a greater understanding of the ways in which medical student ethnicity affects attainment in undergraduate assessment.

The research question this thesis will seek to answer is:

Which factors influence the differential performance of white and ethnic minority medical students in undergraduate assessments?

Thesis outline

This thesis has the following structure:

- Chapter 1: Introductory chapter explaining the problem the thesis is addressing, and why it is a problem that requires investigation
- Chapter 2: Methods chapter explaining who participated in each of the studies, what was being investigated, how it was being investigated, and evaluating the choice of methods used
- Chapters 3-6 : Write up of four studies undertaken in order to inform the answer to the research question (see below)
- Chapter 7: Discussion chapter explaining the thesis findings, and considering their potential consequences in terms of the delivery of medical education, and future medical education research

Each of the four studies conducted in this thesis had its own specific aims, and these contributed to the main thesis aims, and each study used different methods. An overview of each of the studies is provided in Table 1 to give the reader a basic idea of their contents. The studies were conducted in roughly chronological order and each study's results partly influenced the design of the following studies. The table therefore also contains a summary of the results of each study. All of the studies were conducted with UCL medical students.

Table 1: Overview of the aims, methods and results of the studies in Chapters 3, 4, 5, and 6

Chapter	Aim	Methods (in brief)	Results (in brief)
Chapter 3	To investigate the reliability and magnitude of the effect of ethnic group on examination performance	Quantitative cross-sectional and longitudinal study of Year 1, 2 and 3 medical school examination results, A Level and GCSE results	Ethnic differences were largest in Year 3, but were also present in Years 1 and 2. Within Years 1, 2 and 3, ethnic differences were stable over four year time periods. Ethnic differences at medical school were not explained ethnic differences in school examination results
Chapter 4	To determine whether ethnic differences in medical school examination results can be explained by demographic and psychological factors	Quantitative questionnaire study measuring demographic and psychological factors associated with academic performance in Year 1 and Year 3.	Questionnaire factors were associated with examination results, but did not explain ethnic differences in Year 1 and Year 3 examination performance
Chapter 5	To gain insight into Year 3 medical students' experiences of ethnicity and learning in the clinical environment, with a specific emphasis on stereotypes and stereotyping.	Qualitative interview study with Year 3 students and their clinical teachers	Students and teachers had stereotypically negative views about Asian medical students. The ways in which this might affect Asian students' learning and subsequent examination performance were hypothesised
Chapter 6	To determine whether a brief written intervention can minimise ethnic differences in Year 3 examination results	Quantitative cluster-randomised controlled trial	The intervention differentially affected the examination results of the students in the treatment condition, but not in the manner predicted.

Theoretical and methodological underpinnings of this thesis

This thesis is a piece of medical education research. But what is medical education research? Broadly speaking, it is the study of the teaching and learning of those involved in the provision of medical care. However medical education research encompasses many different epistemologies, and therefore simply stating that a piece of research is "medical education research" does not necessarily provide insight into its theoretical basis or the types of methodologies it might use. In fact there is much debate about medical education's theoretical basis (e.g. Prideaux & Bligh, 2002) and the methodologies medical education researchers should use (e.g. Norman & Schmidt, 2000). This probably results from the interdisciplinary nature of the field (Lonka, ASME, 2007): medical education research draws on a variety of paradigms, methodologies and theories from several disciplines including of course, education and medicine, but also from anthropology, sociology, psychology, statistics and economics among others (Eva, 2008; Bligh & Purcell, 1999; Chen, Bauchner & Burnstein, 2004; Shea, Arnold, Mann et al., 2004). It can include topics as diverse as the psychometric properties of multiple choice tests (Schuwirth & van der Vleuten, 2006), the use of virtual reality simulators in surgical education (Kneebone, 2003), and medical student perceptions of the hidden curriculum (Lempp & Seale, 2004).

Bearing in mind the variety of theoretical standpoints and methods together with the applied nature of much medical education research, it is unsurprising that, in an editorial for the journal *Medical Education*, David Prideaux and John Bligh report difficulties in categorising medical education research findings into overarching themes and ideas (Prideaux & Bligh, 2002). The interdisciplinary nature of medical education research can be considered a strength (Chen et al., 2004), and many lessons can be learned from collaborating across disciplines (Elstein, 1976). However in such a cross-disciplinary field, it is important that medical education researchers are clear about the theoretical underpinnings of their work, and that they clarify their assumptions, beliefs and expectations relating to their research. This will enable readers to interpret their findings and assess their relevance and importance in context (Buckley, 1998). The research question of this thesis was explored using a variety of methodologies, stemming from two main theoretical paradigms: one quantitative and one qualitative. With the aim of providing the clarity demanded by Buckley (1998), each is described below.

1.1.1. Psychology: a quantitative science

All but one of the studies in this thesis were concerned with measuring various aspects of the behaviour of particular populations, performing statistical analyses on the data gathered, and making inferences about the populations from the results of these analyses. This method of studying people is sited in the scientific psychological model. This uses methods adapted from 'hard' sciences such as physics to determine 'truth' and 'falsity' in the quest to explain human behaviour. The scientific psychological approach to studying human behaviour is described by Carlson, Bukist and Martin (2000):

> "How do psychologists 'explain' behaviour? First, we must describe it accurately and comprehensively [...] We must learn how to categorise and measure behaviour so that we can be sure that different psychologists in different places are observing the same phenomena. Next, we must discover the causes of the behaviour we observe – those events responsible for its occurrence. If we can discover the events that caused the behaviour to occur, we have 'explained' it." (Carlson et al., 2000: p.5)

This thesis adopts the following assumptions arising from that model:

a) Populations vary systematically on a number of factors
b) Those factors can be both heritable (such as eye colour) and/or environmental (such as amount of sun exposure)
c) Those factors, often interacting together, are responsible for behavioural outcomes
d) By measuring those factors and calculating their statistical relationships, it is possible to explain and predict particular behaviours

There are many different types of scientific psychological research. The quantitative study in Chapter 4 can be considered individual differences psychology. Individual differences psychology aims to identify factors that are applicable to everyone, but that discriminate among people. For example, all human beings are considered to have some level of intelligence, but we differ systematically in how intelligent we are (Hampson & Colman, 1995). Out of necessity, individual differences research often takes the form of large population studies from which statistically generalisable conclusions can be drawn. This approach does not allow predictions about specific individuals. It only allows large populations to be broken down into smaller sub-populations sharing similar characteristics (Carlson et al., 2000). It is important then to note that this thesis relates to the academic performance of groups of students rather than to the performance of individuals. It is absolutely the case that some students from ethnic minority backgrounds will achieve very high levels of academic attainment at medical school, and that some white students will achieve relatively low levels of academic attainment.

Individual differences psychology is closely related to psychometrics – the science of psychological testing. Psychometrics does assume that individuals can be usefully assessed and selected by comparing how they differ on measurements of certain factors, for example intelligence or personality (Rust & Golombok, 1992). Psychometrics has a controversial reputation, mainly due to the association between intelligence testing, Eugenics and racism. In the late 19th century, Sir Francis Galton, Victorian polymath and 'father of psychometrics', combined his obsession with measurement and statistics (Brookes, 2004) with his cousin Charles Darwin's new ideas on evolution to conclude that intelligence was heritable, could be measured, and was correlated with various desirable and undesirable sociological factors, such as eminence and criminality. It was a short step for Galton to believing that intelligence (and other physical and psychological factors) should be measured, and those measurements could, and should, be used to create a superior race. In a 1904 meeting at the London School of Economics, chaired by the famous statistician Karl Pearson, Galton outlined how an ideal population could be achieved - essentially by restricting the reproductive rights of those he considered below a certain standard, including people in the lower socioeconomic classes of society and "negros" (Galton, 1904). Galton considered his beliefs to have a spiritual component, linking intelligence with morality in a way that Rust & Golombok (1992) believe is one of the underpinnings of racism associated with intelligence testing throughout the 20th century[1]. The idea that low intelligence as measured by IQ tests is the cause of

[1]Galton believed that it was man's moral duty to manipulate the characteristics of the human race, as illustrated in the following quote from his 1904 speech, the contents of which were highly controversial even at the time:

> "It [Eugenics] must be introduced into the national conscience, like a new religion. […] What nature does blindly, slowly and ruthlessly, man may do providently, quickly, kindly. As it lies within his power, so it becomes his duty to work in that direction. The improvement of our stock seems to me one of the highest objects that we can reasonably attempt." (Galton, 1904; p.6)

unemployment, criminality and other undesirable socioeconomic and sociological factors is still present. As recently as 1994, Herrnstein and Murray published their book ‘The Bell Curve’ which essentially argued that African Americans were genetically less intelligent than white Americans, and this was the cause of sociological differences between the two groups (Herrnstein & Murray, 1994). The book caused a great deal of outrage and reignited a furious debate about the heritability measurement of intelligence – more of which in section 1.1.6. Despite the controversy surrounding psychometrics, Rust and Golombok (1992) point out that psychometric methods of selection and assessment are an essential part of a functional society (and surely medical students must be some of the most highly selected and assessed of all populations).

This stance underlines two of the assumptions upon which the quantitative part of this thesis rests. Firstly, that assessments used by the medical school are capable of discriminating between students in a meaningful way. Secondly, that other non-academic cognitive differences between students can be meaningfully measured using tools such as questionnaires. Those assumptions are important: it has been argued that while medical school assessments are valid tests of testing knowledge and skills, there is no guarantee that a student who achieves high scores on these tests will be a “good” doctor, and that other skills perhaps not measured in examinations are equally important (McManus, Powis, Wakeford et al., 2005; Roberts, Warner, Hammond et al., 2005). That argument is significant in terms of research exploring ethnic differences on examinations because it raises the possibility that, although UK students from ethnic minorities may underperform in medical school examinations, UK ethnic minority doctors are not necessarily less clinically sound, worse at communicating, poorer at decision-making or less able on some other measure of “good” doctoring than their white colleagues. This thesis does not unfortunately have to scope to examine every aspect of ethnic minority academic performance. However, it is the case that, regardless of the true validity of medical school examinations results, if a medical student does not have a sufficient level of attainment in medical school examinations, they will never become a doctor, good or otherwise. In this context, the assumption that medical school examinations make meaningful distinctions between students seems sensible.

1.1.2. Psychology: a qualitative approach

In this thesis the ethnic gap in medical school attainment was also explored from a qualitative approach, which is methodologically and epistemologically different from that described in the section above. Qualitative research differs mainly from quantitative research in that it seeks to provide detailed insight into the felt experiences of individuals, rather than seeking to measure aspects of human life. Qualitative research has its roots in sociology and anthropology (Strauss & Corbin, 1998), and is a relatively small field in psychology, although it is more popular in social and health psychology where it is used to explore attitudes towards chronic illness, addiction etc. It is also becoming increasingly popular in medical education where it is often used in tandem with quantitative research (Bligh & Purcell, 1999). A key assumption of qualitative research is that analysing participants' verbal descriptions of events enables researchers to interpret the ways in which participants' thoughts and feelings relate to their behaviour – a theoretical stance which Silverman (2005) has termed the 'emotionalist' model. In this model, the researcher is seen as integral in interpreting the data during the analysis phase, which can often overlap with and indeed inform the data collection phase (Strauss & Corbin, 1998) - a far cry from the rigid objective stance which is of ultimate desirability in quantitative research. Qualitative research is often used to generate theories, but qualitative data can also be analysed using a pre-defined theory as a basis.

Defining the problem: the ethnic gap in attainment in medical education

This section examines in detail the main problem with which this thesis is concerned: that of ethnic disparities in performance at medical school in the UK. To give an indication of number of people this problem relates to, this section begins by describing the proportion of UK medical students who come from ethnic minority backgrounds.

1.1.3. The proportion of medical students from ethnic minorities

In the UK, the proportion of individuals from ethnic minority backgrounds studying medicine is greater than the proportion of ethnic minorities in the general student population: in 2003, 35% of applicants and 29% of acceptances to medical school were from ethnic minorities compared to 16% of UCAS applicants and 16% of acceptances (BMA, 2004). However different ethnic minority groups are not equally represented. Of those accepted to study medicine in 2003, 22.2% were of Asian origin, which is a higher proportion of Asians than in the UK population, even after taking into account the fact that the UK ethnic minority population is on average younger than the UK white population (BMA, 2004; Goldacre, Davidson and Lambert, 2004). This probably partly reflects the relatively high proportion of Asians working in the National Health Service (NHS) and the fact that degrees which lead to professional occupations have historically attracted applicants from immigrants (Esmail, 2001).

The proportion of ethnic minorities studying medicine in the UK has increased over the decades: Goldacre et al. (2004) reported that in 1974, 98.4% of "home" (i.e. who did not pay overseas tuition rates) medical students classified themselves as white, and only 1.6% were from an ethnic minority background. The changes in the ethnic composition of the medical student population are reflected in changes in the ethnic composition of the medical workforce: Goldacre et al. (2004) showed that among the UK doctors first appointed to consultant posts during 1964-1991, 81.5% were white UK-trained and 3.3% were non-white UK trained (the remainder were trained abroad). However, among those appointed during 1992-2002, 68.6% were white UK trained and 7.2% were non-white UK trained. NHS Staff data showed that in 2005, 60.0% of House Officers/Foundation Year 1 doctors were white compared to 88.8% of consultants (http://www.ic.nhs.uk/pubs/nhsstaff).

The proportion of ethnic minority students is particularly high in medicine compared to other HE subjects. However students from ethnic minority groups are generally well-represented in HE overall. For example, Connor, Tyres, Madood and Hillage (2004) showed that by 2001/2, ethnic minority participation rates in UK HE had already exceeded the Government's 50% participation rate target, with Asians and black participation rates at 60% and 61% respectively, whereas HE participation in white groups was only 38%. Participation rates vary between ethnic minority groups but all ethnic minority groups have higher rates of participation than whites. Participation rates also vary by sex[2]. Generally women are more likely to participate, but this also varies between ethnic groups. For example, Bangladeshi women and black men have low rates of participation (Connor et al., 2004).

[2] The term sex rather than gender is used to describe males and females throughout this thesis. See section 2.1.2

1.1.4. Ethnicity and attainment in undergraduate medical education

Despite the fact that some ethnic minority groups are well represented in medicine, white students in general achieve higher grades in medical school examinations. Ethnicity and attainment in undergraduate medical education first came under the spotlight in 1995 with the publication in the British Medical Journal (BMJ) of a news article about Manchester University's School of Medicine where males with Asian surnames were more likely than all other students to fail final clinical, but not written, medical school examinations (Dillner, 1995). Aneez Esmail, senior lecturer and member of a Manchester University working party created to examine the problem, made it clear that he did not believe that the male Asian medical students failed because they had a lower level of ability:

> "These were not substandard students. They were accepted to Manchester University on the basis of the same A level criteria as everyone else. If anything they are likely to have been above average." (Esmail, in Dillner, 1995)

This implied that the problem was due to racial discrimination on the part of the examiners. Manchester responded by promising to deliver diversity training and bring in more objective clinical examinations. The school also introduced ethnic monitoring to enable prospective studies of the problem to be undertaken. In the wake of these findings, the then Dean of University of Manchester School of Medicine, Professor Tomlinson, called for other Medical Schools to look at their own results for ethnic gaps in attainment. In a statement based perhaps partly on hope as well as fact he said:

> "This can't be a problem unique to Manchester, and it isn't unique to medicine" (Tomlinson, in Dillner, 1995)

1.1.4.1. Review of the UK undergraduate medical education literature

The Dillner article prompted many UK medical schools to examine the relationship between students' academic attainment and their ethnic backgrounds. A search of the literature and personal correspondence with authors revealed nine published or "in press" studies from eight UK medical schools, in which the effect of ethnic group on a measure of medical school performance had been calculated. A brief review of those studies is presented. A meta-analysis of the results of the studies was calculated to give an overall effect size.

In a cohort study published as a direct result of the Manchester findings, McManus, Richards, Winder and Sproston (1996) analysed retrospective data for medical students who took their finals examinations at London medical schools in 1986, 1987, 1991 and 1992. Within the group of UK students, ethnic minority students (10% of the group) were twice as likely to fail at least one of their final examinations compared to whites. They also achieved significantly lower mean scores. Interestingly, within the much smaller non-UK group, ethnic minorities (72% of the group) passed more of their final examinations than did whites. A study using data from the 1999 final year OSCE at Guy's and St Thomas's showed that white students achieved significantly higher mean scores than ethnic minorities (45% of the total group) (Wass, Roberts, Hoogenboom et al., 2003).

The other studies have concentrated mainly on Year 3 students. In a retrospective cohort study of students who entered the University of Leeds School of Medicine between 1994 and 1997, Lumb and Vail (2004) found that white students achieved significantly higher scores than ethnic minorities in Year 3 clinical assessments (raw data obtained through personal correspondence). Studies by Haq, Higham, Morris and Dacre (2005), and Woolf, Haq, McManus, Higham and Dacre, both used data from UCL and Imperial College medical schools over three consecutive years. They found that white students achieved higher scores than ethnic minority students in Year 3 OSCE and written examinations (Haq et al. compared whites and Asians; Woolf et al. compared whites and non-whites). In a study "in press" at the time of writing, Kilminster, Boursicot and Roberts obtained Year 3 OSCE and written examination data from three Medical Schools. In the OSCE and written examinations at one of the schools and in the written examinations of another, whites achieved statistically significantly higher scores than all other ethnic groups combined. One school showed no significant effect of ethnic group on performance.

David James and his colleagues published a number of studies about predictors of success on the medical course at Nottingham University. In a study of three cohorts from 1970 to 1990 James & Chilvers (2001) found that in one cohort, ethnic minority students were less likely to achieve honours in a clinical medical degree. More recently, in a study of students who entered the course over three consecutive years, Yates & James (2007) found that ethnic minority students underperformed on a number of preclinical and clinical measures of achievement. In another study of five cohorts of medical students, Yates & James (2006) found that ethnic minority students were more likely to be identified as “strugglers” on the medical course compared to white students (“strugglers” being “students who attended the academic progress committee, had their course terminated or suspended, or left the course voluntarily” p1010).

This thesis relates to UK medical students, however it is worth pointing out that studies from outside the UK have also found that white medical students tend to achieve higher scores than other ethnic groups. In the USA, Asian-American, and Hispanic students have been found to underperform on the examinations of the National Board of Medical Examiners (NBME), on the United States Licensing Medical Exam (USLME), and to achieve lower undergraduate science grade-point averages compared to white students (Xu, Veloski, Hojat et al., 1993; Dawson, Iwamoto, Ross et al., 1994; Koenig, Sireci & Wiley, 1998; Veloski, Callahan, Xu et al., 2000). In a study of over 1,000 fourth-year medical students’ performance in formative clinical examinations at the eight medical schools in the New York City Consortium in 1995 and 1996, white students were found to have scores which were on average 0.12 standard deviations higher than black students’ (Colliver, Swartz & Robbs, 2001). By contrast, in a sample of 353 clinical medical students at John Hopkins University School of Medicine, Bienstock, Tzou, Martin & Fox (2000) found no ethnic differences in an Obstetrics and Gynaecology OSCE. In Australia, non-Western born medical students were shown to underperform in final year examinations compared to Western-born students (Liddell & Koritas, 2004); and students of Aboriginal and Torres Island origin were more likely to be rated “unsatisfactory” in first year medical examinations (Kay-Lambkin, Pearson & Rolfe, 2002).

1.1.4.2. Meta-analysis of UK studies measuring the effect of ethnic group on medical school examination results

In order to determine the overall size of the effect of ethnic group on UK undergraduate performance reported in the studies above, the results of the above-mentioned studies were meta-analysed.

1.1.4.2.1. Meta-analysis methods

All UK studies which compared white and ethnic minority medical students' academic attainment from which it was possible to calculate effect sizes with standard errors were included (see Table 2). Yates & James (2006) data were excluded from the meta-analysis because being a "struggler" was not a purely academic outcome. Yates & James (2007) data were excluded because it was not possible calculate standard errors for effect sizes from the published data.

Fixed effects models in the computer programme MIX (http://www.mix-for-meta-analysis.info/) were used. Random effects models were also calculated for comparison. The measure of association was Cohen's *d* (Howell, 2002), calculated using the methods described in Box 1. Where necessary, dichotomous data were converted to odds ratios, using a continuity correction with a value of 0.5 for cell values equivalent to zero.

Three meta-analyses were conducted: one with written examination results, one with OSCE results, and one with combined written and clinical final year results. Separate meta-analyses for written and OSCE results were conducted for two reasons. Firstly because the written and OSCE results of the cohorts reported in Haq et al. (2005) and Woolf et al. (2007) were not independent, and secondly because of the important differences between OSCE and written examination formats (the former being practical examinations marked face-to-face and the latter being more theoretical and often marked by machine). It was not possible to separate the written and clinical components of the finals examinations reported by McManus et al (1996) and James & Chilvers (2001) so those exam results were combined in a separate analysis.

There were nine datasets in the meta-analysis of written scores: four from Haq et al. (2005); two from Woolf et al. (2007) and three from Kilminster et al. (in press). There were 12 datasets in the meta-analysis of OSCE scores: four from Haq et al. (2005), two from Woolf et al. (2007) and three from Kilminster et al. (in press). Wass et al (2003) reported data from two groups of students who took finals OSCE examinations at the same institution one day apart. These were treated as separate groups in the analysis. Andy Lumb provided raw data for four year groups of Year 3 students from his study Lumb & Vail (2004). These were entered into the analysis as one cohort because it was not possible to distinguish between groups in the dataset. There were six datasets in the meta-analysis of final year combined written and clinical examinations. Chris McManus provided raw data for two cohorts of final year students from his cohort study (McManus et al., 1996). David James provided data for four cohorts of students from his James & Chilvers (2001) study, which unlike all the other data, were dichotomous (honours vs. no honours)

Box 1: Three methods used in this thesis for calculating effect sizes (Cohen's *d*):

1. Where means and standard deviations, or t-values and degrees of freedom were available from published data, effect sizes were calculated using the effect size calculator at http://web.uccs.edu/lbecker/Psy590/escalc3.htm, which uses the following formulae:

$$\text{Cohen's } d = M_1 - M_2 / \sigma_{\text{pooled}}$$
$$\text{where } \sigma_{\text{pooled}} = \sqrt{[(\sigma_1^2 + \sigma_2^2) / 2]}$$

$$\text{Cohen's } d = 2t / \sqrt{(df)}$$

2. Where F statistics and participant numbers were available, and the numerator of the degrees of freedom were equal to 1, effect sizes were calculated using the following formula published in Thalheimer & Cook (2002)

$$d = \sqrt{F\left(\frac{n_t + n_c}{n_t\, n_c}\right)\left(\frac{n_t + n_c}{n_t + n_c - 2}\right)}$$

Key to symbols:

d = Cohen's d effect size

F = F statistic

n = number of subjects

Subscripts: t refers to the treatment condition and c refers to the comparison condition (or control condition).

3. From odds ratios, effect sizes were calculated using the method described by Chinn (2000).

Table 2: The 27 datasets from 7 studies comparing white and ethnic minority students' performance in UK undergraduate medical school examinations (W=white; EM=ethnic minority; SD= Standard deviation)

Study	School	Year of exam	Exam type	Data type	n W	mean W	SD W	n EM	mean EM	SD EM	effect size
Haq et al., 2005.	Imperial	2002	Year 3 Written	continuous	182	73.5	6.6	125	74.1	6.2	0.086
Haq et al., 2005.	Imperial	2003	Year 3 Written	continuous	160	71.6	8.3	128	68.7	8.5	-0.340
Woolf et al., 2007.	Imperial	2004	Year 3 Written	continuous	159	71.8	8.3	172	69.6	8.5	-0.270
Haq et al., 2005.	UCL	2002	Year 3 Written	continuous	207	72.6	5.9	116	69.3	5.9	-0.564
Haq et al., 2005.	UCL	2003	Year 3 Written	continuous	176	72.5	6.9	120	71.1	7.1	-0.199
Woolf et al. 2007.	UCL	2004	Year 3 Written	continuous	171	73.3	7.9	199	71.0	8.6	-0.276
Kilminster et al., in press	'School 1'	-	Year 3 Written	continuous	154	64.9	6.1	55	60.1	6.6	-0.755
Kilminster et al., in press	'School 2'	-	Year 3 Written	continuous	117	75.4	10.5	111	75.1	10.3	-0.029
Kilminster et al., in press	'School 3'	-	Year 3 Written	continuous	169	68.0	7.7	184	65.0	7.4	-0.397
Haq et al., 2005.	Imperial	2002	Year 3 OSCE	continuous	182	77.1	4.3	126	75.6	3.8	-0.374
Haq et al., 2005.	Imperial	2003	Year 3 OSCE	continuous	172	77.8	5.1	117	76.2	5.6	-0.299
Woolf et al., 2007.	Imperial	2004	Year 3 OSCE	continuous	159	80.6	4.0	172	80.0	4.0	-0.139
Haq et al., 2005.	UCL	2002	Year 3 OSCE	continuous	207	77.7	4.4	116	75.0	4.9	-0.581
Haq et al., 2005.	UCL	2003	Year 3 OSCE	continuous	176	78.0	4.9	120	76.4	5.1	-0.332
Woolf et al. 2007.	UCL	2004	Year 3 OSCE	continuous	169	77.1	5.2	196	71.0	8.6	-0.849
Kilminster et al., in press	'School 1'	-	Year 3 OSCE	continuous	154	81.1	4.1	55	78.5	5.1	-0.562
Kilminster et al., in press	'School 2'	-	Year 3 OSCE	continuous	117	58.1	5.6	111	57.2	5.4	-0.164
Kilminster et al., in press	'School 3'	-	Year 3 OSCE	continuous	169	71.5	7.4	184	72.1	7.4	0.081
Lumb & Vail 2004.	Leeds	1997-00	Year 3 OSCE	continuous	555	75.8	5.7	133	73.0	7.3	-0.429
Wass et al., 2003.	Guys & St Thomas	1999	Finals OSCE 1	continuous	48	72.5	4.6	43	70.0	4.3	-0.562
Wass et al., 2003.	Guys & St Thomas	1999	Finals OSCE 2	continuous	49	74.1	4.3	35	70.6	5.1	-0.742
McManus et al 1996.	U of London	1986	Finals	continuous	290	100.2	15.9	40	98.7	13.9	-0.100
McManus et al 1996.	U of London	1991	Finals	continuous	292	100.8	14.6	49	96.6	17.4	-0.264
James & Chilvers, 2001.	Nottingham	1970-75	Finals honours	dichotomous	336	n/a	n/a	n/a	n/a	n/a	0.178
James & Chilvers, 2001.	Nottingham	1976-80	Finals honours	dichotomous	552	n/a	n/a	n/a	n/a	n/a	-0.027
James & Chilvers, 2001.	Nottingham	1980-85	Finals honours	dichotomous	663	n/a	n/a	n/a	n/a	n/a	-0.689
James & Chilvers, 2001.	Nottingham	1986-90	Finals honours	dichotomous	598	n/a	n/a	n/a	n/a	n/a	-1.302

1.1.4.2.2. Meta-analysis results and discussion

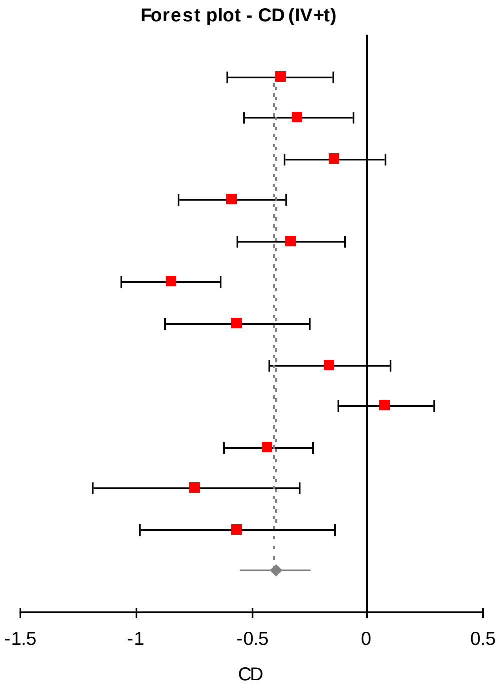
The forest plots for each meta-analysis are shown in Figure 1 , Figure 2 and Figure 3. There was a highly statistically significant negative effect of ethnic minority group on written ($p<0.0001$) and OSCE ($p<0.0001$) examination results. The effect size was slightly but not significantly larger in the OSCE (d=-0.40; 95%CI=-0.55 to -0.23) compared to the written (d=-0.30; 95%CI=-0.45 to -0.15). In the combined finals examinations, the overall effect size of d=-0.20 (95%CI=-0.42 to 0.01) was bordering on statistical significance ($p=0.06$). That result should be interpreted with greater caution as it contained fewer studies than the others, and four of the studies used the measure of "achieving honours in the final examination" which, as it is dichotomous rather than continuous, is less powerful than the raw examination scores obtained from all the other studies. Repeating each meta-analysis using a random effects model showed the same pattern of results.

Cohen laid out rough general guidelines about the interpretation of effect sizes stating that a small but probably meaningful effect size is approximately d=0.2; a medium effect size that most people would be able to notice is d=0.5 and a large effect size is d=0.8 (Howell, 2002). The results of the meta-analyses can therefore be considered to lie in the small to medium range.

Although it was not possible to include the data from Yates & James (2007), it was possible to calculate effect sizes from their published odds ratios. These were broadly similar or larger to the results of the meta-analysis. Ethnic minorities were more likely to: fail more than three preclinical examinations (d= -0.41); obtain lower second or third class BMedSci degree (d=-0.35); be in the 15th centile of Year 3 (d=-0.59) and Year 5 (d=-0.48) written examinations; be in the 15th centile of Year 5 clinical examinations (d=-0.99); and to fail at least one clinical examination (d=-0.76).

Figure 1: Forest plot showing the results of a random effects[3] meta-analysis of 12 datasets comparing white and ethnic minority performance on continuous measures of OSCE performance. Ethnic minority students achieve significantly lower scores (d=-0.40; 95%CI=-0.55 to -0.24; p<0.0001)

Study ID	Year	Exposed AM[e]/SE[e]	Control AM[c]/SE[c]	Weight (%)	Association measure with 95% CI
Imperial	2001	-0.3735/0.1168	-0.3735/0.1168	9.06%	-0.3735 (-0.6025 to -0.1445)
Imperial	2002	-0.2992/0.1205	-0.2992/0.1205	8.77%	-0.2992 (-0.5354 to -0.0631)
Imperial	2003	-0.1391/0.1101	-0.1391/0.1101	9.06%	-0.1391 (-0.355 to 0.0768)
UCL	2001	-0.581/0.1183	-0.581/0.1183	8.83%	-0.581 (-0.8128 to -0.3492)
UCL	2002	-0.3316/0.1192	-0.3316/0.1192	8.81%	-0.3316 (-0.5651 to -0.098)
UCL	2003	-0.8491/0.1094	-0.8491/0.1094	9.08%	-0.8491 (-1.0635 to -0.6346)
'School 1'	-	-0.5619/0.1597	-0.5619/0.1597	7.63%	-0.5619 (-0.875 to -0.2489)
'School 2'	-	-0.1636/0.1327	-0.1636/0.1327	8.42%	-0.1636 (-0.4237 to 0.0965)
'School 3'	-	0.0811/0.1066	0.0811/0.1066	9.16%	0.0811 (-0.1278 to 0.29)
Leeds	1997-00	-0.4288/0.0974	-0.4288/0.0974	9.41%	-0.4288 (-0.6196 to -0.238)
Guys & St Thomas	1999	-0.742/0.2287	-0.742/0.2287	5.80%	-0.742 (-1.1902 to -0.2938)
Guys & St Thomas	1999	-0.5615/0.214	-0.5615/0.214	6.16%	-0.5615 (-0.9809 to -0.1421)
META-ANALYSIS:				100%	-0.3968 (-0.5544 to -0.2392)



[3] Forest plots for the random rather than fixed effects analyses are shown as they partly model factors which may be responsible for some of the heterogeneity of the results.

Figure 2: Forest plot showing the results of a random effects meta-analysis of 9 datasets comparing white and ethnic minority performance on continuous measures of written examination performance. Ethnic minority students achieve significantly lower scores (d=-0.30; 95%CI=-0.45 to -0.15; p<0.0001)

Study ID	Year	Exposed AM[e]/SE[e]	Control AM[c]/SE[c]	Weight (%)	Association measure with 95% CI
Imperial	2001	0.086/0.1162	0.086/0.1162	11.63%	0.086 (-0.1418 to 0.3137)
Imperial	2002	-0.3396/0.1194	-0.3396/0.1194	11.18%	-0.3396 (-0.5737 to -0.1056)
Imperial	2003	-0.2697/0.1105	-0.2697/0.1105	11.63%	-0.2697 (-0.4863 to -0.0531)
UCL	2001	-0.5636/0.1181	-0.5636/0.1181	11.25%	-0.5636 (-0.795 to -0.3322)
UCL	2002	-0.1994/0.1187	-0.1994/0.1187	11.22%	-0.1994 (-0.432 to 0.0332)
UCL	2003	-0.2755/0.1048	-0.2755/0.1048	11.93%	-0.2755 (-0.4809 to -0.0702)
'School 1'	-	-0.7553/0.1615	-0.7553/0.1615	9.13%	-0.7553 (-1.0719 to -0.4388)
'School 2'	-	-0.0288/0.1325	-0.0288/0.1325	10.52%	-0.0288 (-0.2886 to 0.2309)
'School 3'	-	-0.3973/0.1076	-0.3973/0.1076	11.78%	-0.3973 (-0.6081 to -0.1864)
META-ANALYSIS:				100%	-0.2971 (-0.4476 to -0.1466)

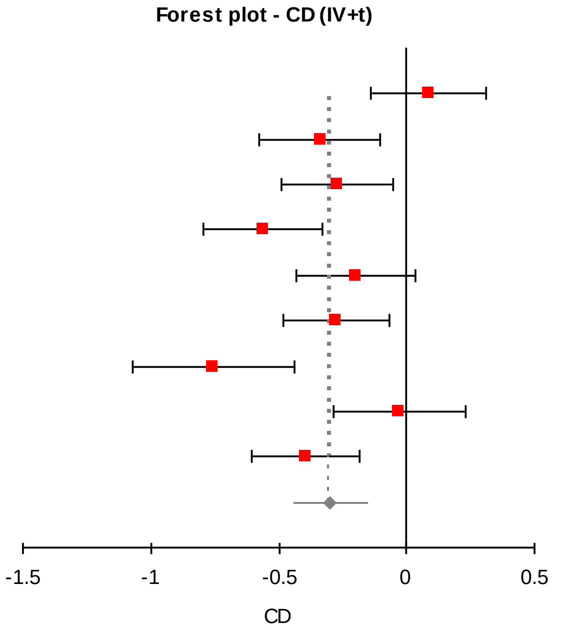
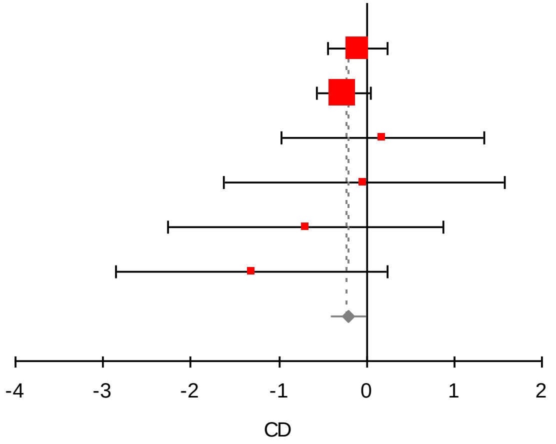


Figure 3: Forest plot showing the results of a random effects meta-analysis of 6 datasets comparing white and ethnic minority finals performance from the University of London (McManus et al., 1996) and Nottingham (James & Chilvers, 2001). Nottingham data refer to number of students achieving honours. London data are raw exam scores. The negative effect of ethnic minority is bordering on statistical significance (d=-0.20; 95%CI=-0.42 to 0.01; p=0.06)

Study ID	Year	Exposed AM[e]/SE[e]	Control AM[c]/SE[c]	Weight (%)	Association measure with 95% CI
University of London	1986	-0.1002/0.1687	-0.1002/0.1687	3.41%	-0.1002 (-0.4309 to 0.2304)
University of London	1991	-0.264/0.1548	-0.264/0.1548	49.46%	-0.264 (-0.5673 to 0.0393)
Nottingham	1970-75	0.178/0.5896	0.178/0.5896	3.41%	0.178 (-0.9777 to 1.3337)
Nottingham	1976-80	-0.027/0.8141	-0.027/0.8141	1.79%	-0.027 (-1.6226 to 1.5686)
Nottingham	1981-85	-0.689/0.8014	-0.689/0.8014	1.84%	-0.689 (-2.2597 to 0.8817)
Nottingham	1986-90	-1.302/0.791	-1.302/0.791	1.89%	-1.302 (-2.8524 to 0.2484)
META-ANALYSIS:				100%	-0.2041 (-0.4174 to 0.0092)

Forest plot - CD (IV+t)



The funnel plots for each meta-analysis (Figure 4, Figure 5, Figure 6) show no evidence of sampling bias. The lack of "funnel" shape to the plots in Figure 4 and Figure 5 probably reflects the fact that many of the studies have similar sample sizes.

There was important heterogeneity within both OSCE and written meta-analyses - the I^2 statistic was equivalent to 79.2% (CI=64.2 to 87.9) in the OSCE, and 73.2% (95%CI=47.6 to 86.3) in the written. In the meta-analysis of finals results, I^2 was equivalent to zero, but with an upper confidence interval of 74.6% (see Higgins, Thompson, Deeks & Altman, 2003 for an explanation of the I^2 statistic). The original study papers did not indicate any obvious underlying subgroups responsible for the heterogeneity. Instead it may reflect the fact that most of the studies from which the data were obtained compared "white" and "ethnic minority" groups, but the "ethnic minority" groups at the different medical schools in which these studies took place are likely to be heterogeneous. Furthermore, the data from Haq et al. (2005) compared whites with Asians. However Asians are the single largest ethnic minority groups at Imperial and UCL medical schools (see Table 4 for the breakdown of four cohorts of UCL medical students by ethnic group), and the Haq et al. data are therefore comparable to the Woolf et al. data.

Figure 4: Funnel plot for the meta-analysis of UK undergraduate OSCE results by ethnic group, showing no evidence of sampling bias

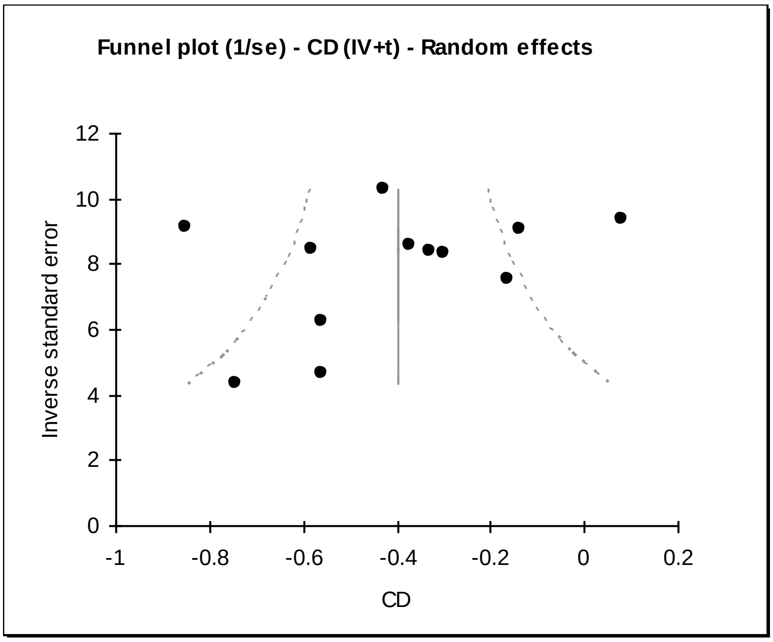


Figure 5: Funnel plot for the meta-analysis of UK undergraduate written results by ethnic group, showing no evidence of sampling bias

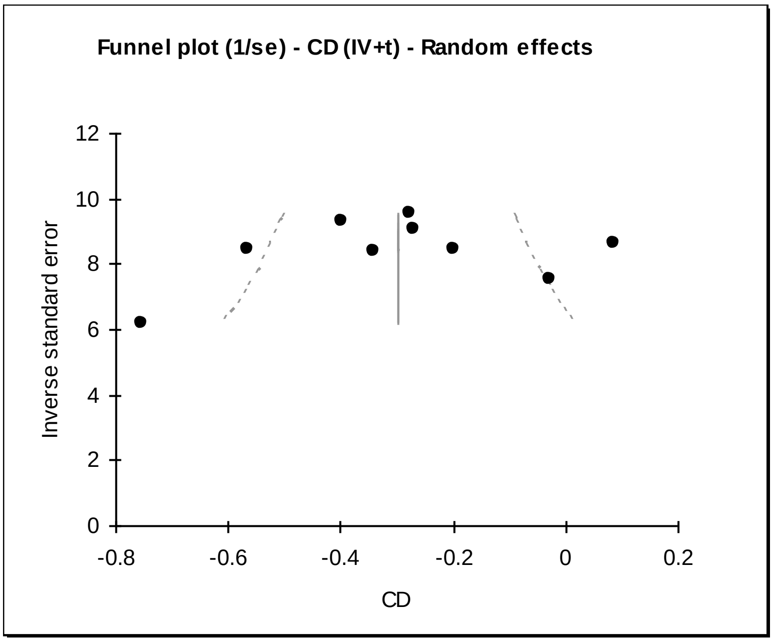
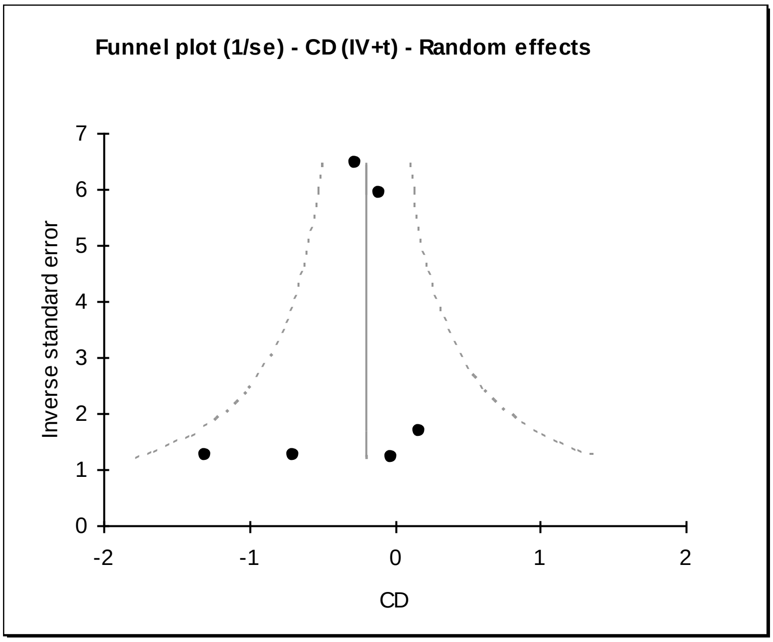


Figure 6: Funnel plot for the meta-analysis of UK undergraduate finals results by ethnic group, showing no evidence of sampling bias



1.1.5. Ethnicity and attainment in postgraduate medicine

As well as there being an ethnic difference in undergraduate medical education, researchers have also found ethnic differences in UK postgraduate medicine. The results of these studies are summarised below. Due to the lack of raw data available for some of the studies, a meta-analysis was not conducted. Instead, the effect sizes for the available were calculated using three methods described above in Box 1. The effect sizes are presented in Table 3 .The median effect size was d=-0.30, which, can be considered in the small to medium range and is similar to that found in the studies of undergraduate medics in section 1.1.4.2.2 above.

In an early study, Wakeford, Farooqi, Rashid & Southgate (1992) looked at pass rates of the 3686 candidates who took the Membership of the Royal College of General Practitioners (MRCGP) examinations for the first time from 1988 to 1990, of who 244 were Asian and the remainder were non-Asian. They found that non-Asians achieved significantly higher scores than Asians on the written examinations [$t(267)=8.58$; $p<0.001$], but not the orals [Oral 1: $t(155)=0.58$; $p=0.116$; Oral 2: $t(155)=1.79$; $p=0.076$], although only the best 85% written candidates continued to the oral. However when the analysis was restricted to UK-trained Asians only, there were no difference between the whites and the Asians on any parts of the examination. More recent MRCGP data from 2004 published in the BMA document *Examining Equality: a survey of Royal College Exams* (BMA, 2006) showed that white candidates (n range=1358-1589) were more likely to pass the written (odds ratio=5.76), clinical (odds ratio=6.20), oral (odds ratio=4.17), and consulting skills (odds ratio=3.04) components of the MRCGP examination when compared to all other ethnic groups (n range=791-1022). The white group had higher pass rates than any other ethnic group (although whether the data provided included non-UK candidates was not specified).

In the same document it was reported that preliminary data from the Membership of the Royal College of Paediatrics and Child Health (MRCPCH) examination for 9,119 candidates from May 1999 to January 2005 had shown that all ethnic groups had similar pass rates on the written and clinical examinations; although in the clinical examination, pass rates for Middle Eastern and Pakistani/Bangladeshi candidates were consistently 10 per cent lower than the average pass rate, while the pass rate for white candidates was consistently 10 per cent higher than average for both types of examination. UK graduates were found to outperform overseas graduates on all parts of the MRCPCH examination. Again, in the same report, it was described how graduates from the UK and Republic of Ireland performed better than non-UK graduates in the entire Membership of the Royal College of Obstetricians and Gynaecologists (MRCOG) examination; and The Faculty of Accident and Emergency Medicine had provided incomplete data which showed the same trend in the Intercollegiate Board for the Fellowship of the Faculty of Accident and Emergency Medicine (FFAEM) examination.

A more recent academic journal publication by Dewhurst, McManus, Mollon et al (2007) showed that white UK graduates who took the Membership of the Royal College of Physicians (UK) examination [MRCP(UK)] in 2003/4 were 1.58 times more likely than ethnic minority UK graduates to pass the written Part I of the examination ($p<0.001$), 1.73 times more likely to pass the written Part II of the examination ($p<0.001$), and 1.93 time more likely to pass PACES, the practical clinical Part II of the examination ($p<0.001$). Bessant and colleagues (2006) had very similar findings when they followed up a subgroup of individuals who had taken an MRCP(UK) PACES revision course: 73% of white UK candidates passed PACES first time compared to only 56% of ethnic minority UK candidates ($p=0.0012$, odds ratio=2.15).

Table 3: Effect sizes from published studies comparing performance of ethnic groups in the Membership of the Royal College of General Practitioners (MRCP) and the Royal College of Physicians UK (MRCP UK) examinations. Wherever possible, comparisons between candidates trained in the UK are shown.

Study	**Institution**	**Year(s) exam taken**	**N**	**Groups**	**Exam type**	**Effect size (d)**
Wakeford, Farooqi, Rashid, Southgate (1992)	RCGP	1988-1990	3570	UK-trained non-Asian vs UK-trained Asian	MRCGP MCQ	-0.10
Wakeford, Farooqi, Rashid, Southgate (1992)	RCGP	1988-1990	3570	UK-trained non-Asian vs UK-trained Asian	MRCGP MEQ	-0.07
Wakeford, Farooqi, Rashid, Southgate (1992)	RCGP	1988-1990	3570	UK-trained non-Asian vs UK-trained Asian	MRCGP Reading	-0.02
Wakeford, Farooqi, Rashid, Southgate (1992)	RCGP	1988-1990	3194	UK-trained non-Asian vs UK-trained Asian	MRCGP Oral 1	0.03
Wakeford, Farooqi, Rashid, Southgate (1992)	RCGP	1988-1990	3194	UK-trained non-Asian vs UK-trained Asian	MRCGP Oral 2	0.00
BMA (2006)	RCGP	2004	2265	white vs ethnic minority	MRCGP written	-0.97
BMA (2006)	RCGP	2004	2440	white vs ethnic minority	MRCGP Multiple choice	-1.01
BMA (2006)	RCGP	2004	2149	white vs ethnic minority	MRCGP Oral	-0.79
BMA (2006)	RCGP	2004	2453	white vs ethnic minority	MRCGP Consulting skills	-0.61
Bessant, Bessant, Chesser, Coakley (2006)	RCP	2002	227	white vs ethnic minority	MRCP(UK) Part II PACES	-0.42
Dewhurst, McManus, Mollon et al (2007)	RCP	2003	3650	UK white vs UK non-white	MRCP(UK) Part I	-0.25
Dewhurst, McManus, Mollon et al (2007)	RCP	2003	2718	UK white vs UK non-white	MRCP(UK) Part II Written	-0.30
Dewhurst, McManus, Mollon et al (2007)	RCP	2003	2353	UK white vs UK non-white	MRCP(UK) Part II PACES	-0.38
						Median effect size =-0.30

Ethnicity and attainment in non-medical education

As Professor Tomlinson correctly pointed out in 1995 (Dillner, 1995), the fact that people from different ethnic groups have different levels of academic achievement is not a new finding, and neither is it unique to medicine. This section contains an overview of research relating to ethnicity and academic attainment in non-medical education. It is restricted to UK studies.

Since the 1960s, research into compulsory school education has consistently shown that ethnic minority schoolchildren underachieve academically compared to white schoolchildren (Sharma, 2000). There are however considerable differences in attainment between the different ethnic minority groups from the first pre-school assessments through to degree level. At entry to primary school, children are assessed on the Foundation Stage Profile, which measures progress against early learning goals in terms of communication and literacy, mathematical ability, personal social and emotion development, knowledge and understanding of the world; physical development and creative development. In 2003, the national average was 50%. The highest scorers were the white Irish (57%), white British (52%), Indian (45%) and Chinese (42%), although Indians scored below average on 10 of the 13 subscales. The lowest scorers were the Bangladeshis, Pakistanis and black Africans with scores of 30%, 31% and 40% respectively (Department for Education and Skills, 2005). At all post-foundation levels of compulsory education in which school children are assessed, from Key Stage 1 (ages 5-7) through to General Certificate of Secondary Education (GCSE) level (ages 14-16) Chinese and Indian children achieve higher grades than whites, whereas Pakistani, Bangladeshi, black Caribbean, and black African children achieve lower grades (Bhattacharyya, Ison & Blair, 2003). In the later compulsory and non-compulsory stages of school education, where most students take GCSEs and A level examinations respectively, white children achieve slightly higher marks than all other ethnic minority groups combined, although the differences are small within the highest achieving groups. The slight difference at A level remains in the pool of applicants to university, and as a result, students from ethnic minorities enter university with slightly lower marks at A level, the difference being equivalent to a small effect size of about 0.1 (McManus, Woolf & Dacre, 2008).

Once at university, many studies have found that white students are more likely to get a “good” degree (first and upper second), and are less likely to get lower second and third class degrees compared to all other ethnic minority students, including Chinese and Indian students (Connor et al., 2004; Leslie, 2005; Elias & Jones, 2006; Richardson, 2008). Within the ethnic minority group, differences between different groups do remain however, with students from mixed ethnic groups performing the best, followed by Chinese and Indian, with students in the black Caribbean group achieving the lowest scores. Richardson (2008) reported that on average, Asian students were half as likely to achieve a “good degree” compared to white students (odds ratio=0.50), and black students were approximately a third as likely (odd ratio=0.33). The ethnic differences varied between the different types of courses and different types of institutions, being smallest in medicine and in the so-called Russell-group universities (high profile English research universities).

Explanations for ethnic minority academic underachievement

Several explanations have been proposed for the academic underachievement of people from ethnic minorities, from school-age children to adult students. The most important are described and evaluated below. Most of the research in this area has been conducted with school-aged children or HE students, thus the results of these studies are generally presented first, followed by any studies which have been conducted with medical students. It is important to note when considering the explanations described below that the causes of ethnic minority underachievement are probably multi-factorial and interact with one another (The Swann Report, 1985).

1.1.6. Differences in intelligence (IQ)

Performance on academic examinations correlates relatively well, but not perfectly, with performance in Intelligence Quotient (IQ) test scores. The main difference between the two types of test is that academic examinations are designed to measure the amount of context-specific information learned in a particular environment (e.g. school) whereas IQ tests are designed to measure context-free, general intelligence. It has been shown above that ethnic minority children and adults underperform in academic examinations relative to whites in a variety of contexts. Research, mainly from the United States, has also shown that some ethnic minorities, particularly blacks, achieve lower IQ tests scores than whites (Brooks-Gunn, Klebanov & Duncan, 1996). This evidence, taken together with evidence that IQ test scores are approximately 50%

heritable (Plomin & Petrill, 1997), has led some to argue that whites are innately more intelligent than ethnic minority groups, notably blacks. This highly controversial hypothesis has been propagated most notably by psychologists Hans Eysenck in the UK (e.g. Eysenck, 1971) and A R Jensen in the US (e.g. Jensen, 1969). The widely-published counter-hypothesis is that ethnic groups differ on a number of environmental factors including culture, levels of deprivation and socio-economic class, and it is these and other (not necessarily measurable) environmental factors rather than genetic factors that are responsible for ethnic differences in test performance.

Both arguments have extremely important social and political implications, for example the ‘environmental’ hypothesis is part of the underpinning of some widening participation schemes, which are designed to encourage members of under-represented ethnic and social groups to apply for medical school. In those schemes, the requirement for exceptionally high school-leaving grades can be waived for applicants from poorly-performing schools, the assumption being that their grades reflect their schooling and other environmental factors, rather than their current and presumably their potential academic ability:

> “It has been well documented that previous academic achievement—grades in A level examinations (taken at age 17-18), or grade point average—is a good, albeit imperfect, predictor of success at medical school, particularly in the early years. This can be valid only if the grades reflect the student’s true academic ability, which is not usually the case for applicants to any widening participation initiative.”
> (Garlick & Brown, 2008)

The debate between the proponents of each hypothesis unfortunately continues to rage at least 35 years after it begun (e.g. Rushton & Jensen, 2005; Nisbett, 2005). This thesis is not the place to outline the debate in detail (and it has been discussed at length elsewhere, e.g. see *The Bell Curve*: *Intelligence and class structure in American life* by Herrnstein & Murray, 1994 and the responses to it published in *The Bell Curve Debate: History, Documents, Opinions* edited by Jacoby & Glauberman, 1995). Suffice to say that although IQ tests are probably the best available measure of cognitive aptitude, they cannot provide a perfect measure of innate general intelligence and are probably biased in favour of the white middle classes (Mackintosh & Mascie-Taylor, 1985; Rust & Golombok, 1992). Furthermore there is plenty of evidence to support the hypothesis that environmental factors are the most important predictor of ethnic and social class variability in IQ and other test scores. It therefore seems highly unlikely that ethnic differences on IQ or other academic tests are due to between-group differences in innate general intelligence (e.g. Scarr-Salapatek, 1971; Mackintosh & Mascie-Taylor, 1985; Brooks-Gunn, Klebanov & Duncan, 1996; Dickens & Flynn, 2006).

1.1.7. Socio-economic status

1.1.7.1. Compulsory and post-compulsory school education

Children who experience economic deprivation have lower levels of attainment (DfES, 2005). A Joseph Rowntree Foundation (JRF) Report "Tackling UK poverty and disadvantage in the twenty-first century" (Darton & Strelitz, 2003) discusses the links between disadvantage and attainment. In the report Jason Strelitz describes the negative spiralling effect of disadvantage on educational attainment:

> "As education is a process, different factors have a cumulative effect. Under-development at one stage will lead to ill-preparedness at the next, which in turn may impact in a range of ways. This process begins before a child is born, […] and these factors continue to affect the attainment process throughout."
> (Strelitz, 2003)

Strelitz also explains that poverty is associated with a host of psychological factors which may affect attainment such as lack of expectations, lack of successful role models and lack of motivation. Those psychological factors, together with factors related to the institutions or schools in which education takes place, provide learners with "educational capital" (Howard, McLaughlin & Vacha, 1996), which may influence both their current and future educational outcomes.

Children from ethnic minorities tend have higher levels of deprivation than whites (Department of Work and Pensions, 2004). Ethnic minorities are nearly twice as likely to live in low income households compared to whites, unemployment is higher within the ethnic minority population, and wages are comparatively lower (DWP, 2004). Ethnic minority school children are more likely to live in deprived postcodes, and are less likely to have a household headed by an individual in socio-economic class I (higher managerial and professional occupations) than whites (DfES, 2006). The relationship between socio-economic status and ethnic group is not straightforward however. Furthermore, socio-economic differences exist between ethnic groups for a number of different reasons (see Modood, 2006, for a discussion of social mobility, migration, ethnicity and social class). To give two examples, the percentage of Indian low income homes is 17%, compared to 60% of Bangladeshi homes; 14% of white British school children are eligible for free school meals (FSM), compared to 10.5% of Chinese, 12% of Indians, 34% of black Caribbeans and 49.5% of Bangladeshis (DfES, 2005).

The relationship between attainment, socio-economic status and ethnic group is even more complex. For example, the DfES report published in 2005 showed that there is very little difference in the GCSE attainment of FSM eligible and non-FSM eligible Bangladeshis, although FSM eligible Bangladeshis have a higher mean level of attainment than FSM eligible children in general, whereas non-FSM eligible Bangladeshis have a lower mean level of attainment than other non-FSM eligible children. Furthermore, Chinese and Asian children do better than expected, bearing in mind the numbers eligible for FSM. As well as raw grades, another way pupil's progress can be measured is by taking their earlier Key Stage performance into account when measuring their later Key Stage performance – something the DfES calls "Value Added". Using this measure, most ethnic minority groups make more progress in later Key Stages than do whites who had the same earlier Key Stage scores, with Bangladeshis doing particularly well compared to whites at GCSE, although their raw scores at GCSE are lower than whites' (DfES, 2006). The DfES also have a measure of "contextual value added", which takes into account not only prior Key Stage attainment, but also sex, special needs and deprivation. On that measure, children from most ethnic minority groups make more progress throughout the Key Stages than whites, with the exception of Pakistani, black Caribbean and Other ethnic groups. The overall finding from both DfES reports is that while socio-economic status (as measured by postcode, parents' jobs, free-school meals) is partly responsible for ethnic differences in educational attainment, it does not explain all the variance in test score (DfES, 2005; 2006).

1.1.7.2. Higher Education in general

The HE population differs considerably from the school-age population in a number of ways including socio-economic status. High socio-economic group has consistently been shown to positively predict application and acceptance to HE (Sammons, 1995).

In HE student populations, the type of school attended is often used as a proxy for social deprivation (as described in the quote about the widening participation scheme in the section 1.1.6 above). A report by the Higher Education Funding Council for England (HEFCE) analysed the HE performance and schooling background in the 1997-8 cohort of HE entrants with A levels, finding a complex relationship between school type and HE performance, which was also related to sex and the subject of HE study. The most consistent finding (as had previously been shown by Smith & Naylor, 2001) was that students who had attended *independent* schools had a lower level of HE attainment (HEFCE, 2003). Broeke & Nicholls (2007) analysed Higher Education Statistics Agency (HESA) data from 2004/5, finding that white students achieved better higher education qualifications than ethnic minorities even when sex, school leaving examination type and results, disability, deprivation, subject of study, type of higher education institution, term-time accommodation, and age were all taken into account.

1.1.7.3. Medical education

Within the medical student population, there is considerably less variability in economic deprivation or socio-economic status compared to the general school-age or even HE populations (Powis, Hamilton, McManus, 2007). Approximately three quarters of medical students have parents from socio-economic groups (SEG) I and II (Arulampalam, 2004; Seyan, Greenhalgh & Dorling., 2004; BMA, 2004) – a situation which has changed little in the last 50 years (McManus, 2004). In terms of applications and acceptances to Medical School, an analysis of UCAS data from 2002 by the BMA (2004) showed that medical school applicants from SEG I and II were more likely to be accepted. Within acceptances, approximately the same proportions of whites and Asians came from SEG I and II, although Asians were slightly more likely to come from SEG I. Acceptances from black ethnic groups were less likely than Asians and whites to come from SEG I backgrounds. However, that analysis did not take A Levels or other academic variables into account. McManus & Richards (1984) showed that socioeconomic factors did not predict acceptance once A Levels were taken into account, which as the authors point out, means socioeconomic class indirectly increases the chances of acceptance by increasing the likelihood of achieving the necessary qualifications.

In terms of ethnic group, socio-economic status and attainment in medical student populations, a study of 11,192 applicants to study medicine at the University of Nottingham found that white, Chinese and Mixed applicants were more likely to be materially deprived (as measured by postcode), and this partly, but not fully, explained their lower UCAS tariff score (which is based mostly on A level points; Powis, Hamilton, Ferguson, 2007). Arulampalam et al. (2004) reported that socio-economic background did not predict drop out in the first year of medical school, once prior qualifications and A levels were taken into account. Few studies have directly investigated the relationship between socio-economic status, ethnic group and medical school examination performance; however a regression analysis to predict Year 3 outcome at Leeds Medical School found that non-white ethnic group negatively predicted Year 3 scores, even when socio-economic group and school type were taken into account (Lumb & Vail, 2004)

1.1.8. Differences in entry qualifications of HE students from different ethnic backgrounds

1.1.8.1. Higher Education in general

According to the Higher Education Funding Council for England (HEFCE), A levels are the best single predictor of HE achievement (HEFCE, 2003). It follows then that ethnic differences in A level results (or other entry qualifications) would translate into ethnic differences at degree level. As mentioned above, white HE students tend to have slightly more A level points when compared to all ethnic minority groups combined, although Chinese students do particularly well in A levels. Richardson (2008) has shown that differences in UCAS tariff scores account for some, but not all of the difference in the proportion of white and ethnic minority students gaining “good” degrees, although he found that previous academic qualifications did account for the difference between black and Asian attainment in HE. Moreover, at HE level, Chinese students underachieve compared to whites, despite generally having higher entry qualifications.

1.1.8.2. Medical education

In medicine, prior academic performance is also a significant predictor of undergraduate and postgraduate performance. Eammon Ferguson and his colleagues’ systematic review and meta-analysis of the factors influencing performance in medicine indicated that previous academic performance accounted for 30% in the variance of undergraduate performance, and 14% of the variance in postgraduate performance (Ferguson et al., 2002). More recent studies have found higher A level results positively predict both undergraduate performance (Ferguson, James, O'Hehir et al., 2003; McManus, Smithers, Partridge, et al., 2003) and achieving membership qualifications in a shorter time (McManus et al., 2003). They also negatively predict dropping off the Medical Register as a doctor (McManus et al., 2003), dropping out of medical school (Arulampalam, 2004), and "struggling" at medical school (Yates & James, 2006). High marks at Biology and Chemistry A level and O level/GCSE have been found to predict undergraduate medical examination success (James & Chilvers, 2001).

In terms of ethnicity and medical school attainment, as in HE, McManus et al. (1996) found that even after taking into account A level and O level results, ethnic minorities were still more likely to fail their finals. In a recent study of Youth Cohort Study data and UCAS data for all applicants to medical school in 2003-2005, McManus, Woolf & Dacre (2008) showed that ethnic minority students enter medical school with slightly lower entry-qualifications compared to whites (d=-0.1), but this difference did not explain all of the ethnic difference in medical school examination results.

1.1.9. Increase in participation means a lower standard

We have seen that ethnic minority students are more likely to apply to and enter HE, and that Asian Indians are well-represented in medicine. This 'over-representation' of ethnic minorities in medical school has been proposed to explain ethnic minority underachievement at medical school, the idea being that the group of ethnic minority students is larger and therefore will contain overall weaker applicants (BMA, 2004). Richardson (2008) argues against what he calls the "more means worse" hypothesis, pointing to the relatively similar levels of black and Asian participation in and to their differential levels of performance. He also references work done by Elias & Jones (2006) which showed ethnic differences in Physics degree attainment – a subject in which ethnic minorities are relatively under-represented and have very similar entry qualifications to whites. The "more means worse" hypothesis requires that more ethnic minorities are accepted to HE institutions simply because more apply, the implication being that universities are more likely to accept weaker ethic minority candidates because they do not want to reject too many people from ethnic minorities. There is little numerical data to support or refute this claim. McManus et al.'s (2008) finding that ethnic minorities are accepted to medical school with slightly lower A Level grades than whites suggests that ethnic minority applicants are being accepted to medical school using slightly different criteria, although no inference about the nature of those criteria can be made, and the results were not analysed by medical school (McManus et al., 2008). In any case, the "more means worse" hypothesis does not hold true in the case of sex as it predicts that female attainment in HE and medicine should have dropped with the rapid increase in number of women entering HE and medicine, when in fact the opposite is true (e.g. Haq et al., 2005, Woolf et al., 2007).

1.1.10. Language

English language proficiency is known to affect younger children's academic attainment, and is thought to be partly responsible for Indian children's underachievement at pre-school Foundation Stage, which contrasts starkly with their later school-age performance (DfES, 2005). In fact, the difference in performance between children who speak English as a first language and those who speak it as an additional language narrows with age. The difference is relatively small at GCSE.

In medicine, particularly in the clinical parts of the course where students are assessed on their ability to communicate with patients, it is feasible that difficulties in spoken English might influence the ethnic attainment gap. In a study of a communication skills final examination, Wass et al (2003) attributed white students' higher scores in part to particularly poor communication skills in a small subset of ethnic minority male students, and slight differences between white examiners' and ethnic minority simulated patients' perceptions of "good" communication skills. Those researchers showed that ethnic minority students who performed badly in the examination were more likely to have pronunciation, word stress, and intonation influenced by their heritage language. However research by Haq et al (2005) and McManus et al (1996) suggests that linguistic ability is not the only possible reasons ethnic differences in performance. Haq et al (2005) showed that, despite being native English speakers, UK-educated Asian students achieved lower examination scores than white UK medical students. McManus and colleagues found that, although UK white students did better in written and clinical finals examinations compared to UK ethnic minority students, non-UK ethnic minority students (most of who presumably were not native Anglophones) did better than UK white students. Furthermore, the fact that ethnic minority students underperformed in written examinations, which are marked by machines, suggests that the differences are not due to bias on the part of the clinical examiners or differences in oral communication.

1.1.11. Unfair discrimination

An obvious reason for ethnic minority underachievement is that students from ethnic minorities experience more direct or indirect racial discrimination in learning environments than white students.

1.1.11.1. Compulsory and post-compulsory school education

In school age children, the Swann Report (1985) attributed black Caribbean children's underachievement at least in part to probable racial discrimination on the part of teachers and education authorities who failed to recognise the particular learning needs of those groups, placed less value on the cultural practices of those groups (e.g. using Patois words in spoken English), or treated children as examples of negative stereotypes (e.g. that they were lazy), and had correspondingly low expectations. As discussed above, Asian children tend to do well at school, but the report's authors argue that Asian children's academic success is not evidence of a lack of racism, because discrimination may have different effects in different groups. Supporting this, Sharma (2000) reviewed the self-reported experiences of Asian children in education and found that Asians can be subject to stereotyping from teachers and racist abuse, mainly from peers. A recent DfES (2006) report found that mixed heritage children reported racism from teachers and peers, which led to poor behaviour.

1.1.11.2. Higher Education

In terms of HE, the evidence about ethnic minorities being the victims of discrimination is mixed. Connor et al (1996) reported that some HE ethnic minority students felt they had experienced 'subtle forms of exclusion and marginalisation'. However a later survey of students by the same team published in 2004 found that only 7% of ethnic minority students reported racial discrimination, although they point out that under-reporting probably occurred (and it could justifiably be argued that any proportion over 0% is too much). Connor et al. also found that when asked to list difficulties or problems they had encountered at university, ethnic minorities were unlikely to list discrimination, although Chinese, Other Asian, Bangladeshi and Pakistani students were the most likely to say that they did not receive enough encouragement and support from academic staff. In an accompanying interview study, the authors found that direct discrimination on the part of teachers was not perceived as a problem by HE students, but that a lack of cultural diversity meant staff and students could be cultural insensitive, for example, arranging events around alcohol.

1.1.11.3. Medical education

In medical education, much of the debate on discrimination has centred around who is accepted to study medicine (see Esmail, 2001 for an overview), and less about the experiences of ethnic minority students when they are studying on the course. A study of medical graduates by the BMA (2003) found that ethnicity was more likely to be perceived as affecting progress after qualification (for example, in terms of early career opportunities, or specialist training) than during medical school, mainly due to the fact that country of qualification rather than ethnic group *per se* was perceived as the main reason for discrimination. However over 62% (n=76/476) of ethnic minority graduates did feel that ethnic group was a significant factor in medical training. Another qualitative study from a London medical school reported that some ethnic minority students felt they did not "fit" with the image of a traditional medical student, and that white students believed "quiet and shy" Asian female students were more likely to be humiliated or ignored by consultants (Lempp & Seale, 2006). In a personal account published in the King's Fund book "Racism in medicine", a second generation British Pakistani GP wrote how he had experienced racist attitudes from clinical teachers whilst at medical school, as well as isolation from his white peers (Dadabhoy, 2001). Other researchers have also found ethnic minority medical students may experience marginalisation through student-imposed segregation: in a study at a Canadian medical school, Beagan (2003) showed the existence of cliques which were bound together partly by the ethnic origin of the members and called names such as "the Oriental group" and "the Chinese crowd". A BMA report (2004) suggested that medical school societies may encourage this type of segregation, as one medical student explained in the report:

> "I must admit that in medical school there is sometimes an invisible divide between groups of students based on their ethnicity, these groups fuelled by societies exclusively for people of a certain ethnicity. Personally I think societies like this are more likely to separate people according to race."
> (p46; BMA, 2004)

This evidence makes it clear that racist attitudes and behaviour are present at least to some extent in medical schools; less clear are the effects this has on the academic attainment of ethnic minority medical students.

1.1.12. The interaction between sex and ethnic group

Newspaper articles about educational ethnic differences commonly discuss what they call “black boys” (“Plan to help black boys achieve”, BBC 9th April 2007 http://news.bbc.co.uk/1/hi/education/6537951.stm), often in relation to black *Caribbean* males. The assumption is that sex and ethnic group interact statistically to affect academic attainment, e.g. it is only males from certain ethnic groups that perform differently compared to women of those ethnic groups – in some ethnic groups there are no sex differences. This section examines the evidence for this interaction.

1.1.12.1. Compulsory and post-compulsory school education

Sex has long been known to be a factor which affects educational outcomes: girls do better than boys at all Key Stages of UK compulsory education (ages 7, 11 and 16) (Machin & McNally, 2005). At A level, females achieve slightly higher scores than males, although the difference is much narrower than at GCSE (DfES, 2007). There is conflicting evidence that sex and ethnic group interact to affect attainment in compulsory education. An analysis of data from the Youth Cohort Study of England and Wales 1997, 1999 and 2001 published in 2006 by Connolly found no sex by ethnic group interaction on the outcome variable “likelihood of gaining 5 or more A*-C passes at GCSE”. However a report using more recent Youth Cohort Study data published the following year by the Department for Educational and Skills (DfES, 2007) found that there was an interaction, the greatest male to female gap being in the black Other and black Caribbean groups.

1.1.12.2. Higher Education

Richardson’s (2008) Higher Education Academic review of data from 1958 to 2005 indicated that since the late 1970s, female undergraduate students have been more likely to achieve a “good” degree than males. However until recently, male students achieved more first class degrees (the top classification) and more third class degrees in some subjects, indicating perhaps more variability in their abilities. Richardson (2008) found evidence of a sex by ethnic group interaction in HE, where the gap between white and ethnic minority attainment is larger in female (odds ratio Asian female/white female=0.47; black female/white female=0.31) than in male students (odds ratio Asian male/white male=0.54; black male/white male=0.35), and it tends to be the male ethnic minorities who are least likely to achieve “good degrees”.

1.1.12.3. Medical education

In medical education, issues surrounding sex are of particular interest because of the high proportion of females studying medicine: there are currently about three women to every two men studying medicine in the UK, although the number varies between medical schools (BMA, 2004). The number of women in medicine has increased dramatically over the last 40 years, which may be due in part to the increase in fair selection processes (BMA, 2004). However, the number of women applying to medicine has also increased hugely. This change at undergraduate level has implications for the demographic composition of the medical workforce: in 2005, 73.4% of Consultants in England were male compared to 45.1% of House Officers or Foundation Year 1 doctors (The Information Centre, NHS Staff http://www.ic.nhs.uk/pubs/nhsstaff) - although females are less likely to progress into the top jobs in medicine (McManus et al., 2000). This issue has recently attracted media attention (BBC 3rd August 2004 http://news.bbc.co.uk/1/hi/talking_point/3528786.stm), and debate within the medical establishment (Kilminster, Downes, Gough et al., 2006; Dacre, 2008; McKinstry, 2008).

In terms of academic attainment, sex differences in undergraduate medical education are slightly less reliable than the differences found in other areas of HE. A 2002 review of the literature showed that in general, female sex positively predicts good performance; and although men can slightly outperform women in early parts of the course, those differences disappear or are reversed in clinical examinations and examinations in taken later in the undergraduate course (Ferguson et al;. 2002). Later research has found that female medical students score higher in paediatric, obstetrics and gynaecology, and psychiatry examinations (McDonough, Horgan, Codd et al., 2000; Higham & Steer, 2004; Bienstock, Martin, Tzou & Fox, 2002). At postgraduate level a study found that female candidates do better in the clinical assessments of the MRCP(UK), but not in the written assessments (Dewhurst et al., 2007). The BMA report into sex and ethnic group differences in UK postgraduate examinations (2006) reported small sex differences: female candidates did slightly better on the written component of one college's membership exam, on the clinical component of two further college's exams, and on all components of a third's exam. One exception was the membership exam of the Royal College of Anaesthetists where 63% of candidates were male, and of those who passed only 39% were female.

Do sex and ethnic group interact to affect medical educational outcomes? Two studies, one of final year medical students (Wass et al., 2003) and one of postgraduate examination candidates (Dewhurst et al., 2007) have found that males from ethnic minority backgrounds performed particularly poorly in clinical examinations. However, other studies have found no interaction between sex and ethnic group in performance on undergraduate examinations (e.g. Woolf et al., 2007).

1.1.13. Ethnic differences on other variables known to affect medical school performance

Aside from ethnic group, socio-economic class, sex and prior attainment, other factors are known to affect medical students' performance in examinations. In their 2002 review of the literature, Ferguson, James and Madeley (2002) identified personality, learning styles as key predictors of success at medical school. According to most trait theories of personality, traits represent inborn dispositions that lead people to behave in particular ways (Pervin, Cervone & John, 2005). There is some argument about the number and exact nature of these traits, but many researchers now generally agree on five broad personality traits ('the Big 5'): Neuroticism, Extraversion, Openness to Experience, Agreeableness and Conscientiousness (Matthews & Deary, 1998)[4]. Aspects of personality related to Conscientiousness and Extraversion have been found to positively predict medical and dental student performance (Ferguson et al., 2003; Lievens, Coesier, De Fruyt & Maeseneer, 2002; Chamberlain, Catano & Cunningham, 2005).

Approaches to learning and studying (learning or study styles), in particularly strategic, deep, converger and accommodator styles have also been found to predict undergraduate and postgraduate medical student examination performance (Ferguson et al., 2003; Smits, Verbeek, Nauta et al., 2004). Richardson (2008) has suggested that difference in learning styles should be investigated in the exploration of ethnic differences in attainment in Higher Education. However McManus et al (1996) found no ethnic differences in study habits or clinical experience in white and ethnic minority final year students in the mid-1980s, despite the fact that ethnic minorities were more likely to fail their examinations.

[4] The Big 5 are commonly measured with versions of Costa and McCrae's NEO-PI personality inventory (e.g. Costa & McCrae, 1992).

Mental health factors such as anxiety, depression and stress (often high in medical students - Firth-Cozens, 2001) may also influence medical students' learning and performance. Ferguson's review found that state anxiety showed a U-shaped association with first year performance (Ferguson et al., 2002). A study of students at five medical schools in the United States found that overall, students from ethnic minorities were *less* likely to report burnout, but more likely to report that their ethnic group had negatively affected their medical school experience (Dyrbye, Thomas, Eacker et al., 2007).

Why is ethnic minority underachievement a problem?

We have seen that ethnic minorities underperform in various academic contexts. We have also seen that there is no sound reason to believe that ethnic minorities are less genetically able than whites. There is therefore every reason to believe that in general, ethnic minority groups who underachieve are not reaching their potential. This is important for two main reasons: firstly because it has repercussions for the individuals and those close to them, as well as for wider society; and secondly because it can be considered unfair and therefore morally unjustifiable.

Poor academic achievement is related to poorer employment prospects, disadvantage and poverty (Clark & Drinkwater, 2007), which are themselves associated with negative health outcomes (Marmot, Ryff, Bumpass et al., 1997). Although there is wide variation between ethnic groups, there is evidence that on the whole, people from ethnic minorities in the UK are less likely to be in active employment, less likely to be in skilled jobs (Owen, 2000), and more likely to suffer from disadvantage compared to whites (Darton & Strelitz, 2003). One reason for this is the relatively lower academic attainment of ethnic minority groups compared to whites (although it is important again to stress both the variation between ethnic minority groups; and the contribution of other factors).

In medical education, the difference between white and ethnic minority attainment is relatively small and, it could therefore be argued, insignificant. However, although it is small, the difference is reliable and statistically significant. This is particularly noteworthy because compared to the population of UK school children or even the population of other UK HE students (in which ethnic differences have been found), UK medical students are a homogeneous population. UK medical students are highly selected on the basis of their academic achievements, they come from similar social backgrounds, and they are trained to enter a single organisation: the NHS. This homogeneity means that, when studying the factors that affect an outcome measure such as examination performance, the impact of extraneous variables on the outcome measure will be smaller than it might be in other more heterogeneous populations (McManus, 2005). The fact that ethnic differences are found in such a population means that the effect is likely to be real and significant.

Moreover, the effect of ethnic group found in UK medical students mirrors ethnic differences found at school-level, elsewhere in HE, and in wider society. While small statistically significant differences are not always considered relevant in medical trials, the racial discrimination and oppression suffered by many people from ethnic minorities in the UK means that even relatively small ethnic differences in attainment can have huge political and social implications, and cannot be dismissed. As the political philosopher, Dr, now Lord, Bhikhu Parekh, explained in 1985:

> "A debate on so sensitive an issue [...] can hardly remain apolitical"
> (The Swann Report, 1985).

Indeed, the number of Government reports being commissioned to explore ethnic difference in attainment (many of which are quoted in this introductory chapter) is testimony to its current political importance. The current Labour Government has stated its keenness to ensure that members of ethnic minority groups do not face barriers to achievement from school age through to HE and into the workforce (Cabinet Office, 2003).

The Department of Health has created a Medical Workforce (Equality and Diversity) Reference Group, which aims to:

> "increase the participation and achievement of equalities target
> groups within the medical workforce"
> (DH, 2004)

In this context, ethnic minority academic achievement is considered an important issue which needs to be investigated and addressed.

The British Medical Association has also recognised the importance of equality in the medical workforce and in medical education, and encourages medical schools to:

> "explicitly affirm their commitment to equal opportunities in the provision of services and learning opportunities to students regardless of ethnicity"
> (BMA, Medicine in the 21st Century 2005)

Studying ethnic differences in medical education is important because of the special position of responsibility and trust that doctors hold in society. Medical training is lengthy, and the experiences doctors have, and the knowledge and skills that they gain during their long medical student careers, will shape their future practice and patient care (Chen et al., 2004). They may literally be a matter of life and death. Understanding the systematic difference in the experiences and performance of particular groups of medical students and graduates is therefore of vital importance. Further, for doctors to practice effectively, they need to be respected and trusted by their colleagues as well as by their patients. The medical profession need to operate and be seen to operate in a way which is fair and free of discrimination towards their trainees, as well as their patients (Coker, 2001). Finally, if a person fails to qualify as a doctor because of a poor academic record, as well as having negative economic and psychological consequences for them and their family, it also leaves society with one fewer doctor.

Conclusion

The 1985 Swann Report into the Education of Children from ethnic minority Groups has been much referenced in this introductory chapter. It is striking how, despite the fact that it was published 20 years ago, much of the report still resonates with the picture of ethnicity and educational attainment in today's Britain. Little seems to have changed. Children from many ethnic minority groups underperform compared to whites in almost every educational domain. Adults from ethnic minority groups have lower levels of attainment compared to whites in Higher Education. Even at medical school ethnic differences exist. Ethnic minority underachievement is a serious and contemporary problem. Taboos and multifactorial complexities may make it difficult to investigate ethnic differences in medical school attainment, but such investigations need to be carried out in order that the problem can be better understood, and ultimately, ameliorated.

Chapter 2. Participants, context and methodology

"The debate [on ethnic minority underachievement] is vitiated by what I might call the fallacy of the single factor. The participants tend to look for one specific factor […] to explain the fact of underachievement. This is obviously an inherently impossible enterprise. Not even a relatively simple natural phenomenon like the falling of an apple or the dropping of a stone can be explained in terms of a single cause".
(Bhikhu Parekh, The Swann Report, 1985)

"There is no such thing as unprejudiced observation. Every act of observation we make is biased. What we see or otherwise sense is a function of what we have seen or sensed in the past. […] All scientific work of an experimental or exploratory character starts with some expectation about the outcome of the inquiry."
(Sir Peter Medawar, 1963)

Summary of Chapter 2

This chapter describes and explains the methodological approaches used in this thesis to investigate the research question: "which factors influence the differential performance of white and ethnic minority UCL medical students in undergraduate assessments?" A brief history of UCL Medical School and an overview of the MBBS course provide the context in which the research took place.

Introduction

A multi-methods approach was used in this thesis to enable the complex and relatively under-explored problem of ethnic minority underachievement at medical school to be investigated from a variety of different angles, each method shedding light on particular yet different aspects of the research question (see Table 1 for an overview of the aims and methods of each study conducted). This is a pragmatic method which is appropriate for investigating a complex problem (Johnson & Onwuegbuzie, 2004). The complexity of the problem of ethnic minority academic underachievement was reflected in the two aims of this thesis. The first aim was to systematically investigate the influence of different factors on performance in undergraduate medical assessments, specifically the factors that mediate and moderate the effects of ethnic group on medical school attainment. This aim is particularly suited to quantitative methodologies, as they are able to provide data on the magnitude of the problem (for example, the cross-sectional data analysed in Chapter 3), on the statistical relationships between the large number of factors involved (for example, in the study in Chapter 4 which used questionnaire data); and on the specific effects of an intervention on clearly-defined outcomes (for example, in the randomised controlled trial in Chapter 6). The second aim of this thesis was to provide medical educators and medical students with a greater understanding of the ways in which medical student ethnicity affects attainment in undergraduate assessment. This aim is more suited to qualitative methodologies (for example the interview study in Chapter 5) which allow issues to be explored in all their depth and complexity, without reducing them in the way necessitated by much quantitative research.

This chapter describes the methodology used to explore the main research question of the thesis: ‘which factors influence the differential performance of white and ethnic minority UCL medical students in undergraduate assessments?’. The chapter is structured in the following manner:

- Definition of key terms
- Study participants
- Context in which the study took place: brief history of UCL Medical School, and description of the current MBBS course

- Main outcome measures: Year 1 and Year 3 assessments, their format, validity and reliability
- School examinations
- Statistical tests
- Ethical considerations
- Justification of the approach used
- Comparisons with methods used in other studies of medical students

Definition of key terms

2.1.1. Race, ethnicity and ethnic group

"Race", "ethnicity", and "ethnic group" are politically-charged terms. The terms "ethnicity" and "race" are considered by many sociologists to be distinct. "Race" implies biologically-determined physical differences, whereas "ethnicity" implies socially-constructed cultural differences (McKenzie & Crowcroft, 1994; Senior & Bhopal, 1994). However the distinction between a biologically-determined concept of race and a culturally-determined concept of ethnicity is not entirely clear, for example the Oxford English Dictionary defines the adjective "ethnic" as:

> "Pertaining to race; peculiar to a race or nation; ethnological. Also, pertaining to or having common racial, cultural, religious, or linguistic characteristics, esp. designating a racial or other group within a larger system; hence (*U.S. colloq.*), foreign, exotic."
> (Oxford English Dictionary, www.oed.com)

The noun "ethnic minority" is included within the definition of ethnic as:

> "A group of people differentiated from the rest of the community by racial origins or cultural background, and usu. claiming or enjoying official recognition of their group identity."
> (Oxford English Dictionary, www.oed.com)

Senior and Bhopal (1994) have a similar definition, but omit the words "race" or "racial", replacing them with "shared origins" which also suggests biological similarities:

> "[ethnicity] implies one or more of the following: shared origins or social background; shared culture and traditions that are distinctive, maintained between generations, and lead to a sense of identity and group; and a common language or religious tradition'"
> (Senior & Bhopal, 1994)

This rather confused situation reflects the fact that "ethnicity" is a very complex word which relates both to biological differences and to identity. In this thesis the term "ethnicity" is used to refer to capture how people belong to ethnic groups that are based on culture but also on some biological similarities (for example skin colour). For example, the first chapter of this thesis is called 'ethnicity and academic attainment' because it discusses how membership of an ethnic group (i.e. ethnicity) can affect academic attainment. In this thesis the term 'ethnic group' is used distinctly from 'ethnicity' to refer to the cultural background of individuals or groups of individuals. The term 'race' is not used because it is not considered to add any useful information to the research question.

The categorisation of people into ethnic groups is also fraught with difficulty. For example, should a Ugandan Asian living in Britain considered African, Asian, or European? Because of these problems it is now generally considered that the only person who is able to categorise their own ethnic group "correctly" is the person themselves (DH, 2007) and therefore the most common way that organisations determine the ethnic composition of their workforce, student body or patient population is by asking people self report their own ethnic group. In this thesis, participants were grouped according to the 16 categories used in the 2001 UK Census, which take account of cultural and physical characteristics. They are white: British, Irish, or Other; black or black British: Caribbean, African or Other, Asian or Asian British: Indian, Pakistani, Bangladeshi or Other; Chinese; Mixed: white and black Caribbean, white and black African, white and Asian, Other; and Other. This categorisation is also used by the NHS (DH, 2007), the GMC (http://www.gmc-uk.org/about/ethnicity/Ethnicity_Data_Leaflet.pdf) and UCL Medical School. It should also be noted that ethnicity is also a context-specific concept (Gill, 2001). For example, in the US, the term “Asians” refers mainly to a group of people who originate from for example, China, Japan, Korea, the Philippines, and Vietnam (http://www.asian-nation.org/index.shtml); whereas in the UK, “Asians” is often used to refer to people who have their origins in India, Pakistan, Bangladesh, and Sri Lanka (Modood, 2005). Furthermore, the social and political implications of belonging to different ethnic groups are very different in different countries. For example, the experiences of Ugandan Asians who came to Britain in the 1970s will be very different from the experiences of black African Americans or black Caribbean Americans growing up in the Southern States of the USA in the 1960s. As such, this thesis concentrates exclusively on ethnicity and ethnic groups in the UK in the last two decades of the 20th century and first decade of the 21st century.

One of the problems with studying ethnic group differences in medical students has been the lack of statistical power resulting from small numbers of students from some ethnic groups. London has a huge population of medical students and these schools have some of the largest proportions of students from ethnic minority backgrounds, reflecting that fact that 45% of the UK’s ethnic minorities live in London. Despite this, at UCL the numbers in some ethnic minority groups is still small. This means that although there may well be real differences in the academic performance of some ethnic minority groups, for statistical analysis the ethnic group variable was further categorised into “white” (white British, white Irish, white Other) and “ethnic minority” (all other ethnic groups except “Unknown or Refused”). This had additional statistical benefit that at UCL Medical School white and ethnic minority students were in almost equal sized groups.

2.1.2. Sex and gender

The term sex rather than gender was used to describe males and females throughout this thesis. Gender describes the socially constructed characteristics of men and women, whereas sex refers to what is biologically determined (Lancet, 2006). In this thesis, gender, as in the roles that males and females undertake in society, was not measured. For example, in the questionnaire in Chapter 4 participants were asked “what is your sex?” and could chose between ‘male’ or ‘female’. Their response was taken to refer to their biological sex rather than their gender role.

Participants

The main participants in this thesis were Year 1 and Year 3 UCL medical students in academic years 2005/6 (Year 1 n=362; Year 3 n=389) and 2006/7 (Year 1 n=337; Year 3 n=349). In 2005, 58.1% (226/389) of Year 3 students were female and in 2006, 62.5% (218/349) were female. In Year 1 the proportion of females was slightly lower than in Year 3: in 2005, 51.1% (184/360) of Year 1 students were female, and in 2006, 48.1% (162/337) of Year 1 students were female. Overall in the four main cohorts in the study population approximately 48% of students were white. With 2% of students being of unknown ethnic group, this means half of the students were from ethnic minority groups. At 17%, the largest ethnic minority group was the Asian or British Asian Indians. Apart from the Mixed groups, the black Caribbean group was the smallest consisting of only 0.8% of the study population (equivalent to approximately 3 students per year). See Table 4 for breakdown the study population by cohort and ethnic group.

The study in Chapter 3 involved Year 1, Year 2 and Year 3 students; the study in Chapter 4 involved Year 1, Year 3 and Year 4 students; and the study in Chapter 5 involved clinical teachers as well as Year 3 students. Information relating to those participants is included in the appropriate chapters. MBPhD students were excluded from all analyses on the basis that they follow a different clinical course from the other students, and did not complete all assessments (see the section on the MBBS course at UCL Medical School below).

Table 4. UCL Medical School Year 1 and Year 3 medical students by ethnic group* for academic years 2005/6 and 2006/7 *2001 UK Census ethnic categories

	Year 1		Year 3		Mean (%)
	2005/6 (%)	2006/7 (%)	2005/6 (%)	2006/7 (%)	
white British	142 (39.2)	157 (46.6)	138 (35.5)	139 (39.8)	144 (40.3)
white Irish	5 (1.4)	0 (0)	5 (1.3)	6 (1.7)	5 (1.5)
white Other	18 (5.0)	19 (5.6)	31 (8.0)	24 (6.9)	20 (5.7)
white total	165 (45.6)	176 (52.2)	174 (44.7)	169 (48.2)	171 (47.6)
black Caribbean	3 (0.8)	5 (1.5)	2 (0.5)	2 (0.6)	3 (0.8)
black African	13 (3.6)	8 (2.4)	15 (3.8)	2 (0.6)	12 (3.3)
black Other	0 (0.0)	1 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
Asian Indian	63 (17.4)	52 (15.4)	73 (18.8)	53 (15.2)	60 (16.8)
Asian Pakistani	18 (5.0)	9 (2.7)	17 (4.4)	18 (5.2)	16 (4.3)
Asian Bangladeshi	2 (0.6)	6 (1.8)	7 (1.8)	14 (4.0)	7 (2.0)
Chinese	25 (6.9)	28 (8.3)	29 (7.6)	27 (7.7)	27 (7.6)
Asian Other	36 (9.9)	22 (6.5)	30 (7.7)	32 (9.2)	30 (8.4)
Mixed white and black Caribbean	0 (0)	2 (0.6)	3 (0.8)	2 (0.6)	3 (0.7)
Mixed white and black African	2 (0.6)	2 (0.6)	2 (0.5)	1 (0.3)	2 (0.6)
Mixed white and Asian	6 (1.7)	5 (1.5)	6 (1.5)	4 (1.2)	5 (1.5)
Mixed Other	12 (3.3)	6 (1.8)	11 (2.8)	7 (2.0)	9 (2.5)
Other ethnic group	9 (2.5)	10 (3.0)	13 (3.3)	12 (3.4)	11 (3.2)
Total ethnic minority (non-white)	189 (52.2)	156 (46.3)	208 (53.5)	174 (49.9)	182 (50.6)
Unknown	8 (2.2)	5 (1.5)	7 (1.8)	6 (2.0)	7 (1.9)
Total	362	337	389	349	359

Context

2.1.3. UCL Medical School: a brief history to October 2008

The research in this thesis took place in an institution which since 1st October 2008 has been known as UCL Medical School. However when this research started, the medical school had been known as the Royal Free & University College Medical School (RFUCMS or RUMS). This name modification is just one of the many changes which have occurred in the School's complex history. The University College, Middlesex and Royal Free Medical Schools – each with their own particular histories and identities - were merged at the end of the 20th century to form the current UCL Medical School. In addition, the Whittington Hospital, despite having rather different history, also became a key clinical site. In order to provide an understanding of the environment in which this research took place, this section gives a brief history of each institution, followed by an account of mergers which created the UCL Medical School of 2008.[5]

2.1.3.1. University College Hospital Medical School

University College London (UCL) began life in 1826 as the University of London in Bloomsbury. It was founded after a campaign lead by Henry Brougham MP inspired by the ideas of the philosopher Jeremy Bentham. At the time Oxford and Cambridge were the only other universities in England. They would only accept students who were members of the Church of England and students were almost exclusively upper class. UCL on the other hand was cheap, secular and enlightened. Students from all beliefs were allowed entry, including those previously excluded from undergraduate education such as Catholics, Jews, and non-conformists. No religious subjects were taught. The aim was for graduates to take on 'Old Corruption' the corporate establishment run by Church and State on a system of patrimony (Sinclair, 1997). Oxford and Cambridge Universities and the medical and surgical Royal Colleges disapproved and the university was initially refused legal recognition through a royal charter, not receiving it until 1836 two years, by when it had changed its name to University College.

Medical lectures began at the University of London on 1st October 1828 (University College London Act 1999), and six years later in 1834 the near by North London Hospital was founded specifically as a teaching hospital, providing fee-paying UCL students with non-fee-paying patients to learn from (Sinclair, 1997). In 1837 it changed its name to University College Hospital (UCH) and enjoyed a reputation for excellence, with 1846 Robert Lister performing the first operation under anaesthetic there in 1846 and Norman Collie taking the first x-ray to be used for clinical purposes there in 1896. However in 1898 it was no longer convenient for UCL to administer the hospital and the clinical medical students, so in 1905 University College Transfer Act separated UCH and its clinical medical school (named the University College Hospital Medical School) from UCL and its preclinical medical school. The administration of UCH Medical School was then separated from the Hospital in 1948, and became an independent school of the University of London (University College London Act

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[5] In addition to the sources referenced below, this account is informed from information contained on the UCL website www.ucl.ac.uk; the University College London Hospital website www.uclh.nhs.uk, the Royal Free Hospital website www.royalfree.nhs.uk, the Access to Archives website www.a2a.org.uk, and the Genesis project website http://www.londonmet.ac.uk/genesis.

1999). It wasn’t until 1980 that The University College London Act 1979 re-united the UCH Medical School with UCL as the Faculty of Clinical Sciences.

2.1.3.2. The Middlesex Hospital Medical School

The Middlesex Infirmary was established in 1745 in two terraced houses in Windmill Street, Soho, in Central London (Ranger, 1985). It was founded to provide care for the poor and was the first hospital to have beds for inpatients. In 1746 it was renamed the Middlesex Hospital and its first pupils were enrolled; however an official Middlesex Hospital Medical School was not founded until nearly 90 years later in 1835, as a response to the establishment of the medical school at nearby UCL. In 1755, the Middlesex Hospital was relocated to Mortimer Street, near Euston in North Central London and in 1935 (the centenary of the foundation of the medical school) it was rebuilt on the same site. The Middlesex Hospital was closed in 2005 and the building was demolished in 2008.

2.1.3.3. The Royal Free Medical School

The London General Institution for the Gratuitous Cure of Malignant Diseases was founded in 1828 as a dispensary with no inpatient beds to help the poor of Hatton Garden, in East Central London, who could not afford medical care. In the 1832 it put down straw mattresses to treat victims of the cholera epidemic, which no London hospitals were accepting. Now with beds, it was able to change its name to the Free Hospital Greville Street. A Royal Charter granted by the new Queen Victoria in recognition of its work meant its name was changed again in 1837 to the Royal Free Hospital. In 1876, the Medical Act allowed medical degrees to be granted regardless of sex, and in 1877, the Royal Free Hospital made history by being the first to accept female medical students. Those students had completed their preclinical training at the London School of Medicine for Women by men sympathetic to their cause. The School had been founded three years earlier in 1874 by Sophia Jex-Blake after her expulsion from Edinburgh University, in a house off Brunswick Square in Bloomsbury. Starting in the late 19th century, the School had a tradition of overseas cooperation in particular with India which included graduates going abroad to train women to see patients in countries in which women could not be seen by male doctors.

In 1900 the London Royal Free Hospital School of Medicine for Women became a school of the University of London’s Faculty of Medicine (University College London

Act 1999). In 1914, the increase in the number of women wanting to study medicine meant the School had to be enlarged to accept 300 students. In 1947, all medical education became co-educational and men were allowed to enter the School and it was renamed the Royal Free Hospital School of Medical. The School continued to be known for its research, particularly for its medical, renal and haemophilia centres. In 1974 the hospital and medical school moved to Hampstead in North London.

2.1.3.4. The Whittington Hospital

The 19th century saw the founding of three workhouse infirmaries in close proximity to each other in Islington, North London. They would go on to become the Whittington Hospital. In 1848 the Highgate Hill Smallpox and Vaccination Hospital was opened on Highgate Hill and remained in use until 1900, when a newly built Highgate Hill Infirmary (later St Mary's Hospital, not to be confused with St Mary's Hospital Medical School in Paddington) was opened, and the smallpox hospital became nurses' accommodation. In 1866 the St Pancras, or Highgate, Infirmary (later Highgate Hospital) was opened near Waterlow Park, slightly further up Highgate Hill. In 1877 the Holborn and Finsbury, or Holborn Union, Infirmary (later Archway Hospital) was opened on the other side of the road to the smallpox hospital. In 1930 the management of these institutions was transferred to the London County Council, and they became St Mary's Hospital, Highgate Hospital and Archway Hospital respectively. With the advent of the National Health Service in 1948 the three hospitals were joined to form the Whittington Hospital – a District General with 2,000 beds (Whittington Hospital History Project, 1985).

Educationally, the Whittington Hospital has a long reputation for nursing training going back to Edith Cavell who was Night Sister at the Highgate Infirmary in 1901 before later becoming famous for her work in World War I (Whittington Hospital History Project, 1985). It accepted its first University College Hospital medical students in 1973 and became a university hospital in 1976. In 1998 the then Royal Free and University College Medical School (now UCL Medical School) together with the new Middlesex University (previously Middlesex Polytechnic and not to be confused with the Middlesex Hospital), bought the old Holborn Union Infirmary Building, and the Whittington Hospital became one of the three UCL Medical School clinical sites. It continues to have a strong reputation for excellence in teaching and learning.

2.1.3.5. The merger of the University College, Middlesex and Royal Free Medical Schools

By the early 20th century all of the 12 medical schools in London (St Bartholomew's Hospital Medical College, the London Hospital Medical College, St Mary's Hospital Medical School, UCH Medical School, The Middlesex Medical School, The Royal Free Hospital School of Medicine, The Westminster Medical School, King's College Hospital Medical School, Guy's Hospital Medical School, Charing Cross Hospital Medical School, St Thomas's Hospital Medical School, and St George's Hospital Medical School) had become independent institutions within the University of London's Faculty of Medicine. In 1968, The Royal Commission on Medical Education in the Todd Report recommended that those 12 medical schools be reorganised and reduced to six larger medical schools by merging them in pairs. Each pair was to forge closer associations with one of the multifaculty colleges of the University of London (e.g. UCL, Imperial, King's College) in order to create large departments with increased variety in expertise and equipment, and to encourage a broadening of the medical school curriculum, thus bringing medical education more in line with general undergraduate education at the University (BMJ, 1969). In the report University College was paired with the Royal Free, and the Middlesex was paired with St Mary's in Paddington.

Although the Todd Report started the ball rolling, it took the publication of two further reports - the Flowers Report into the restructuring of London medical education in 1980 and Sir Bernard Tomlinson's Report of the Inquiry into London's Health Service, Medical Education and Research in 1992 - for the merging to begin in earnest. According to an editorial in the BMJ (BMJ, 1980) this merging was done primarily for financial reasons: the Faculty of Medicine was costing the University of London a great deal and therefore it was keen for Medical Schools to merge, which would increase class sizes and mean more students would be using the same resources. However, the report also suggested that medical schools having closer links with the colleges of the University would increase 'academic strength', benefiting teaching and research (Queen Mary & Westfield College Bill 1995; University College London Act 1996; Imperial College Act 1997). University College Hospital therefore merged with the Middlesex Hospital in 1982, and in 1987 the first student was inaugurated to the new University College and Middlesex School of Medicine. Then on 1st August 1998, 30 years after it was suggested in the Todd Report, University College and Royal Free

Medical Schools merged and renamed the Royal Free & University College Medical School.

Not everyone was happy with the mergers, often due to the sense of lost identity (Crisp, Williams & Price, 2001). Paul Francis Heffron, an admittedly eccentric senior lecturer at the Middlesex Hospital Medical School (BMJ, 2001)

> "conducted his last lectures [at the Middlesex] wearing a black arm band" (p1403)

There have been numerous discussions about preventing the identities of the Middlesex and Royal Free Medical Schools being lost within the UCL brand. It was agreed to keep "the Middlesex" and "the Royal Free" in the titles of the newly formed medical schools for ten years after each merger. In 2008, 10 years after the merger with the Royal Free, the name of the School was considerably shortened to UCL Medical School. Its campuses, which had previously been called the Bloomsbury, Archway and Hampstead Campuses, were renamed the Bloomsbury, Whittington Hospital and Royal Free Hospital Campuses, in order to preserve the Royal Free name.

2.1.4. MBBS course at UCL Medical School

One of the aims of medical school is to take relatively unformed individuals with potential and transform them into members of the medical profession. Medicine is a profession which is regulated by the General Medical Council (GMC), which also has responsibility for ensuring appropriate standards in UK medical schools (http://www.gmc-uk.org/education/undergraduate/undergraduate_policy.asp). In his anthropological account of UCL Medical School in 1993, Simon Sinclair describes how the traditionally insular nature of medical school means it can be regarded as what Erving Goffman has called a "total institution" (*Cf*. McManus, 2003).

Instead of the “institution” (the medical school) being physically closed to outsiders (as is the case with other total institutions such as asylums or prisons) Sinclair argues that it is instead cognitively and conceptually closed to lay persons; and this enables medical students to develop ways of thinking and behaving which are qualitatively different from non-medics:

> “The unceasing need to work for unceasing examinations set by different professional segments ultimately results in professional cognitive membership of the institution of which [medical students] are an inmate (this is the professional of medicine, a passage and a membership that may exclude the lay world just as surely as asylum walls)”.
> (Sinclair, 1997: p15)

This process of transforming a newly accepted medical student into a member of the medical profession takes a great many years (it takes most UCL medical students at least 6 years to qualify for their first Foundation Year) and training in a variety of contexts from a variety of different individuals. This means that students’ experiences of the MBBS course will be very different at different points. An overview of the MBBS course at UCL is given in order to help the reader better understand the context in which this thesis took place.

Currently, UCL Medical School is a large London medical school run over three main clinical sites (Bloomsbury, the Royal Free, and the Whittington). As one of the first University Medical Schools, UCL Medical School remains one of the more traditional Schools in the UK. For most students, the MBBS course is 6 years long, comprising two ‘pre-clinical’ years (Years 1 and 2, called Phase 1 or “Science and Medicine”), one general (Year 3) and one specialist (Year 4) clinical year (together called Phase 2 or “Science and Medical Practice”); one preparation for practice year (Year 5, Phase 3); and one intercalated BSc (iBSc) year. In every year students have professional development, pathology, use of drugs and society and the individual (comprising epidemiology, sociology and psychology) modules, the aim being for students to build on their knowledge from previous years in a spiral learning model (see Figure 7). In the earlier years these modules are formally taught but in later years the learning is more integrated with other clinical teaching.

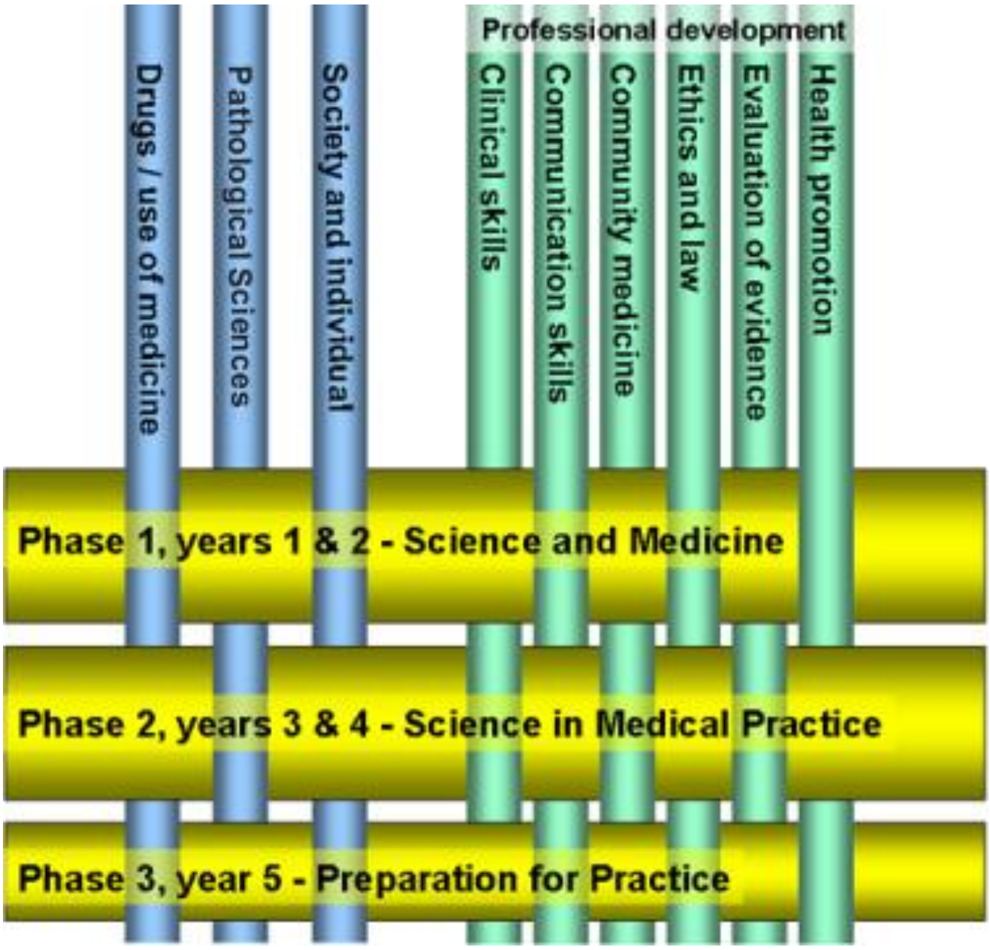


Figure 7: The MBBS course at UCL Medical School showing the horizontal and vertical modules and excluding the iBSc year

In 2005 the MBBS course was reviewed. In 2006, the administration of the preclinical and clinical parts of the MBBS course were united in the newly-formed Division of Medical Education. Other recommendations from the review included increasing integration in the course of professional development, increasing widening participation opportunities, improving students' sense of belonging by incorporating students into hospitals, and improving students' learning experiences by increasing the amount of small group teaching, e-learning and lengthening clinical attachments (www.ucl.ac.uk/medicalschool/staff/mbbs-review/MBBS_Review_Final_Report-version-2.2.pdf). Most of the changes suggested in the review were only being decided upon in 2005, 2006 and 2007 when the research in this thesis took place. However, knowledge about what UCL Medical School wanted to improve about its own course provides insight into the format of the course during that period.

2.1.4.1. Years 1 and 2 MBBS (Phase 1)

Phase 1 of the MBBS course aims to teach students the basic sciences which relate to clinical sciences, and to help students develop the ability to understand the basics of research in order that they can understand advances in clinical research and are able to carry out research projects themselves during their BSc. In Phase 1 students spend the majority of their time on the UCL Bloomsbury Campus attending lectures, anatomy demonstrations and lab classes. The course is arranged in consecutive modules based on physiological systems and functions rather than disciplines and taught by basic scientists including pharmacologists, chemists, biologists, and so on. The modules are:

- Foundations of Health and Disease
- Infection and Defence
- Circulation and Breathing
- Fluids, Nutrition and Metabolism
- Movement and Musculoskeletal Biology
- Neuroscience and Behaviour
- Endocrine Systems and Regulation
- Reproduction, Genetics and Development
- Cancer Biology

In addition to the above, students spend half a day a week in small groups learning about communication and clinical skills, ethics and law, evaluation of evidence, health promotion and community oriented medicine as part of the Professional Development Spine (PDS). As part of PDS students also have a limited number of placements in the community, for example in a GP's surgery. In general however students do not however have much patient contact in Years 1 and 2. Students stay in the same PDS groups throughout Years 1 and 2, often forming close bonds with their fellow tutees and tutors. Many value their PDS groups as a source of academic and pastoral support which can sometimes be lacking in the 350+ person lecture theatres in which much of the other teaching takes place. The non-academic support is particularly important as for approximately 90% of students Year 1 is their first time at university and constitutes a big change in their lives. Students also spend one afternoon per week for 16 weeks studying a subject of their choice – not necessarily directly related to medicine - on Student Selected Components (SSCs), as required by the GMC (GMC, 2003).

The academic year in Phase 1 runs from September to May, and summative examinations are sat at the end of the year. Students who fail can resit the examinations at the next sitting. Those who fail the resits and have extenuating circumstances can ask the medical school to appeal to UCL to let them resit the entire year.

2.1.4.2. Year 3 MBBS (Phase 2)

Year 3 is the first completely clinical year, and thus constitutes another major change in medical students' lives, as for most students, this will be their first real experience of being taught by practicing clinicians on real patients. The year starts in September with a month-long Introductory Course to Clinical Medicine (ICCM). The ICCM is mostly taught by Year 5 peer tutors and clinical skills staff. The rest of Year 3 is then made up of four modules (Surgery; Orthopaedics Rheumatology and Care of the Older Person; General Medicine and Medicine in the Community; and General Medical Specialities). Due to large student numbers, medical school administration splits students into two groups which rotate around the modules in converse order: group 1 takes modules 1 and 2 followed by modules 3 and 4, whereas group 2 takes modules 3 and 4 followed by modules 1 and 2.

Within each module, students are attached to the clinical firms appropriate to that module. Each of these modules is taught in a 'Block' of 10 weeks which means that as there are four modules, there are four Blocks, making up 40 weeks of teaching. Each of the modules is taught at a hospital on one of the three clinical sites and students rotate between two of the three sites over the year, spending Blocks 1 and 2 at one site and Blocks 3 and 4 at another site. This means that although all students are taught each of the four modules, their experiences will differ slightly depending on which hospital they were situated in for their particular module, for example, students doing the Surgery module at the Whittington will be taught by different doctors and see different patients compared to students who did their Surgery module at Bloomsbury (Table 5).

Table 5: The structure of Year 3 at UCL Medical School. Students rotate around modules 1,2,3 and 4 in Blocks 1, 2, 3 and 4 over three clinical sites: Royal Free (R), Whittington (W) and Bloomsbury (B). Numbers based on a year estimated to have 350 students

	Block 1 (Oct - Dec)	**Block 2** (Jan – Mar)	**Block 3** (Apr – Jun)	**Block 4** (Jun – Aug)
Group 1 (n~175)	**Module 1**	**Module 2**	**Module 3**	**Module 4**
	Site R (n=~58)	Site R (n=~58)	Site W or B (n=~58)	Site W or B (n=~58)
	Site B (n=~58)	Site B (n=~58)	Site W or R (n=~58)	Site W or R (n=~58)
	Site W (n=~58)	Site W (n=~58)	Site R or B (n=~58)	Site R or B (n=~58)
Group 2 (n~175)	**Module 3**	**Module 4**	**Module 1**	**Module 2**
	Site R (n=~58)	Site R (n=~58)	Site W or B (n=~58)	Site W or B (n=~58)
	Site B (n=~58)	Site B (n=~58)	Site W or R (n=~58)	Site W or R (n=~58)
	Site W (n=~58)	Site W (n=~58)	Site R or B (n=~58)	Site R or B (n=~58)

The clinical firms the students are attached to consist of senior and junior clinical staff, and medical students undertake clinical duties as part of that firm. They are expected to spend a considerable proportion of time with patients: taking histories, examining, performing clinical skills such as taking blood (venepuncture), assisting in theatre, and many of the other roles which prepare them for their Foundation Years. Students also have community placements in GP surgeries, and at least twice in the year they are expected to be "on take" in the Emergency Department - sometimes overnight - helping the clinical staff with emergencies. Self-directed learning is combined with formal teaching from clinical and non-clinical staff in tutorials, seminars, lectures and in PDS. Summative written examinations are taken twice in the year, and students sit a summative clinical examination (OSCE) at the end of the year in August. Students have approximately two weeks' holiday before starting Year 4.

2.1.4.3. Year 4 MBBS (Phase 2)

Year 4 is the specialist clinical year. Students study three 15-week modules: Child and Family Health with Dermatology, Women's Health and Communicable Diseases, and Clinical Neurosciences, which each contain lecture-based teaching and teaching on clinical attachments. Child and Family Health consists of "home paediatrics" at one of the main three clinical sites and "away paediatrics" at a District General Hospital

(DGH) linked to UCL Medical School. Students also have a GP attachment in the London area. During the home paediatrics and GP attachments students also attend dermatology clinics. The Women's Health module consists of three attachments: two in Obstetrics and Gynaecology (one including community based teaching at a main site, and one at a DGH) and an attachment in Communicable Diseases (CD) taught at either Bloomsbury or Hampstead campuses. In Clinical Neurosciences students also have three attachments: one General Community Psychiatry attachment which includes community based teaching, one Specialist Psychiatry attachment which includes a week of Ophthalmology, and one Neurology attachment. Students sit an OSCE and two written examinations at the end of each module in December, in April and one at the end of July.

2.1.4.4. Year 5 MBBS (Phase 3)

The aim of the final year is to prepare students for their Foundation years. Students should hone their clinical method (communication, examination and diagnostics), practice essential practical procedures, and obtain wide experiences of the presentation and management of common and important clinical conditions. Students are also expected to become independent learners in order to organise their own personal and professional development. Year 5 is therefore less structured than the previous years, although students are expected to attend 100%. Year 5 students have to attend the following four-week attachments:

- Medicine at a DGH, including clinical revision sessions
- Surgery at a DGH, including clinical revision sessions
- General Practice outside London
- Accident and Emergency (A&E)
- Oncology

Year 5 students also have a number of other learning tasks. They are required to complete online PDS workbook assignments which are embedded in the four core attachments. They also complete an 8 week elective (usually a placement in a hospital) which they organise themselves, often outside the UK. Electives can provide invaluable clinical experience as students are given clinical responsibilities they cannot have at home. Furthermore, as in Years 1 and 2, final year students study for an SSC of their choice in two 4-week attachments. Finally, as part of their Oncology or A&E

attachment each student needs to complete a one-day “Dr Who” course on the assessment of the critically ill patient at the Royal Free clinical skills centre.

The Final MBBS Examination at UCL is held in June. It includes both written and OSCE assessments (an overview of the creation of this examination can be found in Dacre, Gaffan, Dunkley & Sturrock, 2006). The written assessments are similar to those in Years 3 and 4 and consist mainly of MCQs. The short station OSCE is very similar to the Year 3 and 4 OSCEs in which each station is 5 or 10 minutes and uses simulated patients. The long station OSCE is unique to finals and uses real patients whom students have to examine in 30 minute stations. The examinations cover Medicine, Surgery, Pathology, Use of Medicines and Public Health as well as assessments of general professional skills including communication, ethics, practical and clinical skills. It does not include Paediatrics, Obstetrics, Gynaecology or Psychiatry as these are assessed in Year 4, except where these are in the context of acute general medicine or surgery. The subject range is focussed on knowledge, skills and attitudes needed in Foundation Year 1.

2.1.4.5. Intercalated BSc year

The iBSc consists of a year of study on a different undergraduate course, usually at UCL but sometimes at other institutions, after which the medical student gains a BSc qualification. iBScs can be in subjects related to medicine such as medical anthropology and pharmacology. Graduate-entry students and some international students are exempt from the iBSc year, but for all other students an iBSc is a course requirement. Once they have completed Phase 1, students are however allowed to choose when in the course they take their iBSc. It is not entirely clear what influences the time at which students take their iBSc. A few courses have a clinical element and therefore should be taken after the student has gained some clinical experience. It may be that students who do not get their first choice of BSc at the end of Year 2 (possibly due to poor grades) may choose to defer. It may also be that students prefer not to have a break in between Year 3 and Year 4 for fear of becoming out of practice clinically. Whatever the reasons, approximately two-thirds of students take their iBSc before they start their clinical studies in Year 3, and the majority of the remainder take it immediately after Year 3. Approximately two or three students per year undertake an MBPhD after the completion of their iBSc. This takes five years, at least 18 months of which are spent purely on research. Those students therefore follow a different clinical course from the MBBS students.

2.1.4.6. Professional Development Spine (PDS)

As mentioned above, professional development is taught in a vertical module (PDS) that runs through Years 1 to 5. PDS subjects include communication and clinical skills, ethics and law, evaluation of evidence, health promotion and community oriented medicine. In Years 1 and 2 students are taught PDS one morning a week which consists of a lecture followed by small group work facilitated by clinical and non-clinical tutors. In Year 3 students are still taught in small groups one afternoon a week, but instead of having the same tutor every week they are taught by more specialised tutors, for example being taught clinical skills such as suturing and catheterisation by clinical skills tutors (most of who have a background in nursing) in specialised clinical skills labs. In Years 4 and 5 PDS is not taught as a separate subject but instead is integrated into the rest of the clinical teaching students receive on the wards, for example in Year 5 students are required to complete professional development portfolios during each of their attachments.

2.1.5. The Medical Student Records Database (the MSSR)

UCL Medical School has a specially designed electronic database which contains data about UCL medical students from 1985 to the present day. The database is secured, and different levels of authorisation are granted as deemed appropriate by the UCL Head of Medical Education. The amount and type of data on each student in the database varies (for example, ethnic group data was not routinely collected until relatively recently), but generally information regarding the following variables is present for every student:

- Sex
- Date of birth
- Place of birth
- Nationality
- Number of years taken to complete the course

More information is available for more recent students, including:

- Photograph
- Ethnic group
- Assessment marks

- Graduate status
- Oxbridge transfer status
- iBSc subject and grade
- Pastoral issues

For this thesis, access to all data except the pastoral issues was granted.

The main outcome measures: Year 1 and Year 3 assessments

The main outcome measure used for the quantitative studies (those in Chapters 3, 4, and 6) were summative assessments for Year 1 and Year 3 students. A description of the format of those assessments in 2005/6 and 2006/7 is provided below.

Year 1 students sit formative written assessments throughout the year and summative written assessments in May, which are based on the four modules studied: Foundations of Health and Disease, Infection and Defence, Circulation and Breathing and Fluids Nutrition and Metabolism. There are four types of examination paper. Multiple true-false multiple choice questionnaires (MCQ) and extended matching questionnaires (EMQ) are both machine-marked. Modified essay questions (MEQ) and observed structured practical examination (OSPE) are both hand-marked. Before the academic year 2006/2007, the OSPE consisted of approximately 6 stations, most of which were written and knowledge-based, although it also incorporated some practical elements (e.g. interpretation of a picture or diagram) and an anatomy spot test. As of 2006/7, the exam took the form of a seated paper similar to the MEQ and an anatomy spot test.

Year 3 students sat written, clinical, and module assessments, each of which contributed to the overall end-of-year mark. There were two machine-marked written assessments at week 20 (February/March) and two more at week 40 (August). Before 2006/7, these consisted of MCQ (Multiple Choice Questionnaire) and EMQ (Extended Matching Questions). In 2006/7, Single Best Answers (SBAs) replaced multiple true-false questions in the MCQ. These written examinations assess students' knowledge of common conditions, uses of drugs, pathological science and more specific knowledge about the subjects they have been studying in the firms they have been attached to. In August, students sat an Objective Structured Clinical Examination (OSCE), which consisted of approximately 20 five minute stations, each of which assessed some form of clinical skill [practical skills (e.g. canulation), communication skills, knowledge of ethics and the Law, or data interpretation]. Students were marked at each station by trained examiners and the station marks are combined to make an overall OSCE score. The module assessment changed slightly between 2004/5 and 2007/8, although the broad format remained similar. Essentially students were marked by consultants on their personal and professional attributes and their clinical ability on the firm, and case-based discussions on patients the student has clerked. Students whose attendance in more than one module is inadequate were not normally permitted to enter the end-of-year assessments.

2.1.6. Validity and reliability of the examinations

In psychometrics, the validity of a test refers to whether it is testing what it aims to test (Rust & Golombok, 1992). The UCL assessments are blueprinted onto the curriculum. This helps improve content validity by ensuring that the assessments measure all the relevant parts of the curriculum, including subject areas and behaviours, and each is given an appropriate weighting (*Cf.* Fowell, Southgate & Bligh, 1999; Schuwirth & van der Vleuten, 2006). The psychometric reliability of a test refers to its reproducibility (Schuwirth & van der Vleuten, 2006). Test reliability is commonly conceptualised as test-retest reliability, whereby if you measured a person's performance on a test one week and then measured their performance on the same test a week later, assuming the conditions are the same and the person has not learned anything relevant to the test in the interim, if the person achieves the same score on both tests, one can assume the test is reliable. Reliability has a number of different forms, and can be statistically calculated in a number of ways. In examinations, where for example a test-retest reliability coefficient is not often feasible to calculate, Cronbach's alpha is often calculated. Cronbach's alpha is measure of internal consistency and describes the correlation between two random samples of all the items it would be possible to include on a test (Bland & Altman, 1997). In practical terms, a Cronbach's alpha of 0.7-0.8 is considered acceptable (Bland & Altman, 1997) as this means that 30-20% of the variance in the test score is due to "error". UCL Medical School has recently started using the software Speedwell to process their examination data (http://www.speedwell.co.uk/). Speedwell calculates reliability using the Kuder Richardson Formula 20[6].

Reliability statistics for the 2006/7 Year 1 examinations were available from Medical School Administration (unfortunately the data were not available for the 2005/6 examinations). For the end-of-year MCQ this was KR20=0.92, for the EMQ it was KR20=0.90, for the OSPE Cronbach's alpha was 0.75. Haq et al (2005) reported that in 2002/3 and 2003/4, the Year 3 written examinations had Cronbach's alphas of over 0.7, whereas the OSCEs had slightly lower reliability statistics of approximately 0.65 and 0.70, which although being on the cusp of acceptability for distinguishing between individual students is more than sufficient for the purposes of this thesis which are to reliably distinguish between groups.

School examinations

The examinations taken by participants before they arrived at UCL Medical School are frequently referred to in this thesis, in particular GCSEs and A (Advanced) Levels. GCSEs are the national examinations taken by school children at the end of compulsory secondary education in England and Wales. They replaced O Levels in 1988. Possible marks range from A* to U, pass grades being from A* to C at Level 1 and D to G at Level 2. GCSEs are available in approximately 40 subjects, some of which are compulsory (usually at least maths, English and one science). GCSEs are usually assessed on a mixture of coursework and examinations, the weighting depending on the subject (http://www.dfes.gov.uk/qualifications/). A Levels are the post-compulsory national examinations generally taken by students in England, Wales and Northern Ireland. 5 GCSE passes at Level 1 are usually required to study A Levels. To study a particular A Level it is usually necessary to have passed that subject at GCSE level with a grade B or above, although some subjects which can be studied at A Level are not generally studied at GCSE level. A Levels are usually studied over two years, and since 2000 students have taken AS (Advanced Subsidiary) levels - equivalent to half a traditional A Level - at the end of the first year, completing their A Level qualifications by taking A2 Levels at the end of the second year. AS levels are

[6] The formula to calculate an exam's KR20 is KR20=$n(\sigma_e$-$\Sigma\ \sigma_r)/\ \sigma_e\ (n$-1); where σ_e Is the variance of the candidate's score for the exam; $\Sigma\ \sigma_r$ is the sum of the variances of the candidate's scores for each response; and n is the number of responses.

qualifications in their own right; and many students take 4 AS levels but only complete three subjects to A2 level, thus ending up with 3 A Levels and one AS level. Possible marks range from A to U with pass grades being A to E. A Level assessments usually consist of about 30% coursework and 70% examination, and some subjects such as art also assess practical skills. AS and A2 Levels can be taken in approximately 80 subjects (http://www.dfes.gov.uk/qualifications/). A levels have been shown to predict university performance (Smith & Naylor, 2001), including at medical school (McManus, Powis, Wakeford, Ferguson et al., 2005) although in more recent years grade inflation has reduced this predictive power for the highest achieving students and has led to a new A* grade being piloted in 2008 (http:/ / www.qca.org.uk/ libraryAssets/ media/ Ken_Boston_to_Alan_Johnson_22_03_20 07.pdf) although questions remain about whether the introduction of this new grade will be sufficient to discriminate effectively between applicants to medical school (McManus, Woolf & Dacre, 2008).

Other examinations which can be taken in the UK and are considered by UCAS to be equivalent to A Levels include the Scottish Higher (equivalent to the AS) and Advanced Higher (equivalent to the A2) and the International Baccalaureate (IB). In Highers, five subjects are usually studied with grades ranging from A to D (http://www.sqa.org.uk/). The IB can be taken throughout the UK in English, French or Spanish. It is much less widely available than A Levels. It contains three compulsory components (theory of knowledge, creativity action service, and extended essay) and 6 subjects from the domains of maths, languages, science, arts and humanities (http://www.dfes.gov.uk/qualifications/). The IB is assessed on a points basis and the maximum score (45 points) is equivalent to more than 6 A levels at grade 'A'.

Statistical tests

All statistics were carried out in SPSS v14. Chapter 5 was a qualitative study and therefore the data were not analysed statistically; details of that qualitative data analysis are given in Chapter 5 section 5.1.4.

2.1.7. Descriptive statistics

For normally distributed data, descriptive statistics included calculations of means and standard deviations. When the assumption of normality was violated, medians (with upper and lower quartiles) and modes were calculated.

2.1.8. Inferential statistics

2.1.8.1. Univariate

Univariate inferential statistics used included Pearson's r for bivariate correlations, t-tests to compare the mean scores of two groups on a dependent variable and one-way analyses of variance (ANOVA) to compare the mean scores of more than two groups on a dependent variable. When the assumption of normality was violated, the non-parametric equivalents of those tests were used, i.e. Spearman's Rho; Mann-Whitney U tests; and Kruskal-Wallis tests. To compare groups on categorical outcome measures, Chi-squared tests were used.

2.1.8.2. Multivariate

Two or three way ANOVAs were used to compare the means of two or more groups on two or more dependent variables and to check for interaction effects; and multiple regression to determine the relative influence of independent variables on a dependent variable. There are no non-parametric equivalents of these tests. Where necessary, post-hoc testing was carried out using the Ryan-Einot-Gabriel-Welsch procedure in SPSS. This is one of the most powerful post-hoc tests which keeps the familywise error rate at α[7] (Howell, 2002). Path analysis was used in Chapter 3 and 4 to determine the estimated causal relationships between large numbers of variables. The type of path analysis used is explained in Chapter 3 section 3.1.2.3 .

2.1.8.3. Standardisation: *z*-scores

In Chapters 3 and 4, data from several cohorts were combined for analysis in order to provide sufficiently large datasets for statistically powerful analyses. However, before combining the data from different cohorts it was necessary to transform or standardise those data into *z*-scores, which have a mean of zero and a standard deviation of 1 and are normally distributed; and, as with most distributions of continuous data, 95 and 99 percent of all scores lie within 1.96 and three standard deviations of the mean,

[7] α is the probability of rejecting a true hypothesis, i.e. of a Type I error; and the familywise error rate refers to the probability that there will be at least one Type I error in a group (family) of group comparisons (Howell, 2002).

respectively (Altman & Bland, 2005). Without this standardisation it would not be possible to combine the Year 1 summative assessments scores of students who took their examinations in 2005 and 2006, not only because of slight differences between the two examinations, but also because the means of the two cohorts' scores on those examinations would differ. This standardisation was done in SPSS v14.

2.1.8.4. Effect sizes

Effect sizes (Cohen's *d*) were calculated to provide information about the magnitude of the effects found in Chapters 3, 4, and 5. As mentioned in Chapter 1, Cohen laid out rough general guidelines about the interpretation of effect sizes stating that a small but probably meaningful effect size is approximately d=0.2; a medium effect size that most people would be able to notice is d=0.5 and a large effect size is d=0.8 (Howell, 2002). Standardised effect sizes such as Cohen's *d* are useful when the unit in which dependent variable is measured does not have intrinsic meaning to most people (Howell, 2002) such is the case in Chapters 3, 4, and 5 where the examination score percentages (which most people can understand) have been transformed into *z*-scores. The methods used to calculate Cohen's *d* are shown in Box 1.

Ethical considerations of the thesis

Ethical approval for the studies in Chapters 3 and 4 was granted by the UCL Graduate School Ethics Committee. The studies in Chapters 3 and 6 were covered by the UCL Graduate School Ethics Committee exemptions. The overall project was registered with the UCL Data Protection Officer and all data were kept securely. In addition, the Charing Cross Research Ethics Committee (LREC) approved the interviewing of the clinical teachers with honorary contracts with UCL in the study in Chapter 5. Studies were registered with the UCL Data Protection Committee. All potential participants were informed either in writing or verbally or both that participation was voluntary. The fact that interviewees were contacted directly by email, letter or telephone may have influenced their decision to participate, and Jane Dacre's name on the clinical teachers' letter of invitation may have meant that their participation was not entirely altruistic.

Justification for the approach used

2.1.9. Cross-sectional and cohort designs (Chapters 3 and 4)

Cross-sectional studies use data that are collected at one point in time, and can be considered a “snapshot” of a particular period. Cohort study refers to a design in which aspects of one or more groups of individuals are measured and the individuals are followed up over time (Mann, 2003). The study in Chapter 3 used a combination of cross-sectional and cohorts designs to explore ethnic and sex differences in the UCL Medical School examination results of several groups of students. The cross-sectional component of the study compared white and ethnic minority, and male and female students’ scores on the examination results of several groups of Year 1, Year 2 and Year 3 UCL medical students. In the cohort part of that study, the previous examination data of two particular cohorts of Year 3 students were gathered and analysed to determine whether ethnic and sex differences in those students’ Year 3 examination results could be explained by previous differences in their examination results.

In Chapter 4, again, there were two types of data collected, although both can be considered cohort data. Firstly, questionnaire data were collected for two cohorts of Year 1 students and for two cohorts of Year 3 students at the start of the academic year. These students were then followed up and their questionnaire data correlated with their end-of-year examination results. Had the questionnaire been administered at the time of the examinations, this data would have been considered cross-sectional; however the fact that the predictor (questionnaire) variables temporally preceded the outcome (examination) variables made it a cohort design. Secondly, one of the Year 3 cohorts was followed into Year 4, where they were re-administered the questionnaire. Those data gathered were longitudinal.

Cross-sectional studies have one major practical advantage over cohort studies in that the data sets can be large and complete, enabling powerful statistics to be used. The decision about which data to analyse in Chapter 3 was mainly pragmatic: it was considered important to test the size of the effect of ethnic group and sex on UCL medical school results, and these were the data that were readily available from the medical student record database. These data had the advantages and disadvantages laid out above: in the cross-sectional analyses it was possible to collect data on large numbers of students which enabled comparisons to be made between different ethnic minority groups (e.g. Chinese vs. Asian); and this was not possible on the smaller numbers involved in the retrospective cohort study. However, the cohort analyses enabled the predictive power of previous examination results on more recent examinations results to be calculated.

Cohort studies have a number of advantages and disadvantages. They are useful in cases where there are ethical and logistical restraints (Rochon, Gurwitz, Sykora et al., 2005); for example, it was not physically possible to randomly allocate participants to ethnic groups and thus a cohort study was the only pragmatic choice. However, due to the lack of random allocation, confounding can be a serious issue for cohort studies (Rochon et al., 2005). For this reason, it is important to measure as many extraneous variables as possible which can then be factored into the analysis (Mann, 2003). The study in Chapter 4 differed from most clinical cohort studies in that instead of trying to find the effect an independent variable (ethnic group) has on an outcome or dependent variable (examination performance), the aim was to find the variables which mediated and moderated this relationship, what in clinical research might be considered the confounding variables (although the causal relationships between these ‘confounders’ and the outcome measure were also being sought). The questionnaire used in Chapter 4 was used to measure many of those variables, which were then included in the analysis using path analysis.

Rochon *et al.* (2005) also warn against possible selection bias in cohort studies. In Studies 1 and 2 selection bias was minimised by obtaining examination and demographic data from almost all students using the medical school records database; by taking care to ensure high response rates from the questionnaire; and by substituting missing values appropriately substituted in the analyses. The gathering of data from pre-existing databases such as the medical school records database is relatively common in cohort studies and has the advantage being relatively free of bias, due to the fact that they tend to be collected by a third party un-involved in the research project (Mann, 2003). Another disadvantage of using a cohort study is that, due to the lack of systematic manipulation of the independent variables, it is not always possible to determine the causal relationships between the variables. This problem can be circumvented by making a *judgement* about the causal relationships between variables.

Mann (2003) lists the following factors to take into account when making this judgement: the strength of association (the stronger the relationship, the more likely it is to be causal); the consistency (reliability) of the result (is it observed at different times, in different places, in different populations?), the temporal relation (if one variable occurs before another, the more likely it is to cause it), the coherence of the evidence when taken in the context of the literature. See also McManus (2003) on deriving causes from correlations.

2.1.10. Questionnaires (Chapter 4)

Questionnaires are one of the most widely used methods in medical education research: three recent issues of the journal *Medical Education* (September, October and November 2007) shows that of the 26 original research papers published, 18 used some form of questionnaire. Previous research (e.g. McManus & Richards, 1986; McManus, Richards, Winder, et al., 1993; McManus, Richards & Winder, 1999) has shown that questionnaires are a suitable method for collecting data on the study habits, personality, attitudes, beliefs and factual information about the lives of medical students. Questionnaires are also useful for gaining large quantities of numerical data on variables, which can be analysed using powerful statistics, and from which (assuming the sampling is appropriate) findings can be generalisable from the study population to wider populations. Furthermore, although questionnaire surveys generally measure self-reported data and are therefore subjective to various types of bias (e.g. social desirability bias and recall bias), previous medical educational studies has shown that it is possible to obtain useful quantitative information from medical students and graduates about topics as sensitive as the amount individuals alcohol consume (e.g. Collier & Beales, 1989); and psychiatric conditions such as depression and burnout which have been shown to be valid in terms of clinical outcomes (e.g. Dahlin & Runeson, 2007; McManus, Winder & Gordon, 2002)

2.1.11. Qualitative methods (Chapter 5)

Qualitative methods aim to help us understand complex social behaviour in its natural setting, with the emphasis on the experiences and views of the participants (Pope & Mays, 1995; Woolf, 2006). They provide rich data which make it possible to analyse the subtleties in participants' ideas, values, attitudes and perceptions in a way that is not always possible using quantitative methods. Qualitative research is particularly useful for exploring relatively nebulous concepts or under-explored research areas

(Barbour, 2005), such as ethnic minority underperformance in undergraduate medicine. As such, qualitative methods were considered to be particularly applicable as a complement to the quantitative methods for investigating the research question (Greenhalgh, Helman & Chowdhury, 1998) and for generating hypotheses (Carter, Shaw & Thomas, 1999). Qualitative methods include unstructured and semi-structured interviews, focus groups, and observational studies – two of these, semi-structured interviews and focus groups, were used in this thesis and are described.

2.1.11.1. Semi-structured interviews

Semi-structured interviews are commonly used in healthcare research. They generally (and in this case) refer to one-to-one, face-to-face interviews in which the researcher asks the participant a series of open-ended questions. The fact that the interview is semi-structured as opposed to structured means that although the order and content of the questions is defined prior to the start of the interview, the participant and the researcher are free to deviate from the precise schedule in order to explore concepts or ideas in detail. This makes semi-structured interviews interactive and flexible, but also sufficiently constrained to ensure that the topics which need to be are covered (Britten, Jones, Murphy & Stacy, 1995; DiCicco-Bloom & Crabtree, 2006).

2.1.11.2. Focus groups

Focus group are similar to group interviews in that they are an effective way of gathering data from a number of different participants all at one time; however in focus groups, the researcher is particularly interested in the interactions between the participants for example the questions they ask each other, the comments they make on each others' experiences and opinions. They can give insights into the variety of communicative styles people use, for example jokes, anecdotes, teasing and arguing, which can highlight group norms or "sub-cultures" (Kitzinger, 1995; Hughes & DuMont, 1993). Focus groups are useful when the researcher is interested in a range of views on a particular subject, and/or to shed light on quantitative data (Krueger & Casey, 2000), as in the case of this research, one of the aims of which was to generate hypotheses about the reasons for ethnic minority underperformance. According to Kitzinger (1995) and Wilson (1997) they can be particularly useful for exploring taboo subjects, as less inhibited members of the group can encourage shyer group members to participate (although care has to be taken by the group moderator to ensure that more extraverted group members do not inhibit more introverted members). Barbour

(2005) explains how relatively homogenous groups can provide participants with a safe environment in which to share experiences. This was particularly important in this research which sought to explore the stereotypes that participants had about medical students from different ethnic groups, which were not necessarily explicitly aware that they had, and which can be a taboo subject. Indeed, this was the main reason that focus groups were used in tandem with individual interviews, as explained fully in Chapter 5.

2.1.12. Randomised controlled trials (RCTs) (Chapter 6)

RCTs are considered the "gold standard" of evaluative research (Torgerson, 2002). They are more common in medical education research (with its relative proximity to medical research) compared to other educational research, but there is some debate about whether or not RCTs are useful in medical education research. Much of this debate has centred around the evaluation of large-scale educational interventions such as curriculum developments (Prideaux, 2002; Norman and Schmidt, 2000). Medical educationalists have pointed out five main limitations of educational RCTs (Prideaux, 2002; Norman, 2003):

1. *Ethics of randomisation* – it is unethical or unjustifiable to randomly enrol learners in programmes in which they have no control over the learning methods
2. *Blinding difficulty* – it is unfeasible and even "impossible" (Norman, 2000) to maintain blinding among students or teachers
3. *Too many variables* – learning is affected by large numbers of variables which cannot all be measured, controlled and accounted for
4. *Appropriateness of outcome measure* – it is difficult to choose medical educational outcome measures which are solely influenced by controlled variables
5. *Under-theorised nature of many educational interventions*

Norman (Norman & Schmidt, 2000; Norman, 2002) has called for experiments which are designed to test specific hypotheses arising from specific theories. Such lab-based experiments can then be applied in practice, thus eventually contributing to our understanding of the factors involved in large-scale interventions. The RCT reported in this thesis was a replication of a previous experiment carried out in the United States with school children, which produced impressively large effects. The strengths of the

RCT carried out in Chapter 6 are summarised in terms of the criticisms levelled at medical education RCTs:

1. *Ethics of randomisation* – students in both conditions were required to submit reflective essays as a course requirement i.e. the PDS curriculum designers felt this was a useful exercise for the students, regardless of the experimental manipulation; therefore the randomisation of students was not unethical.
2. *Blinding difficulty* – tutors and students were not told about the hypotheses or theory of stereotype threat. Moreover, the similarity of the treatment and control tasks together with the clustered design of the experiment meant that students were unlikely to realise that they were part of an experiment, and even if they did realise, they would be very unlikely to become aware of the research hypothesis.

3. & 4. *Too many variables* and *Appropriateness of outcome measure* – the intervention was specific and concise. Although the outcome measure (assessment results) is affected by many different factors, these factors were not part of the intervention and were therefore controlled by the randomisation.

5. *Under-theorised nature of many educational interventions* – the experiment tested specific hypotheses arising from a psychological theory - stereotype threat - which has been well tested in laboratory settings (e.g. Steele & Aronson, 1995; Croizet & Claire, 1998; Aronson, Fried & Good, 2002).

Comparison with previous methods for studying the effects of ethnic group in medical students

Most quantitative studies which have investigated ethnicity and performance at medical school have used descriptive data; and most of those data come from retrospective cohort studies which were designed to look at other questions - for example the predictors of success or failure at medical school (e.g. Ferguson et al., 2002; Lumb & Vail, 2004; Yates & James, 2007). Those studies have only included ethnic group as a standard demographic variable and do not provide much insight into the *reasons* for the ethnic differences in performance. They do however provide an essential evidence base on which further interpretive research can be designed. The study in Chapter 3 similarly provided descriptive data about the population studied in this thesis with precisely the aim of providing a solid basis for further exploration of the research question using other methods.

As in the study in Chapter 4, questionnaires have been used previously to measure statistical relationships between students' ethnicities and various attitudinal measures. McManus, Livingstone and Katona (2006) used a questionnaire to collect data on the factors influencing the motivations of teenagers interested in applying to medicine, including ethnic group, showing that those from ethnic minorities were more likely than whites to be motivated by the scientific aspects of medicine and also to be less motivated by a desire to help other people. Beagan (2003) used survey data (together with interview data) to show students from different ethnic groups had different attitudes about how their ethnicity affected their "fitting in" to medical school.

Qualitative methods similar to the type used in the study in Chapter 5 have been used to explore the experiences of medical students from different ethnic groups. Heidi Lempp (Lempp & Seale, 2006) used semi-structured interviews with 36 medical students at different stages of the course, and although she did not specifically set out to explore ethnicity, themes surrounding ethnicity arose from the data and (to her credit) she analysed and published her results. Beagan (2003) explored Canadian medical students' experiences and concepts of racism, coding the transcripts of their interviews inductively. Other qualitative methods have also been used, for example Wass et al. (2003) used a discourse analysis of video data of OSCE stations. This type of analysis provides useful information about the behaviours of students within an assessment setting, as well as about the interactions between examiners and students. However, there are ethical and methodological implications of videoing students in high stakes situations such as finals examinations which make this type of research difficult.

A search of the literature revealed no previous randomised field experiments or RCTs in the field of medical education which have had specific hypotheses relating to ethnicity. However, as discussed above RCTs have been used in other medical education settings, and have also successfully been used specifically to test stereotype threat in non-medical educational settings.

Conclusion

In summary, this thesis employed a combination of tried and tested methods for studying medical students and graduates: cross-sectional and cohort studies, questionnaires, semi-structured interviews, focus groups and a randomised controlled trial. The combination of methods increased the validity and reliability of the thesis conclusions. The major limitation was the localised nature of the studies which make it harder to form generalisable conclusions which could have practical applications across UK medical schools; however they were designed to provide a much-needed insight into this important problem, and provided a sound basis upon which further research can be built.

Chapter 3. Ethnic and sex differences in UCL Medical School summative examinations in Years 1, 2 and 3

Summary of Chapter 3

Ethnic and sex differences in UCL Medical School summative examinations in Years 1, 2 and 3 were examined. Firstly, cross-sectional analyses were performed to explore the stability and magnitude of ethnic and sex academic differences in Year 3 (n=1484), Year 2 (n=1300), and Year 1 (n=1379) medical students. Secondly, retrospective longitudinal data for two year groups of Year 3 students (n=617) were analysed to investigate whether ethnic differences in Year 3 examination scores could be explained by differences in prior academic attainment, including GCSEs and A Levels. Results showed that in Years 1, 2, and 3, whites achieved significantly higher marks than ethnic minorities ($p<0.001$). The effect size was smaller in Years 1 and 2 (d=-0.17), where the emphasis is on learning basic sciences, than in Year 3 (d=-0.44), where the course is predominantly clinical. Female students achieved higher marks than males but only in Year 3 ($p<0.001$; d=-0.31). These differences were stable over four consecutive years. Path models fitted to the longitudinal data showed that minority ethnic group ($p<0.001$) and male sex ($p<0.001$) both directly negatively predicted Year 3 results, even after taking GCSE, A Level and Year 1 and Year 3 medical school examination scores into account.

Introduction

In Chapter 1 it was shown that ethnic and sex differences exist in UK higher education. White students and female students achieve higher grades than ethnic minority and male students in a variety of HE subjects, including medicine. Some studies have shown that sex and ethnic group can interact[8] to affect performance in some clinical examinations, with male ethnic minority students doing particularly badly (Dewhurst et al., 2007; Wass et al, 2003), but other studies have found no interaction (McManus et al., 1996; Woolf et al., 2007). As well as ethnic group and sex predicting attainment, school examination performance is known to be a good predictor of performance in medical school examinations. Ferguson et al’s (2002) meta-analysis found that, on average, previous academic performance accounted for 23% of the variance in overall performance at medical school, a medium effect size of 0.48 (corrected for unreliability of predictor and outcome measures, and restriction of range). McManus et al (2005) suggested that A Levels predict performance in medicine because they measure, or correlate with, cognitive ability (intelligence), motivation to achieve, and knowledge which is directly useful at medical school (e.g. knowledge of biology and chemistry).

This thesis is primarily concerned with exploring ethnic differences in performance in Year 3 at UCL Medical School. However in order to understand any ethnic differences, it is necessary to look back at previous examination performance. Do ethnic differences exist in Year 1, or do ethnic differences only occur in the clinical parts of the course? Might the problem start before students are accepted to medical school? How reliable are the ethnic differences over time? Do males from ethnic minorities perform particularly badly compared to females from ethnic minorities as suggested by previous research findings (e.g. Wass et al., 2003)? Those important questions were formalised into the following research questions:

- What is the magnitude of ethnic differences in Year 3 examination scores?

[8] In statistical terms two independent variables are said to interact if the score on the dependent variable cannot be predicted by one of the variables alone, but can be predicted by the combined effect of both independent variables. For example if women’s but not men’s examination performance is affected by how anxious they feel then the independent variables sex and anxiety are said to interact to affect examination performance. This is because examination performance cannot be predicted by measures of sex or degree of anxiety alone, but depends on having measures of both sex *and* degree of anxiety.

- What is the magnitude of sex differences in Year 3 examination scores?
- Do ethnic group and sex interact to affect Year 3 examination scores?
- How stable are ethnic and sex differences over time?
- Are ethnic and sex differences found in Year 3 present in earlier tests of academic ability (Year 1 medical school, Year 2 medical school, A Level and GCSE results)?
- Can ethnic and sex differences in previous academic results explain ethnic and sex differences in Year 3?

Two sets of analyses were undertaken to investigate these questions. The first was a cross-sectional analysis of ethnic and sex differences in four consecutive year groups of Year 3 students, four consecutive year groups of Year 2 students and four consecutive year groups of Year 1 students. The second was a retrospective longitudinal analysis of the previous examination results of students who started Year 3 in 2005 or 2006. In this Chapter, “cohort” refers to the academic year (e.g. 2005) and “year” is used to refer to the year of study (e.g. Year 1).

Methods

3.1.1. Participants

3.1.1.1. Cross-sectional analyses

Students who started Year 3 in 2003, 2004, 2005, and 2006 (total n=1484); four cohorts of students who started Year 2 in 2002, 2003, 2004, and 2005 (total n=1300) and four cohorts of students who started Year 1 in 2001, 2002, 2003 and 2004 (total n=1379) were selected for inclusion (see Table 6). There was overlap between the cohorts (e.g. many of the students in Year 1 in 2002 were also in Year 2 in 2003 and also in Year 3 in 2005). In total therefore, data from n=1966 students were analysed. For the 2005 and 2006 Year 3 cohorts, retrospective data on A Level and GCSE results, as well as graduate entry status were also gathered. Students without end-of-year examination data or without ethnic or sex data were excluded from the analyses.

Table 6: Participant demographics

		n	white (%)	ethnic minority (%)	missing ethnic group	male (%)	female (%)	missing sex
Year 1	**2001**	334	153 (45.8)	180 (53.9)	1	137 (41.0)	197 (59.0)	0
	2002	368	165 (44.8)	202 (54.9)	1	158 (42.9)	198 (53.8)	12
	2003	336	139 (41.4)	191 (56.9)	6	117 (34.8)	209 (62.2)	10
	2004	341	165 (48.4)	176 (51.6)	0	155 (45.5)	186 (54.5)	0
	Total	**1379**	**622**	**749**	**8**	**567**	**790**	**22**
Year 2	**2002**	316	140 (44.3)	175 (55.4)	1	131 (41.5)	185 (58.8)	0
	2003	343	157 (45.8)	185 (53.9)	1	153 (44.6)	189 (55.1)	1
	2004	320	132 (41.3)	184 (57.5)	4	115 (35.9)	203 (63.4)	2
	2005	321	160 (49.8)	161 (50.1)	0	140 (43.6)	181 (56.4)	0
	Total	**1300**	**733**	**885**	**6**	**676**	**945**	**3**
Year 3	**2003**	381	177 (46.5)	204 (53.5)	0	172 (45.1)	209 (54.9)	0
	2004	379	190 (50.1)	186 (49.1)	3	161 (42.5)	218 (57.5)	0
	2005	375	175 (46.7)	200 (53.3)	0	156 (41.6)	219 (58.4)	0
	2006	349	170 (48.7)	178 (51.0)	1	131 (37.5)	218 (62.5)	0
	Total	**1484**	**712**	**768**	**4**	**620**	**864**	**0**

3.1.1.1.1. Ethnic group and sex

Self-reported ethnic data were available for n=1827/1966 (92.9%) students. The largest groups were “white British” (n=653) and “Asian or Asian British Indian” (n=336). All ethnic categories were further aggregated into white (all white categories, n=885) or ethnic minority (all other categories, n=942). Students who were missing ethnic data but had a photograph were categorised as white (n=20) or ethnic minority (n=41) on the basis of their name and photograph. Two raters (KW and Henry W.W. Potts) independently assigned students with no photograph to ‘white’ (n=32) or ‘ethnic minority’ (n=37) categories on the basis of the student’s name. The raters agreed in 100% of cases (inter-rater reliability: kappa=1.00). Nine students refused to give ethnic information. See Table 7 for detailed information about the ethnic groups included in the study.

The sex of n=1944 students was recorded by the medical school (male=818, 42.1%; female=1126, 57.9%).

Table 7: Self-declared and assigned participant ethnic group (n=1957; n=9 information refused)

	Ethnic Group		n
Self declared	white	white	123
		white British	653
		white Irish	17
		white Other	92
	Total white self-declared		**885**
	black or black British	Caribbean	9
		African	56
		Other	2
	Total black or black British		*67*
	Asian or Asian British	Indian	336
		Pakistani	84
		Bangladeshi	42
		Chinese	114
		Other	157
	Total Asian or Asian British and Chinese		*733*
	Mixed	white and black Caribbean	8
		white and black African	4
		white and Asian	27
		Mixed Other	37
	Total Mixed		*76*
	Other	Other	66
	Total ethnic minority self-declared		**942**
	Information refused		*9*
Assigned	white assigned		52
	ethnic minority assigned		78
Total self-declared & assigned	**Total white**		**937**
	Total ethnic minority		**1020**
	Grand total		**1957**

'ethnic minority' is necessarily a broad category, and to enable more specific ethnic differences to be calculated, students with self-reported ethnic group were also categorised into four ethnic categories: white (n=885), Asian (n=646), Chinese (n=114), and Other (n=182). These groupings were loosely based on what is known about ethnic differences in UK school examinations where Chinese, Indian and white students perform relatively well and black, Bangladeshi and Pakistani children perform relatively poorly (See Chapter 1). Unfortunately, although perhaps unsurprisingly, there were too few black, Bangladeshi and Pakistani students to enable statistically powerful analyses on those separate groups, and therefore Pakistani and Bangladeshi groups were subsumed into the Asian category, and the black group into the new Other category. Mixed white and black students and Mixed Other students were put in the Other category, and Mixed white and Asian students were put in the Asian category.

3.1.1.2. Retrospective longitudinal cohort analyses

Retrospective longitudinal analyses were carried out to predict the end-of-year assessment results of two cohorts of Year 3 students (2005 and 2006). There were n=726 students in total. The following data for the remaining n=617 Year 3 students were obtained from medical student records:

- Year 1 and Year 2 medical school examination results
- A Level and GCSE results
- Whether they had a degree prior to starting the MBBS course

The 109/726 (15.0%) Year 3 students in 2005 and 2006 who transferred from Oxbridge were excluded from the longitudinal analyses. This is because they did not have Year 1, Year 2 or GCSE data, although they did have Year 3 data and A Level data, and therefore including their data would skew the results. In real terms however, the UCL students and the Oxbridge students spent Year 3 on the same course, interacting and learning with one another and therefore Year 3 scores were not re-standardised after excluding the Oxbridge students' data in order that they should accurately reflect UCL students' Year 3 assessment performance.

3.1.1.2.1. Year 1 and 2 medical school examination results

Due to the structure of the MBBS course and some students retaking whole years of study (presumably due to illness or examination failure), it was potentially possible for students in Year 3 in 2005 and 2006 to have been in Year 1 in 2001, 2002, 2003 or 2004, and in Year 2 in 2002, 2003, 2004 or 2005. Data for the following students were therefore selected from the database used in the cohort analyses described above in section 3.1.1.1 :

- All students who started Year 3 in 2005 and 2006

- All students who started Year 1 in 2001, 2002, 2003 or 2004, who dropped out during or at the end of Years 1 or 2

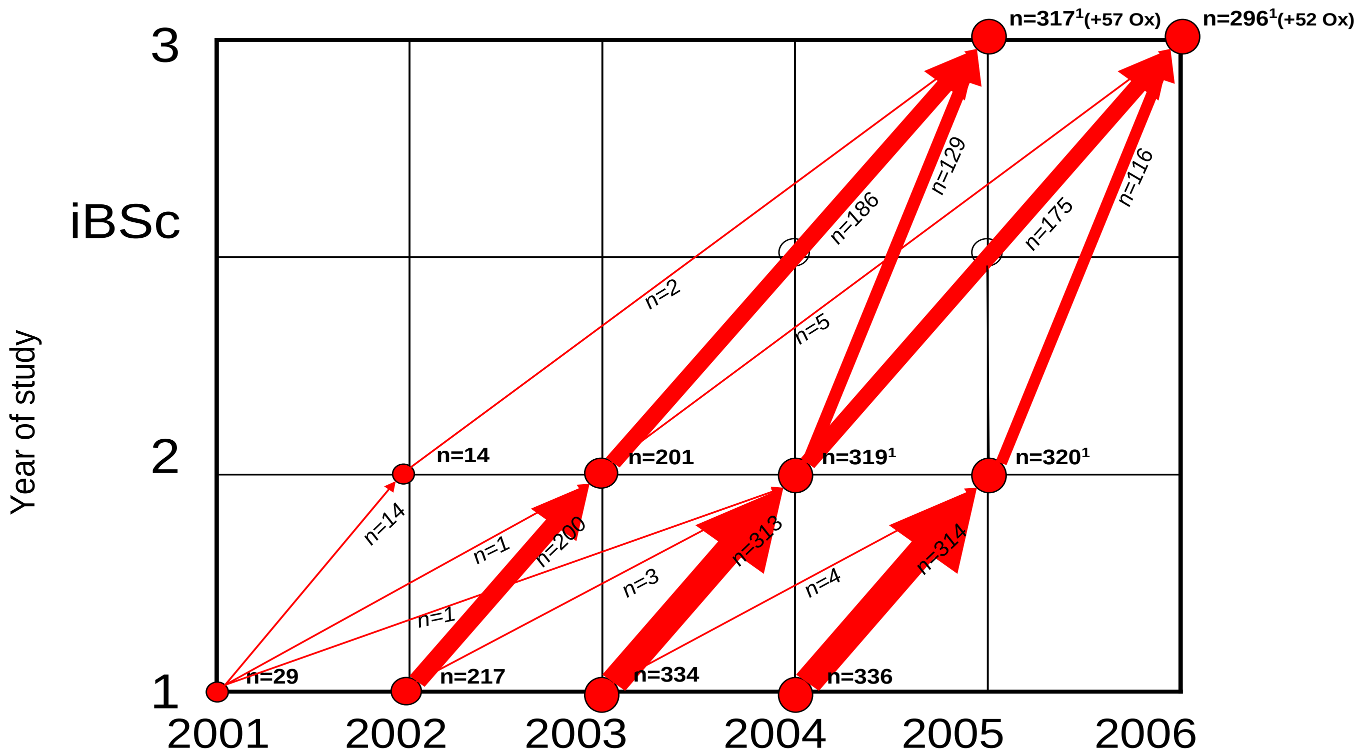
Figure 8 shows students' progression from Year 1 to Year 3 (2005) or Year 3 (2006), taking into account students who dropped out, years which were retaken and intercalated BSc years (Year 1 start date was missing from the database for four Year 2 students: two in 2004 and two in 2005. Year 2 start date was missing for a further two Year 3 students: one in 2005 and one in 2006). Students without end-of-year examination data or without ethnic or sex data were excluded from the analyses (Year 1 n=27; Year 2 n= 14; Year 3 n=30). For ease of comparison between years, only data from students' first attempt at sitting summative assessments were recorded.

3.1.1.2.2. A Level and GCSE data

In the 2005 Year 3 cohort, A Level data were obtained for 350/381 (91.9%) students, and GCSE data for 329/381 (86.4%) students. In the 2006 Year 3 cohort, A Level data were obtained for 319/345 (92.5%) students and GCSE data for 269/345 (78.0%) students. GCSE data were not available for Oxbridge transfer students.
International Baccalaureate, Scottish Highers, Irish Leaving Certificate or other non-A Level qualifications were not recorded due to the difficulties in comparing with A Levels. International GCSE or O level results were recorded and analysed together with GCSE results. Resit and General Studies A Level results were excluded from the analyses (General Studies is not deemed equivalent to other A Level subjects by UCL Medical School). A Levels were scored using the following method: 10 points for an A grade, 8 for a B, 6 for a C, 4 for a D, and 2 for an E or below. The mean of students' best three A Level grades excluding General Studies was used as the outcome measure in the analyses (total A Level points for best 3 A Level grades/3). Single AS levels were not counted. GCSE results were scored as 6 points for an A*, 5 for an A, 4 for a B, 3 for a C, 2 for a D and 1 for an E or below. The mean number of GCSE points was the outcome measure used in the analyses (total GCSE points/number of GCSEs taken)

3.1.1.2.3. Graduate status

85 (11.7%) Year 3 students in 2005 and 2006 were graduates (n=46 missing graduate status data).



[1]n=2 Year 3 students missing Year 2 start date
[2]n=4 Year 2 students missing Year 1 start date

Figure 8: Students' progression from Year 1 to Year 3 2005 or Year 3 2006 is indicated by the red arrows. Cohorts of students shown as red circles with numbers alongside in bold (hypothetical intercalating cohorts represented by clear circles). Lines are proportional to counts. The numbers of students moving between cohorts run alongside the arrows. Where arrows link non-consecutive years (except through an intercalated year) students probably retook that year or re-entered medical school after a break

3.1.2. Statistical analysis

Students in Years 1, 2 and 3 had written and end-of-year examination results. Year 3 students also had OSCE results. Examination marks for each cohort were standardised to *z*-scores (mean of zero, standard deviation of 1) in order to combined data within years. The primary ethnic variable used was that with two categories (white vs. Ethnic minority), although all cohort analyses were repeated using the four-category ethnic variable and the appropriate *post hoc* analyses were conducted to check for differences between ethnic subgroups.

3.1.2.1. Cross-sectional analyses

Within years, two-way ethnic group or sex by cohort ANOVAs were conducted to test whether ethnic or sex differences were stable across time (i.e. to test for ethnic group by cohort or sex by cohort interaction effects). Within years, three-way ethnic group by sex by cohort ANOVAs were conducted to test whether sex and ethnic group interacted, and whether any interactions were stable over time (i.e. to test for three-way ethnic group by sex by cohort interaction effects).

3.1.2.2. Retrospective longitudinal analyses

Simple correlations (Pearson's r) between all the variables were calculated. Multiple regression with mean substitution for missing values was used to investigate the relative predictive power of Year 1 and Year 2 medical school examination performance, graduate status, A Level scores, GCSE scores, ethnic group and sex on Year 3 medical school assessment scores. Path analysis, again with mean substitution for missing values, was used to determine the strengths of the causal relationships between the variables (see section 3.1.2.3 below).

3.1.2.3. Path analysis

Achievement in Year 3 depended on a number of variables which were themselves correlated. Path models were fitted to the data in order to interpret the causal relationships between the variables. Path analysis refers to techniques that allow the relationships between a set of independent and dependent variables, whether categorical or continuous, to be established (Ullman, 2001). Path analysis is considered a special type of structural equation modelling (SEM), as SEM usually includes factor analysis as well as path analysis. Although SEM is used in medical education research, it is not that common (Violato & Hecker, 2007) probably because it is relatively statistically complicated; however path analyses have been used previously in studies of medical students and graduates (e.g. de Saintonge & Dunn, 2001; McManus, Livingston, Katona, 2006).

The relationships between variables in path analyses are depicted in path diagrams, which are helpful in clarifying the relationships between variables and in calculating the equation needed for the analysis. In SEMs, latent as well as measured variables tend to be depicted in the path diagrams. Latent variables are considered to be the underlying factors in a model, for example an individual's true knowledge about diabetes, whereas measured variables are only a physical measurement of that latent variable, e.g. that person's score on a test measuring knowledge about diabetes. The reason that the latent variables and the measured variables differ is because the measurement will necessarily contain a degree of error. This error may be due to a number of other variables, for example, how nervous the person was during the test, or whether the questions that came up in the test happened to have been those that the person revised that morning. However in this case, only measured variables were included in the path analysis. That is because many of the variables that were of interest are in fact the measurement, rather than the latent variable. So for example the research question of this thesis relates to the reasons that individuals from ethnic minorities underperform in assessments – there is no assumption that individuals from ethnic minorities have lower levels of ability (the latent variable).

The path analyses in this thesis used a method similar to that used by de Saintonge & Dunn (2001) and McManus, Livingston, Katona (2006). For each model, the variables were ordered in what was considered a logical order. Earlier variables were placed to the left of later variables (e.g. A levels before Year 1 medical school examination results). Variables considered to be causally equivalent were placed above one another in the diagrams. Initially a saturated model was created which contained all of the possible relationships between variables. A series of multiple regressions in SPSS with an alpha level set at 0.05 was then undertaken. Missing values for each variable were substituted with the mean for that variable. In the first regression analysis, the variable to the furthest right of the path diagram was the dependent variable, and it was regressed on to all variables to the left of it. This process was repeated, working along the path diagram from right to left, with each variable in the path diagram in turn becoming the dependent variable and being regressed on to all the variables to the left of it. For each regression model, non-significant predictors were removed and the regression equation re-calculated until only statistically significant predictor variables remained. Only the beta weights from those final regression analyses were included in the final path model. Where variables were considered causally equivalent simple bivariate correlation coefficients were calculated. All non-significant paths in the saturated models were deleted, leaving only the statistically significant relationships. As is standard practice, causal relationships were depicted by single headed arrows, and correlational relationships with double headed arrows.

Path analysis, as with other multivariate statistical techniques such as factor analysis, generally requires large sample sizes (Ullman, 2001). According to Tabacnick & Fidell (2001), 300 is considered a good sample size and 500 is very good and 1000, an excellent sample size. The sample size in this study (n=617) can therefore be considered to be very good.

Results

The results of the Year 1, Year 2 and Year 3 cross-sectional analyses are presented first followed by the retrospective longitudinal analyses of the previous examination performance of students who started Year 3 in 2005 and 2006. Analyses were performed with the two-category ethnic group variable (white vs ethnic minority) and the four-category ethnic group variable (Asian vs Chinese vs Other vs white).

3.1.3. Cross-sectional analyses

3.1.3.1. Ethnic and sex differences in Year 3 assessments

white students scored statistically significantly higher than ethnic minority students on the total end-of-year assessment in each Year 3 cohort, and this ethnic difference was significant across all cohorts, as indicated by a two-way ANOVA which showed a significant main effect of ethnic group [$F(1,1453)=70.87$; $p<0.001$] and a non-significant ethnic group by cohort interaction [$F(3,1453)=0.534$; $p=0.659$] (see Figure 9). The ethnic difference across cohorts was equivalent to an effect size of d=-0.44. Breaking down the Year 3 total examination score into its OSCE and written components made no difference to this result: white students outperformed the combined ethnic minority group in both the OSCE [$F(1,1453)=41.59$; $p<0.001$;

d=-0.35] and written examinations [F(1,1459)=42.44; p<0.001; *d*=-0.35].

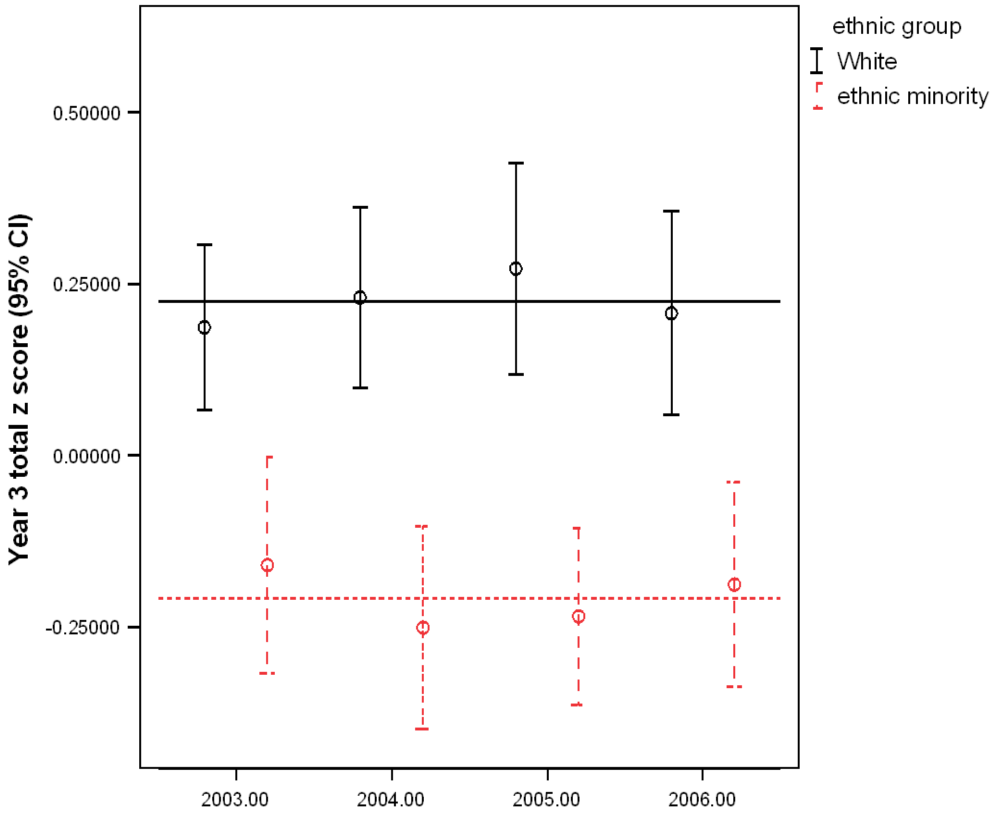


Figure 9: white students scored significantly higher in end-of-year assessments than ethnic minority students in four Year 3 cohorts (p<0.001; n=1454). Subgroup mean reference lines shown.

Repeating the analyses with the four-category ethnic variable using a two-way ethnic group by cohort ANOVA showed a significant main effect of ethnic group [F(3,1399)=25.6;p<0.001] and a non-significant interaction term on total Year 3 score. *Post hoc* testing using the Ryan-Einot-Gabriel-Welsch procedure indicted that white students scored significantly higher than Chinese, Asian and Other ethnic groups, and that those ethnic minority groups did not differ significantly in terms of their performance. However whilst white students outperformed Asian, Chinese and Other ethnic groups on the overall Year 3 total score, there were slight differences in the way the different ethnic groups performed on the OSCE and written examinations. On the OSCE, white students outperformed all other ethnic groups, but on the written examination, white and Chinese students achieved higher scores than the Asian and Other groups [F(3,1406)=18.46;p<0.001] – see Table 8 .

Table 8: Post hoc testing using the Ryan-Einot-Gabriel-Welsch procedure showed that Chinese students achieved higher written examination, but not OSCE examination scores in Year 3 compared to other ethnic minority groups. White students achieved the highest marks in both examinations (scores in different subsets are significantly different at the p=0.05 level).[9]

	Mean written examination *z*-scores			**Mean OSCE *z*-scores**		
		Subset			**Subset**	
Ethnic group	**N**	**1**	**2**	**N**	**1**	**2**
Other	136	-0.255		134	-0.201	
Asian	499	-0.208		497	-0.159	
Chinese	94		0.075	94	-0.145	
white	677		0.182	675		0.180
p value		0.854	0.538		0.884	1.000

In terms of sex, a two-way ANOVA showed a significant effect of sex [F(1,1457)=33.2;p<0.001] and a non-significant sex by cohort interaction [F(1,1457)=2.05;p=0.105] indicating that over four Year 3 cohorts female students outperformed male students, and the cohorts were statistically equivalent in terms of sex differences. The effect size was d=-0.31, which is small to medium. From the graph in Figure 10 it does appear as though there was a slight trend towards male students achieving higher scores over time in Year 3, however the ANOVA results show this is not the case. The sex difference was slightly larger on the OSCE compared to the written examination: the effect size on the OSCE was *d*=-0.26 [F(1,1457)=23.2;p<0.001] but only *d*=-0.15 on the written [F(1,1463)=8.59;p=0.003].

Sex and ethnic group did not interact to affect Year 3 performance: a three-way sex by ethnic group by cohort showed no significant interaction between those three variables [F(3,1453)=0.1.899;p=0.128], in other words, the lower ethnic minority underperformance was not due to either ethnic minority males or ethnic minority females performing particularly badly.

[9] Groups in the same subset (1 or 2) on each dependent variable are statistically equivalent. Those in different subsets are statistically different.

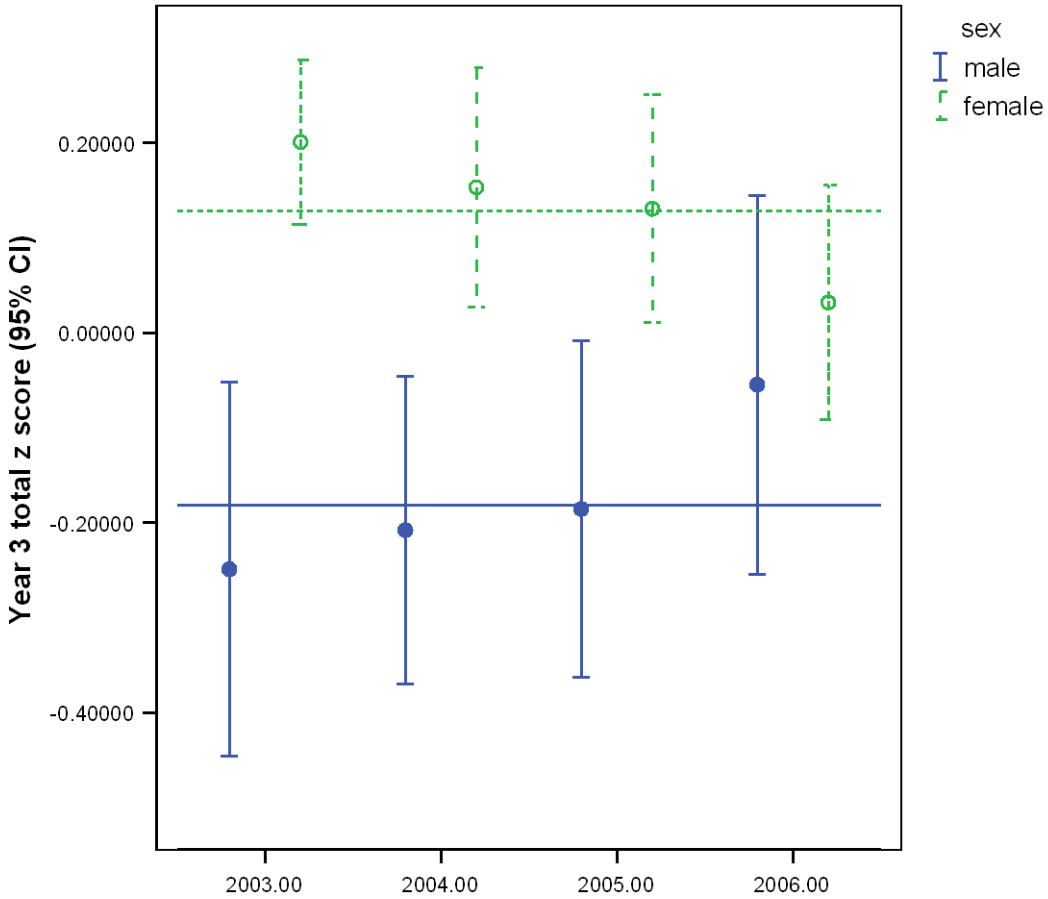


Figure 10: female students outperformed male students in Year 3 end-of-year assessments ($p<0.001$; $n=1458$). Subgroup mean reference lines shown.

3.1.3.2. Ethnic group, sex and performance earlier in the course: Year 2

A two-way ANOVA on data from all four Year 2 cohorts showed a main effect of ethnic group [$F(1,1285)=8.85$; $p=0.003$] and a non-significant ethnic group by cohort interaction [$F(3,1285)=0.632$; $p=0.594$] which means that over all cohorts ethnic minority students achieved lower scores than white students in Year 2 (see Figure 11). The effect size was d=-0.17.

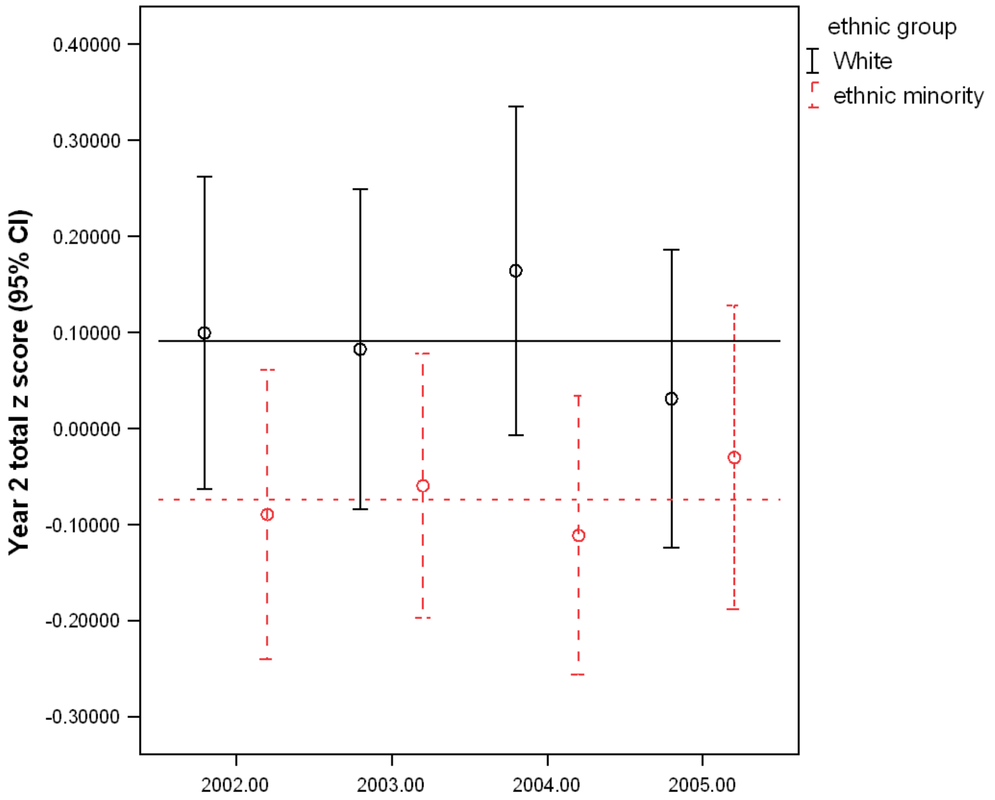


Figure 11: white students outperformed ethnic minority students in Year 2 end-of-year assessments (p=0.003; n=1300). Subgroup mean reference lines shown.

Repeating the analyses with the four-category ethnic group variable showed that white and Chinese students performed significantly better overall in Year 2 than Asian and Other ethnic group students [$F(3,1219)=7.38; p<0.001$]. In fact, Chinese students had the highest Year 2 scores overall, although they were a much smaller group than the whites and the confidence intervals on the means overlap – see Figure 12 .

There were no statistically significant sex differences in any of the Year 2 cohorts. There was however a significant sex by cohort interaction [$F(3,1282)=2.58; p=0.023$], which was due to male students achieving slightly lower scores than females in the 2002 cohort, whereas they achieved slightly higher scores compared to females in all other cohorts.

Within each cohort, two-way ANOVAs showed no significant sex by ethnic group interactions, and across cohorts, a three-way ANOVA showed no significant sex by ethnic group by cohort interaction.

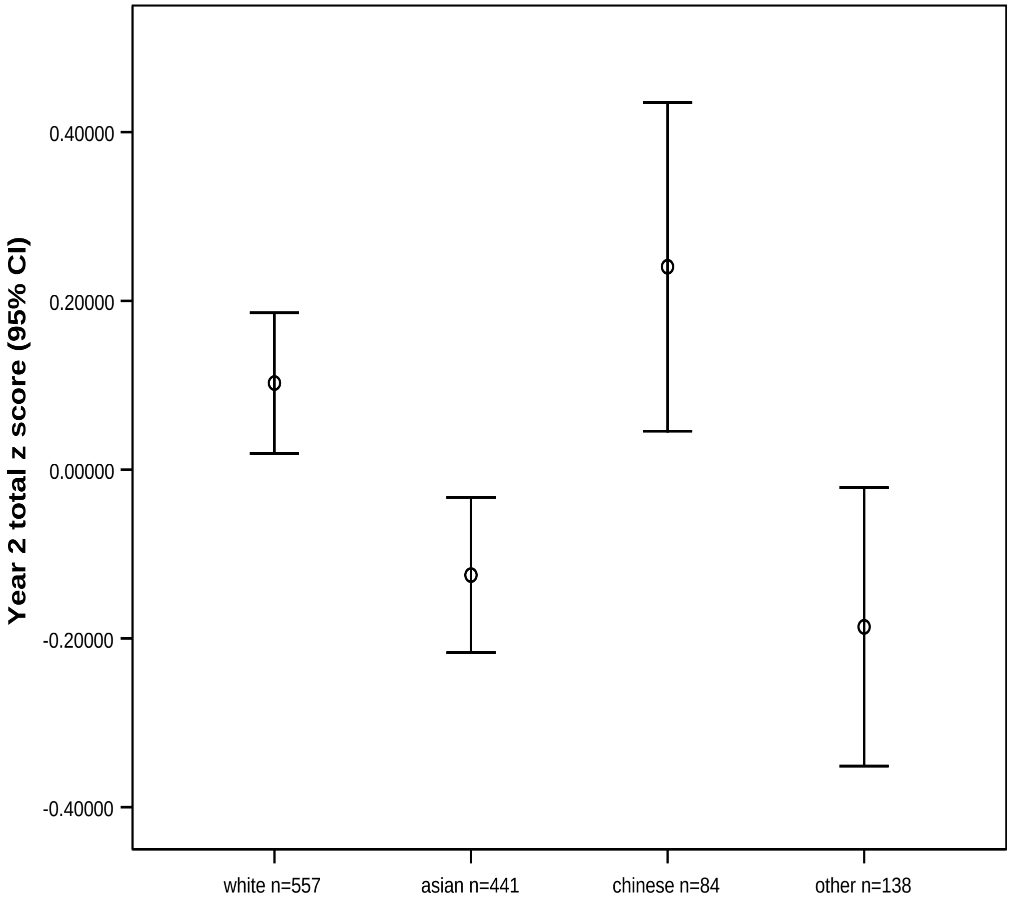


Figure 12: white and Chinese students performed significantly better in Year 2 assessments compared to Asian and Other ethnic group students over four years (p<0.001; n=1220)

3.1.3.3. Ethnic group, sex and performance earlier in the course: Year 1

A two-way ANOVA showed a main effect of ethnic group [F(1,1340)=7.48; p=0.006] a non-significant ethnic group by cohort interaction [F(3,1340)=0.826; p=0.48) indicating that overall, ethnic minority students achieved lower scores than white students in Year 1. The effect size was *d*=-0.17 (see Figure 13).

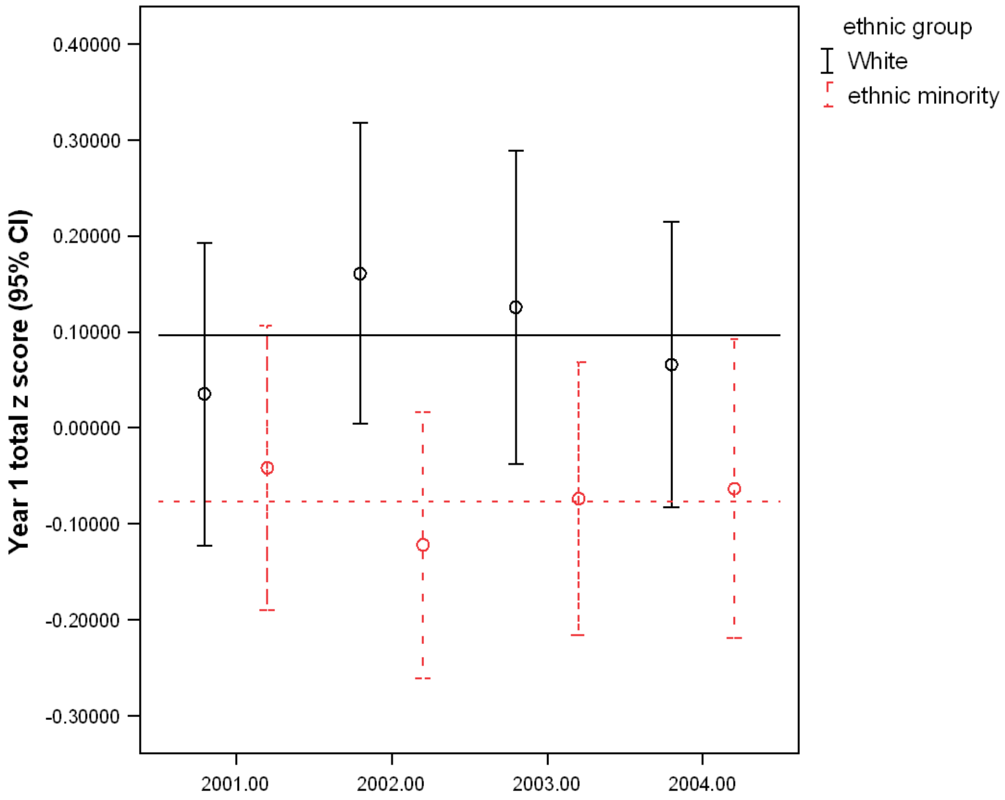


Figure 13: white students achieved higher scores than ethnic minorities in four cohorts of Year 1 end-of-year assessments (p=0.006; n=1341). Subgroup mean reference lines shown.

In all four Year 1 cohorts white and Chinese students achieved significantly higher scores than Asian students, as indicated by a two-way ANOVA with a main effect of ethnic group [F(3,1255)=7.60;p<0.001] and no ethnic group by cohort interaction, and *post hoc* testing using the Ryan-Einot-Gabriel-Welsch procedure. The diagram in Figure 14 shows the Year 1 total mean *z*-scores for each ethnic group. The confidence intervals are much wider in the Chinese and Other groups due to the smaller numbers in those groups. The picture is very similar to that in Year 2, although in Year 1 the difference between the 'Chinese' and 'Other' students was not statistically significant.

In 2003, male students achieved significantly higher Year 1 marks compared to female students [t(324)=2.5; p=0.014]. Overall however the main effect of sex was non-significant across cohorts and there was no sex by cohort interaction.

Within each cohort, two-way ANOVAs showed no sex by ethnic group interactions. Across cohorts, a three-way ANOVA showed no sex by ethnic group by cohort interaction [$F(3,1050)=2.53; p=0.06$].

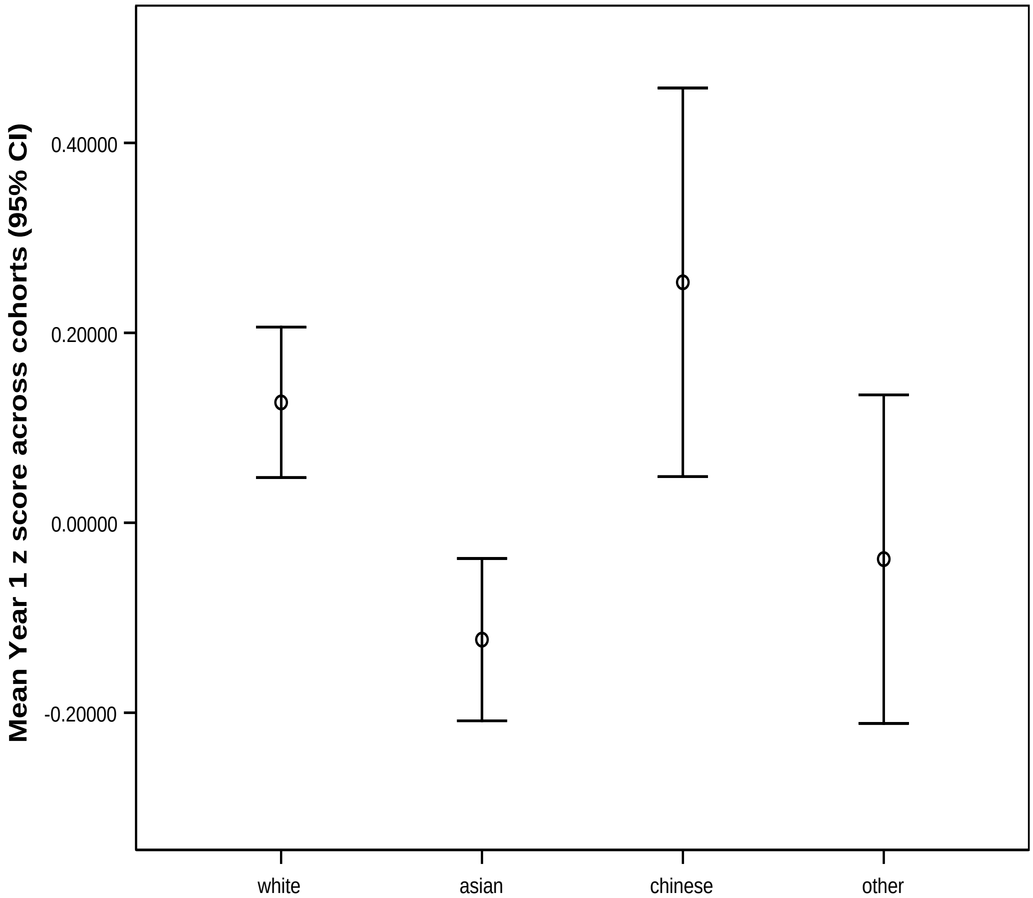


Figure 14: white and Chinese students achieved significantly higher scores than Asian students in Year 1 examinations over four years ($p<0.001$; $n=1256$)

3.1.3.4. Summary of cross-sectional analysis results

ethnic minority medical students achieved lower scores than white students in Years 1, 2 and 3, and those differences were stable over time. The effect of ethnic group on performance in both Years 1 and 2 was small (d=-0.17) but in Year 3 it more than doubled to d=-0.44, meaning that there was either a drop in ethnic minority performance, or an increase in white performance, or both. Ethnic subgroup analyses showed that whilst in Years 1 and 2 the small number of Chinese students performed as well as, if not better than white students (both groups achieving higher scores than the Asian group), in Year 3 Chinese students' scores were significantly worse than the those of the white group, and were not statistically significantly different from the other ethnic minority groups' scores. female students achieved higher scores than male students only in Year 3. In Year 1 and Year 2, male students tended to achieve higher scores than females, although this did not reach statistical significance. There was no sex by ethnic group interaction in any year, indicating that ethnic differences are not due to poor performance of ethnic minority males. Whilst there was some overlap of students between cohorts, it was not possible to say whether it was the same groups of ethnic minority students whose performance deteriorated from Year 1 to Year 3. Longitudinal data were analysed to investigate this question.

3.1.4. Retrospective longitudinal cohort analyses

In the first instance, ethnic and sex differences in the A Level and GCSE results of the Year 3 2005 and 2006 cohorts of students were explored using univariate analyses. This was followed by further investigation of the relationships between the longitudinal assessment data and demographic data for those two cohorts of students, using bivariate correlation and multivariate multiple regression analyses. Finally two path models were created in order to determine the causal relationships between ethnic group, sex, school examination results, graduate status, and Year 1, Year 2 and Year 3 medical school examinations results in these cohorts of students. Bearing in mind the relatively large number of variables included in the multivariate calculations, the bi-categorical (white vs ethnic minority) ethnic group variable was used in the all of the multivariate analyses for simplicity of interpretation.

3.1.4.1. A Levels

The majority (56.7%; 319/563) of students achieved a mean score of 10 from their best three A Levels which is the maximum possible score. This meant the data were skewed. There was a small but statistically significant positive correlation between the number of A Levels students had and the number of points they gained from their best 3 A Levels (Spearman's Rho=0.289; $p<0.001$), suggesting that the best students took the most A Levels.

A *t*-test showed that ethnic minority students achieved statistically significantly more A Level points than white students [$t(568)=3.47$; $p=0.001$]. A non-parametric Mann Whitney U test conducted due the non-normal distribution showed the same level of significance [$z=3.38$;$p=0.001$]. This difference of 0.3 points was equivalent to an effect size of d=0.29. Both groups took the same number of A Levels (mean=3.4; SD=0.6).

The distributions of mean A Level points for white and ethnic minority students are shown in Figure 15 .

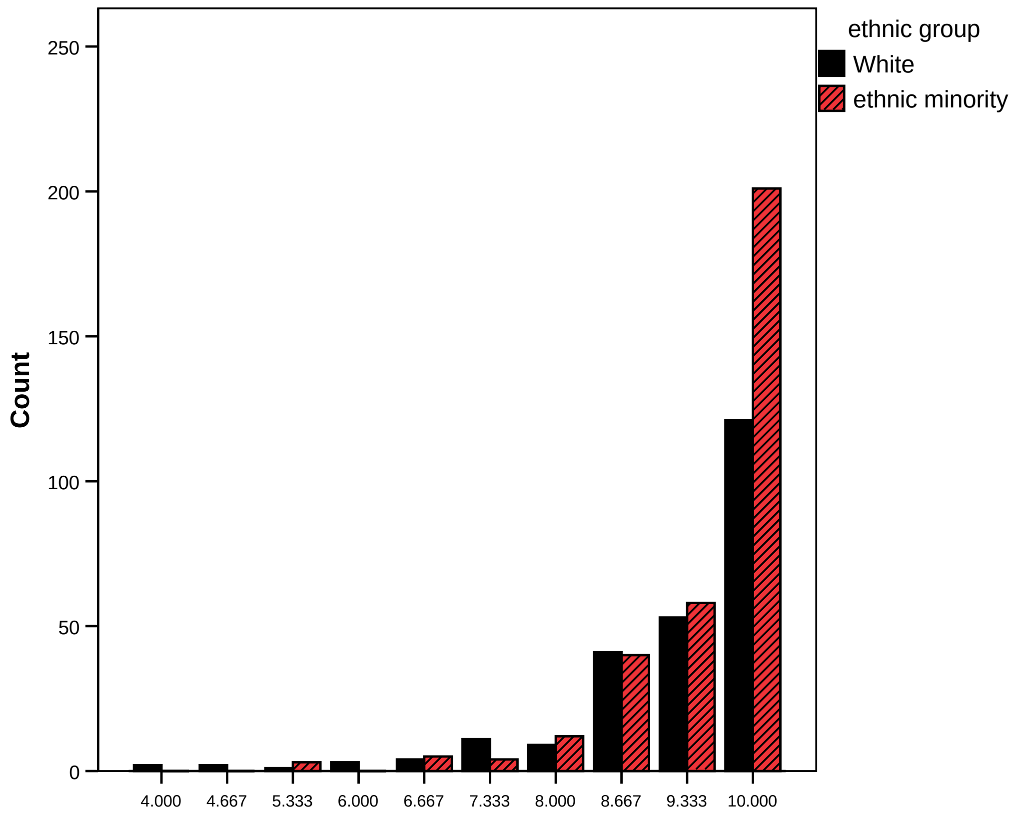


Figure 15: Negatively skewed censored distributions of the mean number of points white and ethnic minority Year 3 students in 2005 and 2006 achieved from their three best A Levels (data from both years combined). The maximum mean possible number of points was 10, which was achieved by 57% of students. Ethnic minority students achieved significantly more A Level points than whites (p<0.001). Oxbridge students excluded.

More detailed investigations using the four-category ethnic group variable revealed that Asian and Chinese students achieved significantly more A Level points compared to white and Other ethnic group students [F(3,557)=8.50; p<0.001] – see Figure 16 . Chinese students also took statistically significantly more A Levels than any other group [F(3,557)=7.54;p<0.001], averaging 3.7 A Levels compared to white students' 3.4 and Asian and Other ethnic group students' 3.3, but the white vs ethnic minority comparison on that variable was not statistically significant.

male and female students had statistically equivalent numbers of points from their top 3 A Level points (mean points=9.39; SD=0.97) and they took the same number of A Levels (mean number of A levels=3.4; SD=0.6).

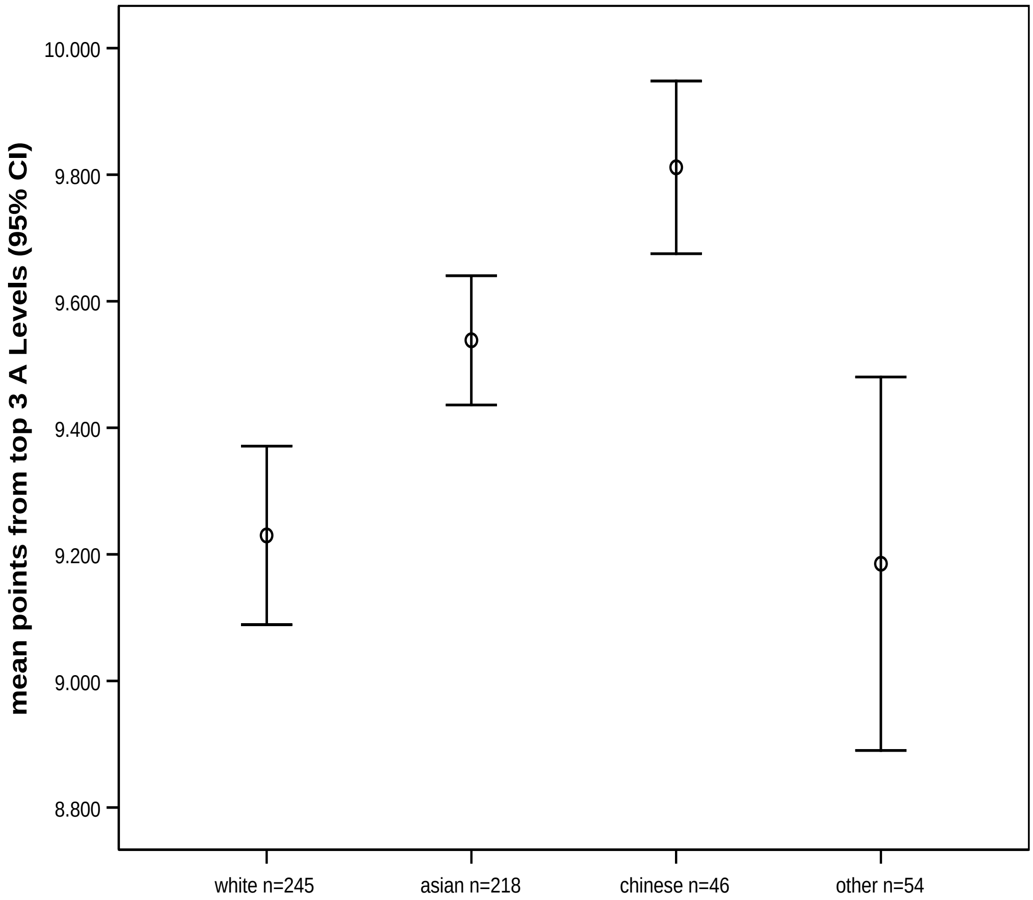


Figure 16: In the Year 3 (2005 and 2006) group, Chinese and Asian students achieved significantly more points at A Level compared to white and Other ethnic group students (p<0.001). Oxbridge students excluded.

3.1.4.2. GCSEs

Three quarters of students' average mark for a GCSE fell between 5 and 6, i.e. was an A or A* (423/563) - the median was 5.39. 3.6% percent (20/563) achieved all A* grades at GCSE (mean score of 6) - see Figure 17 . There was a small but statistically significant correlation between the mean number of points gained from GCSE and the number of GCSEs taken (Spearman's Rho=0.98; p=0.022).

Parametric and non-parametric tests showed ethnic minority students achieved slightly but significantly higher GCSE grades than white students [mean difference=0.1 of a grade; t(540)=-2.6;p=0.009; z=2.7; p=0.007; *d*=0.22], and a one-way ANOVA with *post hoc* testing revealed that this was due to Asian and Chinese students achieving better marks than white and Other ethnic group students [F(3, 535)=4.44; p=0.004]. There were no significant ethnic differences in the number of GCSEs students from different ethnic groups took.

Male students achieved on average 0.2 more GCSE points than female students [t(540)=-5.16;p<0.001; z=4.78;p<0.001], which is an effect size of *d*=0.44. Male students also took slightly more GCSEs, but that difference was not statistically significant (z=0.92; p=0.36).

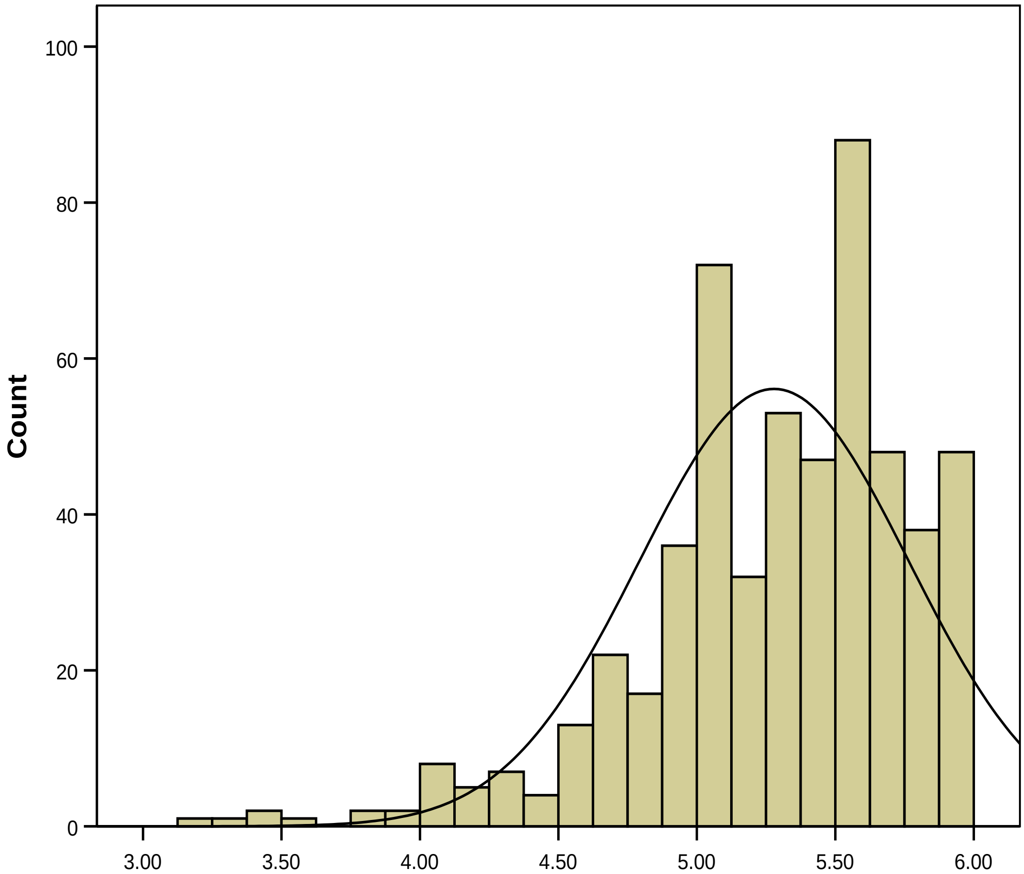


Figure 17: Negatively skewed censored distribution of mean number of points gained at GCSE by Year 3 2005 and 2006 students: 75% achieved all A or A* grades (maximum possible=6). Oxbridge students excluded.

3.1.4.3. Correlations and regression analyses

Ethnic group (white vs ethnic minority) was bivariately correlated with all other variables except sex (see Table 10). Ethnic minorities achieved lower scores in Year

1, Year 2 and Year 3 medical school examination results, but higher A Level and GCSE results than whites. Ethnic minorities were less likely to be graduates and less likely to come from Oxbridge, both of which were positively correlated with Year 3 OSCE and total Year 3 assessment scores. Female sex was positively correlated with Year 3 OSCE, Year 3 total and GCSE points only. As some of the data were non-normally distributed, non-parametric correlations coefficients were also calculated and these revealed an identical pattern of statistically significant results.

A multiple regression of Year 3 end of year total score on the other background variables found they were all significant at $p<0.05$, meaning each independently predicted Year 3 score taking into account all the other variables. Higher Year 3 score was independently predicted by higher Year 2 score ($\beta=0.28$; $p<0.001$); higher Year 1 score ($\beta=0.11$ $p<0.001$); coming from Oxbridge ($\beta=0.18$; $p<0.001$); being a graduate ($\beta=0.12$; $p<0.001$); having more points from top three A Levels ($\beta=0.08$; $p=0.016$); having more GCSEs points ($\beta=0.10$; $p=0.002$); being of female sex ($\beta=0.09$; $p=0.002$); and being of white ethnic group ($\beta=-0.14$; $p<0.001$). The sum of all variables accounted for 26.4% of the variance in Year 3 total score (see Table 9).

Table 9: In a multiple regression analysis, all variables significantly (p<0.05) independently predicted Year 3 end-of-year total result, accounting for a total of 26.4% of the variance

	B	Std. Error	Beta	t	p value
(Constant)	-2.08	0.45		-4.63	<0.001
Year 2 total *z*-score	0.25	0.03	0.30	7.93	<0.001
Year 1 total *z*-score	0.11	0.03	0.14	3.69	<0.001
Graduate entry	0.34	0.09	0.13	3.99	<0.001
Mean points from top 3 A Levels	0.09	0.04	0.09	2.50	0.013
Mean GCSE points	0.16	0.07	0.08	2.33	0.020
Minority ethnic group	-0.22	0.05	-0.14	-4.67	<0.001
female sex	0.13	0.05	0.08	2.72	0.007

Table 10: Simple correlations between medical school exam results, school exam results, and demographics for two cohorts of Year 3 students (p<0.001. *p<0.05)**

		Yr 1 written	Yr 1 total	Yr 2 written	Yr 2 total	Yr 3 written	Yr 3 OSCE	Yr 3 total	Oxbridge	Graduate	Mean points top 3 A Levels	Mean GCSE points	Sex	Ethnic group
Yr 1 written	r	1	**0.968****	**0.745****	**0.747****	**0.608****	**0.240****	**0.502****	n/a	0.070	**0.273****	**0.107***	-0.055	**-0.071***
	N		893	832	832	609	608	605		577	562	539	873	887
Yr 1 total	r		1	**0.750****	**0.762****	**0.622****	**0.277****	**0.530****	n/a	0.061	**0.279****	**0.123****	-0.061	**-0.088****
	N			832	832	609	608	605		577	562	539	873	887
Yr 2 written	r			1	**0.981****	**0.646****	**0.262****	**0.539****	n/a	0.047	**0.248****	**0.144****	-0.054	**-0.069***
	N				836	612	611	608		579	565	542	835	833
Yr 2 total	r				1	**0.643****	**0.262****	**0.542****	n/a	0.045	**0.247****	**0.153****	-0.052	**-0.071***
	N					612	611	608		579	565	542	835	833
Yr 3 written	r					1	**0.431****	**0.812****	**-0.202****	-0.009	**0.272****	**0.243****	0.017	**-0.154****
	N						714	710	716	671	659	590	716	715
Yr 3 OSCE	r						1	**0.781****	**-0.167****	**0.077***	**0.093***	**0.126****	**0.091***	**-0.146****
	N							710	714	670	659	590	714	713
Yr 3 total	r							1	**-0.233****	**0.082***	**0.180****	**0.199****	**0.102****	**-0.227****
	N								710	667	659	590	710	709
Oxbridge	r								1	**0.093***	**-0.223****	**-0.277****	0.002	**0.083****
	N									679	663	593	985	999
Graduate	r									1	**-0.487****	**-0.331****	0.020	**-0.159****
	N										621	558	679	678
Mean points top 3 A Levels	r										1	**0.495****	0.001	**0.114****
	N											583	663	663
Mean GCSE points	r											1	**0.195****	0.067
	N												593	593
Sex	r												1	-0.020
	N													979

3.1.5. Path analysis to predict Year 3 academic performance

Attainment in Year 3 depended on a number of variables which were themselves correlated. Path models were fitted to the data in order to interpret the causal relationships between the variables. Two models were fitted, one using written assessment results (as these are most similar to each other, and thus decreases the variance which is due to the different format of the assessment), and one using overall end-of-year results.

3.1.5.1. Interpreting the path models

Multiple regression output provides B regression coefficients for each independent variable as a measure of the strength of the association between that independent and the dependent variable taking into account the effects of all the other independent variables included in the equation. B coefficients are expressed in the units of the independent variable; however SPSS also provides standardised B coefficients, or beta (β) weights, in its multiple regression output. Beta weights allow the researcher to compare on the same scale the relative strengths of association between each of the independent variables and the dependent variable. It is similar to the r coefficient used in simple correlation. The β regression coefficient was used in the path models to how the relative impact of each of the independent variables on the dependent variable, taking into account all the other independent variables.

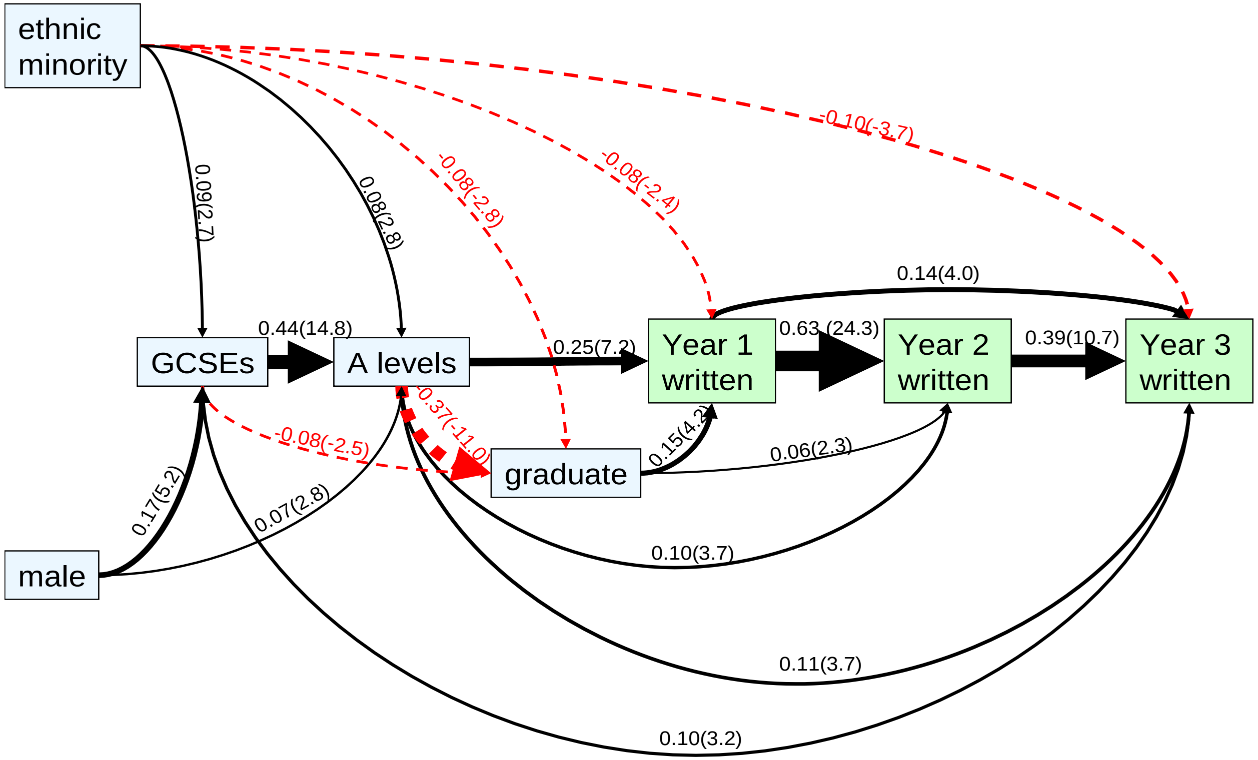


Figure 18: Path diagram showing the relationships between ethnic group, sex, school, and written medical school examination results. Arrows represent individual predictive values of each variable and thickness is proportional to beta weight (shown alongside arrows with t ratios in parentheses) . Black solid lines represent positive relationships between variables and red broken lines represent negative relationships. Earlier exam results predicted later exam results, but minority ethnic group independently negatively predicted Year 1 and Year 3 written assessment results.

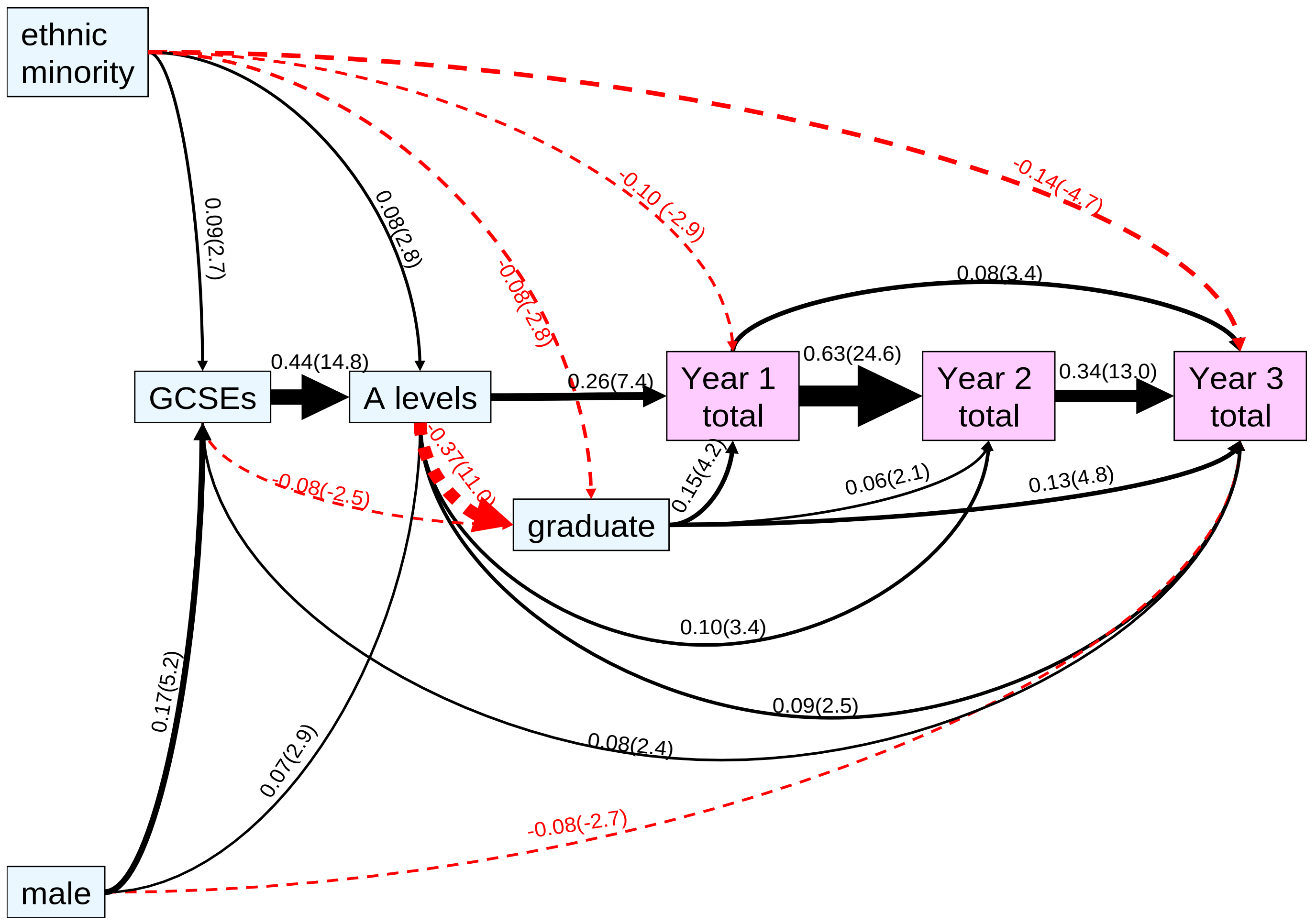


Figure 19: Path diagram showing the relationships between ethnic group, sex, school and overall medical school examination results. Arrows proportional to beta weights (shown alongside arrows with t ratios in parentheses). Minority ethnic group and male sex negatively predicted Year 3 total end-of-year assessment results taking into account all other variables.

The path diagram using only written results was very similar to the overall end-of-years results diagram (see Figure 18 and Figure 19). The main differences were that in the model that used overall assessment scores, female students did better than male students in Year 3 examinations, and graduates did better than non-graduates in Year 3 examinations taking into account all the other variables.

Performance in earlier examinations predicted performance in later examinations – this can be visualised as the “educational backbone” running horizontally through both path models. It was striking that ethnic group, sex, GCSEs, A Levels, and graduate status independently predicted end-of-year Year 3 result, even taking attainment in Years 1 and 2 into account. The strongest relationship in the model was the medium to large correlation between Year 2 and Year 3 results. Another important feature of the models is the moderating effect of the graduate variable on the relationship between A Levels and medical school examination results: although graduate entry students had lower A Level (and GCSE) results, they tended to do better once at medical school.

Minority ethnic group independently predicted lower Year 1 and lower Year 3 scores. The relationships between ethnic group and the pre-medical school variables were complex. As was seen in the bivariate correlations, ethnic minority students had *better* A Level and GCSE results compared to white students and thus would be expected to perform better than white students once at medical school. However they were also less likely to be graduates, which was a positive predictor of performance in Years 1 and 2. Summing the indirect paths from ethnic minority to Year 1 total score (via A Levels and the graduate variable) gave an overall beta weight of -0.003, which was virtually equal to zero; therefore minority ethnic group negatively predicted Year 1 result essentially independently of those variables.

Repeating the path analyses including ethnic group and sex interaction terms found a significant effect of the graduate by ethnic group interaction term on Year 3 written and Year 3 total examination scores. No other interaction terms were statistically significant at the $p<0.05$ level. Further *post hoc* analyses (not shown in the path diagram) were undertaken to explore the relationships between graduate status, examination scores and ethnic group. These showed a significant graduate by ethnic group interaction on Year 1 written score [$F(3,870)=3.88$;$p=0.009$], and Year 3 written score [F(3,610)=7.08;p<0.001] with white graduate students achieving significantly higher scores than ethnic minority graduate students, and indeed both groups of non-graduates (see Figure 20). This suggests that only white students benefited from being a graduate status in terms of their medical school examination results, whereas being a graduate conferred no such advantage for ethnic minorities. The white and ethnic minority graduates also differed in terms of background variables: white graduates had more A Levels points [F(3,564)=64.4 p<0.001] and were older at the start of Year 3 [F(3,617)=260.0 p<0.001] (see Figure 21).

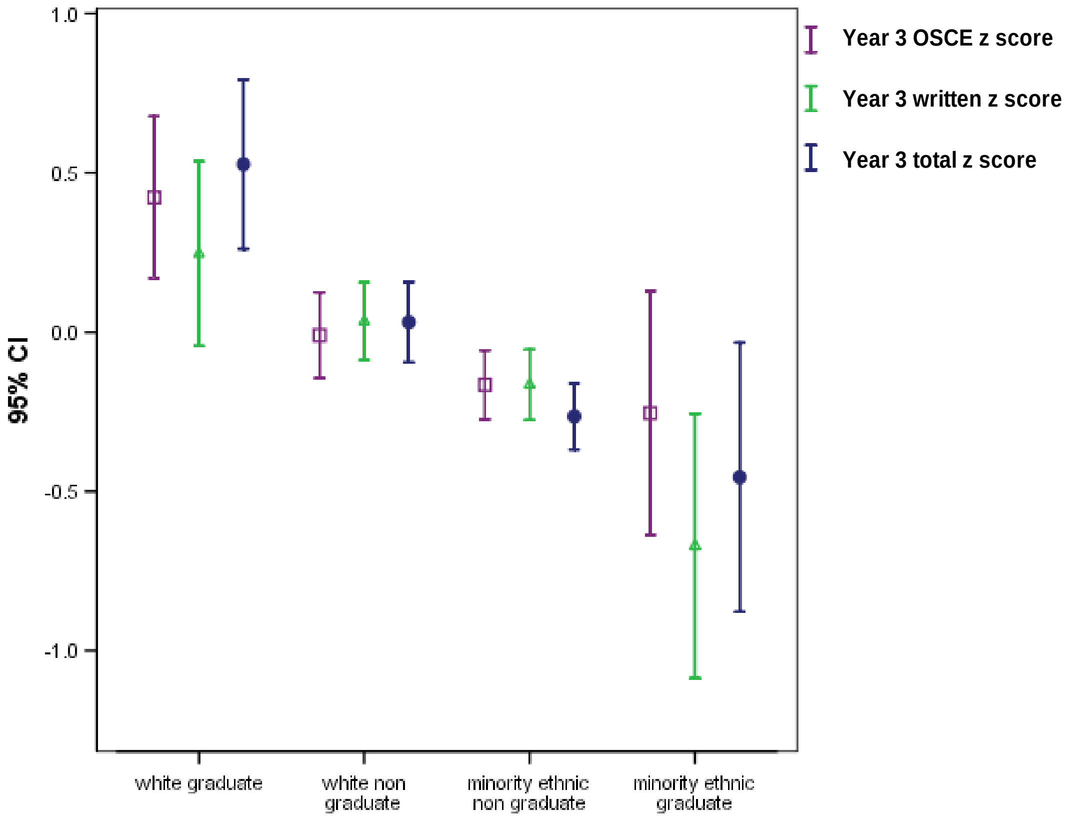


Figure 20: white graduates had higher scores than all other groups on the OSCE (p<0.001 – purple squares), and ethnic minority graduates had lower scores than all other groups on the written examination (p<0.001 – green triangles)

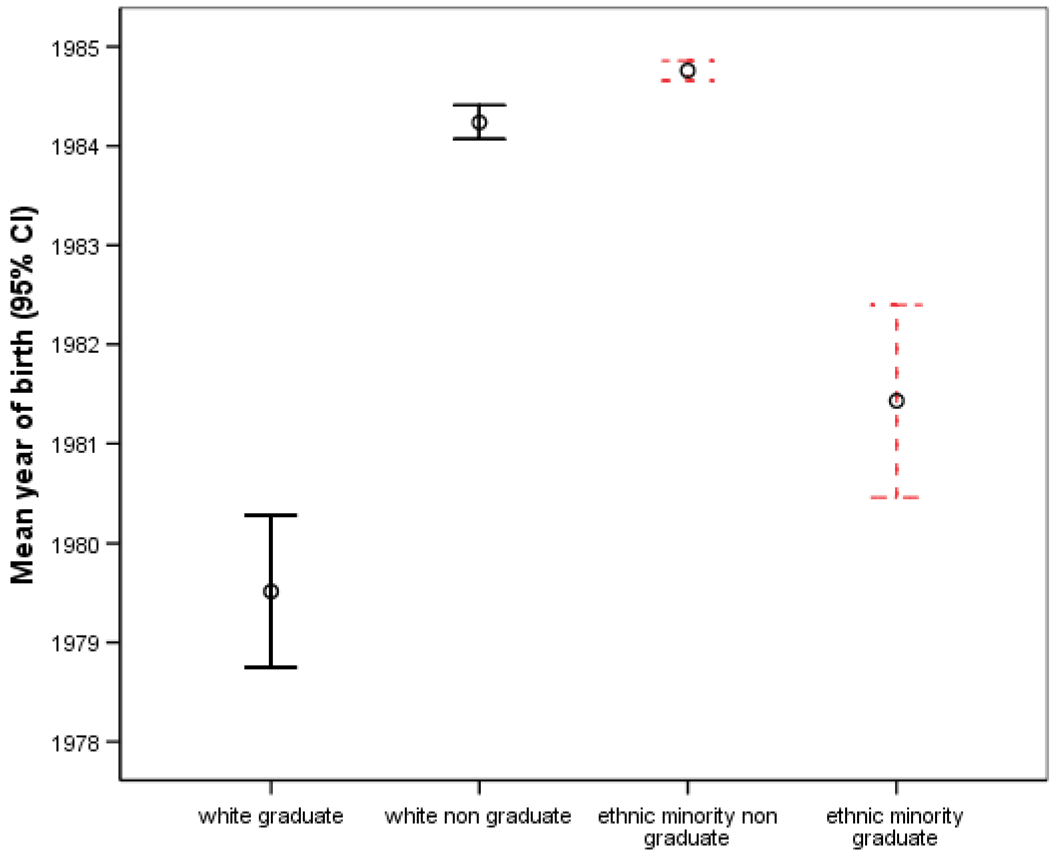


Figure 21: white graduates were older than ethnic minority graduates when they entered Year 3. White non-graduates were also older than ethnic minority non-graduates

Within the non-graduate group, ethnic minority students had slightly better A Level [t(496)=-320.8; p<0.001], and GCSE points [t(478)=270.0; p<0.001] compared to white students, yet they still achieved lower Year 1 results. ethnic minority non-graduates were also younger than white non-graduates when they entered Year 3 [t(536)=6.6; p<0.001], suggesting they were perhaps less likely to have had a "gap year", were less likely to have retaken their A Levels, or were less likely to have taken an intercalated BSc before Year 3 – see Table 11 .

Table 11: white graduates were older and had *more* A Level and GCSE points than ethnic minority graduates. White non-graduates were also older but had slightly fewer A Level and GCSE points than ethnic minority non-graduates

	Mean age entered Year 3 (S.D.); n	Mean points top 3 A Levels (S.D.); n	Mean GCSE points (S.D.); n
white graduate	26.7 (2.9); 55	8.3 (1.8); 46	5.0 (0.7); 43
ethnic minority graduate	24.6 (2.4); 25	7.8 (1.4); 21	4.7 (0.6); 19
white non-graduate	21.9 (1.3); 225	9.0 (0.8); 201	5.3 (0.4); 196
ethnic minority non- graduate	21.3 (0.9); 313	9.7 (0.6). 297	5.4 (0.4); 286

Male students achieved lower grades only in the Year 3 overall results, not on the Year 3 written. The overall Year 3 result is the mean of the Year 3 written, OSCE and firm grades, so it is likely that males did worse on the OSCE and the firm, but not the written. Male students also had slightly worse GCSEs than females, and GCSEs independently positively predicted Year 3 result, although they had slightly better A Levels too, which also independently positively predicted Year 3 result – these two effects essentially cancelled each other out.

Discussion

3.1.6. Summary of results

Ethnic minority students at UCL Medical School underperformed compared to white students in Year 1, Year 2, and Year 3 in end-of-year examinations. The effect of ethnic group on performance in Years 1 and 2 was small (d=-0.17) yet statistically significant. In Year 3 however the gap increased, showing a medium effect size of d=-0.44. These differences were stable over four year time periods. More detailed ethnic analyses revealed that whilst Asian (Indian, Pakistani, Bangladeshi, Other Asian) students consistently achieved lower scores than white students throughout medical school, Chinese students had equal or even slightly better Year 1 and Year 2 results than white students. It was only in Year 3 that Chinese students' end-of-year results were significantly worse than white students' and no longer statistically significantly different from the other ethnic minority groups', which was due to Chinese students' underperformance on the OSCE. The ethnic differences in medical school examination scores were not due to differences in A Level or GCSE performance as the ethnic minority medical students in fact had considerably *better* A Level and GCSEs than the whites (effect sizes were d=0.29 at A Level and d=0.22 at GCSE). These data are important to show that the ethnic differences found in medical school persisted over time, increased rather than diminish, and were not due to differences in prior academic performance. In addition the results showed that female students achieved significantly higher scores than males in Year 3 only, with a small to medium effect size of d=-0.31. In Years 1 and 2, there was a non-significant trend for males to outperform females.

3.1.7. Study limitations

The significance levels were set at a relatively lenient 0.05 level and whilst there is always a balance to be struck between avoiding Type II error whilst also avoiding Type I error, increasing the significance level to a more stringent p=0.01 made little difference to the overall pattern of results: ethnic minority students still achieved lower marks than whites and still had more A Level and GCSE points. Male students still had lower Year 3 results but higher GCSE marks. Year 1, Year 2, graduate status, GCSEs, being white and being female still statistically significantly predicted overall Year 3 score (only A Levels dropped out, with a significance level of p=0.016). However, whilst the relationships between the variables were statistically significant, all of the variables in a multiple regression model to predict Year 3 performance only accounted for just over a quarter in the variance of Year 3 marks, which suggests that some other unmeasured variable(s) were important in predicting those marks. Further investigations are required to determine the nature of those variables, and whether they mediated the effects of ethnic group and sex on Year 3 scores.

The generalisability of the results of this study is potentially relatively limited, bearing in mind that the data come from only one medical school. That being said, as mentioned, there is plenty of evidence from the literature that ethnic minorities underperform in many types of undergraduate and postgraduate medical examinations; however more detailed analyses including data from other medical schools would improve generalisability. The decision not to restandardise the Year 3 results after removing the Oxbridge students, although undertaken *a priori* for carefully considered reasons was a potential source of bias: Oxbridge students tended to do particularly well in Year 3, were more likely to be white than UCL Medical School students, and also had very high A Level scores. Re-running the path analyses after removing the Oxbridge students and restandardising the Year 3 results did alter the results slightly (GCSEs, A Levels and graduate status no longer independently predicted Year 3 result). Importantly however there was still a direct effect of ethnic group and sex on Year 3 scores.

3.1.8. Comparison with previous studies

As described in Chapter 1, many studies have found that ethnic minorities underperform compared to whites in medicine (see Ferguson et al., 2002 for a review) and higher education in general (Richardson, 2008). This study showed that the effect was largest in the clinical years. Previous studies have showed similar results. James and Chilvers (2001) looked at the factors that predicted success on the undergraduate medicine course at Nottingham University, finding that white ethnic group and female sex were positive predictors of gaining honours on the clinical BMBS (the clinical qualification), but they did not predict performance in any other part of the course, including the BMedSci (similar to a standard science degree). Yates and James (2007) showed ethnic differences in both preclinical and clinical examinations, but the differences were greater in the clinical examinations. McManus et al (1996) found that ethnic minorities were more likely to perform poorly in medicine and surgery final examinations and less poorly in pathology and clinical pharmacology final examinations, and that it was not because of the way those subjects were assessed (i.e. by written or face-to-face clinical assessments). Dewhurst et al.'s (2007) study of pass rates on the postgraduate Membership of the Royal College of Physicians examinations [MRCP(UK)] showed that ethnic minorities underperformed in both the written and the practical OSCE-style parts of the examination (called PACES). Dewhurst et al. (2007) also showed that male candidates achieved lower scores than females, but only on PACES. There was no evidence for female candidates performing particularly well in communication tests. There was however an interaction between sex and ethnic group on the PACES exam, with male ethnic minorities performing especially poorly, particularly on communication skills and ethics tests.

This study is, to my knowledge, the only undergraduate medical education study to compare the performance of medical students from different ethnic minority groups (Chinese, Asian and Other). Outside of medicine, a study of national HE data (Richardson, 2008) showed that all ethnic minority groups had lower degree attainment compared to whites, but Indian and Chinese students had better attainment than Bangladeshi, Pakistani and black groups. At postgraduate level in medicine, Dewhurst et al (2007) showed that white candidates were more likely to pass the MRCP(UK) than all of the six other ethnic groups in the study, and the ethnic minority groups did not differ from each other statistically.

In terms of previous attainment, a recent study of UCAS data from 2003-2005 showed that overall, non-white acceptances to UK medical schools had slightly worse A level results than white acceptances, the difference being equivalent to an effect size of 0.1 (McManus, Woolf & Dacre, 2008). A study of 10,888 applicants to the University of Nottingham medical school between 1998 and 2003 showed that white, Chinese and Mixed students had more UCAS tariff points (broadly equivalent to A level points) than students from other ethnic groups (Powis, James & Ferguson, 2007). This contrasts with the picture from this study where at UCL Medical School, ethnic minority, especially Chinese and Asian, students had better GCSE and A level results than whites. Moreover, although in general female students tend to achieve high grades at A levels, these data show that at UCL male medical students had slightly better A levels than females – something also found in the medical school applicant sample in Powis et al's study (2007).

In terms of how graduate status affects medical school achievement, the literature is mixed. Some studies have found that graduate or mature entry students do better than school-leavers at medical school (James & Chilvers, 2001; Wilkinson, Wills & Bushnall, 2004; Lumb & Vail, 2004; Kay-Lambkin et al., 2002) and others have found that there is no difference (Rolfe, Ringland & Pearson, 2004). James, Ferguson, Powis et al. (2008) found entrants to a graduate medical course at Nottingham University were less likely to be of white ethnic group and more likely to have a lower school-leaving examination results than standard-entry students (as was found in this study) although at the time of writing there were no published data on the Nottingham graduate and standard-entry students' attainment on a shared clinical course.

3.1.9. Interpretation of findings

The study findings raise two main questions: firstly, why did ethnic minority students perform relatively poorly in Year 1 and 2 despite having better A Level and GCSE marks (which are good predictors of medical school performance) than white students? Secondly why did ethnic minority and male students perform particularly poorly in Year 3 compared to Years 1 and 2?

This inconsistency between ethnic minority students' good school leaving results and their relatively poor medical school examination results is partly, but not wholly, explained by the fact that white students were more likely to be graduates. Graduate students had worse A Level and GCSE results. This is probably partly because of grade inflation [for example, three A grades at A Level in 2001 represents a lower level of achievement than 3 A grades in for example, 1991 (*Cf*. Powis, Hamilton, McManus, 2007)], and partly because some graduates will have gained insufficient A Level points to enter medical school first time around, succeeding only in entering after gaining an upper second class or first class degree (Powis, James, Ferguson, 2007; Carter & Peile, 2007). However, once at medical school, graduate students did well (graduate status independently positively predicted Year 1 and Year 3 performance) perhaps because of differences in motivation and maturity (McCrorie, 2001; Carter & Peile, 2007).

The relationship between graduate status and ethnic group was further complicated by the fact that whilst white graduates did particularly well compared to white non-graduates in Year 1 and Year 3, ethnic minority graduates performed relatively poorly. White graduates differed from ethnic minority graduates in other ways as well: white graduates were older than ethnic minority graduates, yet despite any grade inflation that might have taken place, ethnic minority graduates had lower A Level results. It is not clear why these differences exist. Speculating though, it may be that white graduates were more likely to have decided that they wanted to be a doctor after a first (or even second) degree and/or a period of time working, whereas ethnic minority graduates were perhaps more likely to be those who failed to get into medical school first time around. If this were true it may have further implications for their levels of motivation, their feelings of self-efficacy and thus their lower performance. However, it is important to remember that differences in graduate status did not fully explain the ethnic difference in medical school results: even within the non-graduate group, ethnic minorities had slightly but significantly better A Level results than whites, yet still performed worse at medical school. This indicates that white and ethnic minority medical students differed on some other variable(s) which influenced their medical school examination performance regardless of their academic history.

As mentioned the study findings also raise the questions of why the ethnic gap increased in Year 3 compared to Years 1 and 2, and why males began underperforming in Year 3. As discussed in Chapter 2, Year 3 at UCL Medical School is very different from Years 1 and 2. Years 1 and 2 are similar to that of a standard science degree: students are taught in large lecture theatres and laboratories by non-clinicians and have very little patient contact and the examinations consist almost entirely of written multiple-choice-type assessments. In Year 3, students are put into firms and receive the majority of their teaching from practicing clinicians in hospitals or community settings (e.g. GP surgeries), where the teaching is more patient focussed and the learning self-directed. Students are still assessed in written multiple-choice-type examinations, but they are also assessed face-to-face by clinicians on their ability to communicate with and examine patients, and to perform practical clinical skills. Whilst it might be tempting to moot direct discrimination on the part of the examiners in face-to-face assessments as a possible cause of ethnic minority underperformance in Year 3, this seems unlikely to be the case because ethnic minority students (except the Chinese students) also underperformed in written examinations which are marked by machine. It seems more likely that ethnic minority and male students had some particular difficulties in learning in the clinical environment, and/or in performing in clinical examinations (Woolf et al. 2007) although precisely why requires further investigation.

3.1.10. Conclusion

The large numbers of participants in this study allowed statistically powerful analyses to be performed which showed that students from ethnic minorities consistently underachieved in Year 1, Year 2 and particularly Year 3 at UCL Medical School compared to white students; and that this was not due to differences in prior academic achievement. This conclusion naturally leads to the question: if ethnic differences in Year 3 of medical school are not due to pre-medical school academic differences, what are they due to? That question is the focus of the rest of this thesis.

Chapter 4. A questionnaire study investigating the factors mediating the effect of ethnic group on Year 1 and Year 3 examination results

Summary of Chapter 4

Questionnaires measuring demographic and psychological factors were administered to all Year 1 and Year 3 UCL medical students in 2005 and 2006 and to Year 4 students in 2006. The response rates were high in Years 1 and 3. Univariate analyses of the responses showed ethnic differences on demographic variables such as graduate status, speaking English as a first language and having parents who are doctors, as well as on some of the psychological variables such as study habits. The personality factor Conscientiousness was correlated with both Year 1 and Year 3 end of year examination scores. Path models fitted to the Year 1 and Year 3 data showed that ethnic group had a direct effect on both Year 1 (β=-0.135) and Year 3 (β =-0.214) results, which was virtually unmediated by the other questionnaire variables. The other independent predictor of good performance in Year 1 was high Conscientiousness (β =0.131). In Year 3 the other predictor of performance was having studied at Oxford or Cambridge in Years 1 and 2 (β=0.187).

Introduction

In Chapters 1 and 3 it was shown that ethnic minority students tend to underperform in examinations, including at UCL. Furthermore, at UCL, the ethnic gap in attainment increased from Years 1 and 2 to Year 3. From the literature review in Chapter 1 it is clear that although many factors are known to affect academic attainment, it is still unknown which, if any, of those factors mediate[10] the ethnic disparity in performance. This chapter describes the results of a questionnaire study which aimed to investigate the extent to which demographic and psychological factors account for the ethnic differences in attainment Year 1 and Year 3 UCL Medical School examinations.

Methods

4.1.1. Participants and sampling strategy

According to Carter, Shaw and Thomas (2000), an adequate sample is one that is drawn using an unbiased method, is representative of the population of interest and is large enough to avoid Type II errors. Commonly participants are randomly sampled from the particular population of interest. However in this case, the target population was Year 1 and Year 3 UCL medical students following the MBBS course. Therefore all UCL medical students who started Year 1 in 2005 (n=362) and 2006 (n=337); all UCL medical students who started Year 3 in 2005 (n=389) and 2006 (n=349) were sampled. Demographic information about these groups has been described in Chapter 2. In addition, the 406 UCL medical students who started Year 4 in 2006 were also eligible to take part (224/404 female; 184/398 white; 2 missing sex data; 8 missing ethnic data). Students without end-of-year examination data who had completed a questionnaire at the start of the year were included in the analyses. See Table 12 .

[10] Baron & Kenny (1986; p1176) explain the difference between mediator and moderator variables as follows: "a given variable may be said to function as a mediator to the extent that it accounts for the relation between the predictor [independent variable] and the criterion [dependent variable] […]. Whereas moderator variables specify when certain effects will hold, mediators speak to how or why such effects occur"

Table 12: UCL medical students eligible to participate in the questionnaire study in Chapter 4

	2005 (n)	2006 (n)	Total (n)
Year 1	362	337	699
Year 3	389	349	738
Year 4	n/a	406	406

4.1.2. Statistical power

Previous unpublished surveys conducted with Year 3 UCL medical students in 2004/5 indicated that approximately 650-700 participants would provide sufficient power to reliably detect ethnic effects.

4.1.3. Questionnaire design

The questionnaires were based on Chris McManus's questionnaires, which he has administered to medical students and doctors (e.g. McManus & Richards, 1986; McManus et al., 1993; McManus, Richards & Winder, 1999; McManus, Winder & Gordon, 2002; McManus, Keeling & Paice, 2004); and Chris McManus advised on the design of these questionnaires. In addition, a variety of publications were consulted [The Royal College of General Practitioners 'Master Classes in Primary Care Research' guide 'The Use and Design of Questionnaires' (Carter et al., 2000); Oppenheim (2001); and Rust & Golombok (1992)]. The first version of the questionnaire was administered in 2005. Preliminary analyses were carried out on the data, and these informed the revision of the questionnaire. A revised version of the questionnaire was administered in 2006. A copy of each questionnaire can be found in the Appendix.

4.1.3.1. Item choice

Questionnaires are generally used to collect quantitative data on wide variety of factors, which typically fall into two broad categories: descriptive and analytical (Oppenheim, 2001). Descriptive items are used for factual information such as demographics or behavioural outcomes (e.g. the number of hours spent on a particular task); analytical items are used to collect data on psychological factors such as attitudes, opinions, and psychological constructs such as personality. The questionnaires in this thesis use a combination of descriptive and analytical items.

Oppenheim (2001) points out that analytical questionnaire design requires items which provide data on both independent variables and confounding variables, thus allowing meaningful hypothesis-driven analyses to be undertaken on the resulting data. The questionnaire was therefore designed to measure the main independent variable under investigation in this research – ethnic group – as well as other variables known from the literature to influence academic attainment.

Items related to:

1. Demographics: age, sex, ethnic group, previous education, parents' occupations and socio-economic group, first language, parents' first language, place of residence
2. Other descriptive information: leisure activities: negative life events: ages first thought of and first decided to become a doctor: episodes of discrimination
3. Cognitive and psychological constructs: personality: study habits: stress, anxiety and depression: psychological impact of discrimination
4. Attitudes: reasons for choosing to become a doctor: opinions about factors that make a good doctor

These variables are commonly measured using self-report questionnaires and previously validated questionnaire items were used whenever possible (Boynton & Greenhalgh, 2004). See Table 13 for a list of the previously validated measures used in the questionnaire. Chris McManus provided other items which had been previously used with medical students and graduates (e.g. McManus et al, 1993; 1998; 1999; 2002).

Table 13: Previously validated questionnaires used in the questionnaire study

Questionnaire	**Authors of Original Questionnaire**	**Example of when used with undergraduate students or qualified doctors**
Shortened Study Process Questionnaire	Biggs (1987), shortened by Fox et al. (2001)	McManus, Richards, Winder & Sproston (1998)
15 item version of the NEO Personality Inventory Revised (NEO-PI-R)	Costa & McCrae (1992)	McManus, Smithers, Partridge, Keeling, Fleming. (2003); McManus, Keeling & Paice (2004).
Hospital Anxiety and Depression Inventory (HADS)	Zigmond & Snaith (1983)	Newbury-Birch, Lowry & Kamali (2002); Andrews & Wilding (2004)
General Health Questionnaire – 12 items (GHQ-12)	Goldberg (1992)	McManus, Winder & Gordon (2002); Paice, Rutter, Wetherell, Winder & McManus (2002)
Modified List of Threatening Experiences	Brugha, Bebbington, Tennant, & Hurry (1985)	Andrews & Wilding (2004)

As mentioned in Chapter 2, section 2.1.1 , ethnic group was measured using the question from the 2001 UK Census, which has 16 ethnic categories (see questionnaires in the Appendix). These can be collapsed into 6 groups: white, Asian, black, Chinese, Mixed and Other, which can be further collapsed into white and ethnic minority groups. This categorisation is not perfect, however it is considered generally acceptable (Gill, 2001), and is also used in the NHS and by UCL Medical School. Social class or socio-economic group was measured using the Registrar General’s classification of social class in the 2005 questionnaire. In the revised 2006 questionnaire, it was decided to use the updated version, the National Statistics Socio-economic Classification (NS-SEC) http://www.statistics.gov.uk/methods_quality/ns_sec/history_origin_concept.asp. See Table 14 .

Table 14: The two measures of social class used in the questionnaires (Registrar General's used in the 2005 questionnaires; and the NS-SEC categories used in the 2006 questionnaires)

Registrar General's Social Class categories		NS-SEC categories	
I	Professional occupations	1	Managerial and professional occupations
II	Managerial and technical occupations	2	Intermediate occupations
III	Skilled (manual and non-manual) occupations	3	Small employers and own account workers
IV	Partly-skilled occupations	4	Lower supervisory and technical occupations
V	Unskilled occupations	5	Semi-routine and routine occupations

4.1.3.2. Ordering of items in the questionnaire

Items were grouped and ordered in a logical and non-threatening manner (Carter et al., 2000; Stone, 1993), starting with demographic and factual information, leading through to questions about cognitive and psychological constructs, and finally to questions regarding becoming a doctor and studying medicine. The last item was a freetext box inviting respondents to comment on the questionnaire if desired.

4.1.3.3. Clarity and legibility of the questionnaire

The clearer and more legible a questionnaire, the easier respondents find it to complete it correctly, and therefore the more valid and reliable the data (Boynton & Greenhalgh, 2004). The following steps were taken to increase the clarity and legibility of the questionnaires:

- Question stems were written in bold and responses were italicised, enabling respondents to easily distinguish them
- Questions and items within questions were numbered to minimise accidental response omission
- Every other row in each response matrix was shaded to reduce the likelihood of respondents accidentally responding incorrectly
- The direction of responses was consistent, with negative responses (e.g. "no"; "strongly disagree" "rarely true" "never") to the left of positive responses (e.g. "yes" "strongly agree" always true" "always"). The exception was the HADS,

which orders its responses in the other direction (e.g. “better than usual” to the left of “much less than usual”)

The questionnaires were piloted on 12 colleagues, who recorded the amount of time it took them to complete the questionnaires and gave constructive feedback on the content and appearance. As a result, the covering letter was extended to include more information about how the results of the study would be used; the layout of the HADS was changed to make it easier to complete; and a question about whether students had received any counselling or therapy was removed as it was considered too ambiguous, too personal, and on reflection it was considered that there was not enough evidence that it was essential to the research question to include it and risk offending respondents.

Care was also taken in the wording of all items to reduce the possibility of social desirability bias and offensiveness (Rust & Golombok, 1992).

4.1.3.4. Ethical considerations in the questionnaire design

Issues of confidentiality can arise when respondents are required to add their names to questionnaires, such as when questionnaire data needs to be linked with other data. Furthermore, in order to give their consent for their data to be used, research participants need to be given sufficient information about the ways in which their data will be used. The questionnaire was designed in the following way in order to increase both confidentiality and respondents’ confidence in the confidentiality of the questionnaire data, and also to allow participants to give informed consent. The first page of the questionnaire consisted of consent form which briefly explained the purpose of the research, the ways in which the data would be used and how this complied with the Data Protection Act 1998. This first page was perforated which allowed participants who consented to print and sign their name on a detachable section. Both attached and detachable sections were individually numbered and before data entry, the names were detached from completed questionnaires and stored separately. The second page was a letter from Jane Dacre (primary PhD supervisor and Vice Dean of UCL Medical School) explaining the broad purpose of the research, and how the data would be used. Students were verbally encouraged to read this letter, and the contents were summarise and presented verbally at the time of administration.

4.1.3.5. Designing the questionnaire to maximise response rate

A 70% response rate or above is generally considered "good" in questionnaire research. A good response rate is important because it decreases the likelihood of there having been a non-respondent bias (whereby non-respondents differ from respondents in a systemic way). Reduction in bias increases the validity and reliability of the data. Incomplete data may be due to participants accidentally not responding for example if pages are stuck together or they are distracted. Low response rates may be due to participants refusing to respond because of the amount or type of information requested, or being unable to respond because for example the instructions are unclear, the questions too complex or the respondents' other needs are not catered to (Carter et al., 2000).

To increase response rates, one must minimise the cost of responding to the questionnaire, maximise the rewards of responding and establish trust with respondents (Carter et al., 2000). There is a relatively large literature concerning response rates in postal surveys (see Boynton, 2004). Factors which increase response rates include making the questionnaire clear and concise, interesting to respondents, simple to complete and sensitively handling potentially embarrassing questions. Showing appreciation for the respondents' time and effort by for example, having a hand-written signature on the questionnaire and a statement of thanks also increase responses. The steps taken to increase the response rate to the questionnaires used for this thesis are outlined in Table 15).

4.1.4. Questionnaire administration

Questionnaires were administered to Year 1 and Year 3 students at the start of the academic year in 2005 and 2006, when all the students were together for an introductory session. Year 4 students were administered the questionnaire during three lectures in the first term of 2006. KW ensured that there was a questionnaire on each seat before the students entered the lecture theatre in order that students would all receive a questionnaire and to minimise time spent during the lecture distributing questionnaires. In Years 1 and 3, KW was introduced by senior faculty members; in Year 4 she was introduced by the lecturers. She went on to introduce herself as a PhD student, explain the purpose and confidential nature of the research, and explain how to answer the questionnaire. Participants spent about 15 minutes completing the questionnaires which were collected at the end of the lecture by KW.

Table 15: Rationale for the steps taken to increase the response rate to the questionnaires

Steps taken to increase response rates	Rationale (after Carter et al., 2000)	
Questionnaire given in the middle of a lecture	Minimises the effort involved for students to respond as they are already seated and have to stay seated after completion of the questionnaire	Minimises cost of responding
Questionnaires printed on A3 paper and saddle-stitched to create a booklet of 4 double-sided pages.	Increases ease of responding; shows time and care taken in presentation of the questionnaire; increases professional look of questionnaire	Minimises cost of responding; Maximises rewards of responding; Establishes trust
Introduction by senior member of staff	Increases importance and authority of questionnaire	Establishes trust
KW gave introduction about the questionnaire including how the findings will be used to improve the learning experience for future students	Appeals to altruism/social utility	Maximises rewards of responding
KW explained how to answer the questionnaire	Making the questionnaire clear, concise; Giving an expression of positive regard for respondents as individuals	Minimises cost of responding; maximises rewards of responding
Page 2 letter from Professor Jane Dacre on UCL headed paper	Increases importance and authority of questionnaire	Establishes trust
Hand numbering of questionnaires	Giving an expression of positive regard for respondents as individuals	Maximises rewards of responding
Confidentiality assured verbally and on the questionnaire	Giving an expression of positive regard for respondents as individuals	Establishes trust
Respondents thanked on the questionnaire	Giving an expression of appreciation	Maximises rewards of responding
Counselling service address and contact number given	Giving an expression of positive regard for respondents as individuals; reduction of feelings of anxiety	Maximises rewards of responding; minimises cost of responding
Questions piloted for clarity and sensitivity	Making the questionnaire clear, concise and sensitive; and reducing feelings of anxiety	Minimises cost of responding

4.1.5. Data entry

The data were anonymised by removing the name section of the questionnaires and then entered into Microsoft Excel spreadsheets by KW and Matthew Toal (a 4th Year

UCL medical student). KW cleaned the data by running frequencies on each response to check for anomalous entries.

4.1.6. Data analysis

The data were analysed using the statistical methods outlined in Chapter 2. In addition, data reduction techniques were used. This is because the questionnaires contained between 27 and 30 questions each, and many question had multiple items. This meant there were a great number of relationships between variables to be analysed, which increased the possibility of Type I errors and the potential for collinearity. The data were reduced in two ways. Firstly, items in the GHQ-12, the HADS and the five factor personality questionnaire were designed to be summed, thus creating one overall score for the GHQ, an anxiety and a depression score for the HADS, and a score on each of the five factors for personality. Secondly, factor analysis was used on “motivations for becoming a doctor” scale, in which respondents rated the importance of 16 items to their decision to become a doctor on a 4 point scale (not important; slightly important; fairly important; very important). As well as testing individual relationships between particular variables, path models were created to examine the relationships between large numbers of questionnaire variables, assessment data, ethnic group and sex, and the results presented in path diagrams.

4.1.6.1. Predictor variables and questionnaire scoring

In order to provide sufficient numbers for a powerful analysis, it was necessary to combine data from the 2005 and 2006 cohorts within Year 1 and within Year 3. The 2005 questionnaire was revised in light of preliminary analyses of the data. This meant that the 2005 and 2006 questionnaires in both Year 1 and Year 3 contained slightly different questions. Only questionnaire variables included in both the 2005 and the 2006 questionnaires were included in the primary analyses. Secondary analyses were performed of the items which were included in either the 2005 version or the 2006 version only. The socio-economic status variable differed slightly in the 2005 and 2006 questionnaires and thus the results for this variable are presented separately for each 2005 and 2006 cohort.

The majority of the categorical questions were scored in a straightforward way. For the previously validated questionnaire items, scoring was done in accordance with instructions in the papers relating to the development of those questionnaires (see Table 16). There were a few exceptions: the type of secondary school attended question contained 6 categories, which were collapsed into ‘fee-paying’ (private, public and private grammar schools) and ‘non-fee paying’ (comprehensive, state grammar, and sixth form college). The questions about father and mother’s education were combined into a single variable: ‘parent with degree’, which had two categories: ‘no parents with a degree’ and ‘at least one parent with a degree’. The same was done for the questions about father and mother being doctors – they were collapsed into a single variable: ‘doctor parent’ which had two categories: ‘no doctor parents’ and ‘at least one doctor parent’.

The personality, study habits and stress questions provided continuous data. Scores on the five personality factors (Neuroticism, Extraversion, Openness to experience, Agreeableness, and Conscientiousness) were calculated by summing the scores on the three items which were designed to measure each factor (i.e. there were three items designed to measure Extraversion; three items designed to measure Neuroticism, etc). This gave a possible range of 5-15 on each factor. The three study process factors (surface, deep and strategic) were creating by summing scores on the appropriate scale items (e.g. McManus, Keeling, Paice, 2004). The possible range of scores was 6-30. Stress as measured using the GHQ-12 was scored using the Likert method, giving a possible range of 0-36; and the binary method, giving a possible range of 0-12 and where a score above 4 is a probable case (e.g. Guthrie, black, Bagalkote et al., 1998; Moffat, McConnachie, Ross et al., 2004). Negative life events were measured using the Modified List of Threatening Experiences (Brugha et al., 1985; Andrews & Wilding, 2004). Where students reported more than one instance of an event occurring in the previous three years, the newest incidence was counted. Experience was categorised into ‘occurred in the previous three years’ and ‘occurred over three years previously or not at all’.

Table 16: The demographic and psychological dependent variables, categorical or continuous, which were included in the primary analyses, and the method for scoring each variable. *stress was measuring using the GHQ-12 which can be scored as a continuous or a categorical variable. See text for a description of the scoring of the continuous stress variable

	Questionnaire variables	Categorical/ continuous	Scoring method
Demographic variables	ethnic group	categorical	1=white; 2=ethnic minority
	sex	categorical	1=male; 2=female
	date of birth	categorical	days, months and years
	father's socio-economic group	categorical	1, 2, 3, 4, 5 & 6 in 2005; 1, 2, 3, 4, 5 in 2006
	type of secondary school	categorical	1=non-fee paying; 2=fee-paying
	UK vs non-UK secondary schooling	categorical	1=other (non-UK); 2=UK
	graduate status	categorical	1=non-grad; 2=grad
	whether living at or away from home	categorical	1=away; 2=home
	first language	categorical	1=not English 2=English
	parents' first language	categorical	1=not English 2=English
	parents' education	categorical	1=no degree; 2= at least one parent with degree
	doctor parents	categorical	1=no doctor; 2=at least one doctor
Psychological variables	personality (Neuroticism, Extraversion, Openness, Agreeableness, Conscientiousness)	continuous	5-15 on each factor
	study habits	continuous	6-30 on each factor
	stress*	continuous	0-36 in total
		categorical	1=no case; 2=probable case
	negative life events	categorical	1=last 3 months; 2=last year; 3=last three years; 4= >3 years ago or never
	age first thought of becoming a doctor	continuous	age in years
	age decided to definitely become a doctor	continuous	age in years
	desire to practice medicine on qualification	categorical	1=no; 2=possibly; 3=probably; 4=definitely
	how often think of leaving medical school	categorical	1=daily; 2=weekly; 3=monthly; 4=once or twice; 5=never
	motivation for wanting to be a doctor	continuous	Items factor-analysed to produce scorings

4.1.6.2. Outcome measures

The main outcome measures were the overall end-of-year examination results (details of the assessments in Chapter 2). In the multivariate analyses, the three Year 3 examinations (written, OSCE and firm grade) were taken as separate outcome measures. Only first attempts at examinations were analysed. Raw examination scores within years were on different scales and were transformed into *z*-scores before being combined. As there was only one cohort of Year 4 students, and their scores were approximately normally distributed, it was not necessary to transform Year 4 scores.

Results

The results section is set out in the following order:

- Questionnaire response rates
- Ethnic differences in end-of-year examination results
- Descriptive data for the questionnaire variables
- Univariate relationships between ethnic group, questionnaire variables and examination scores
- Analysis of longitudinal data
- Multivariate path analysis results

4.1.7. Questionnaire responses

4.1.7.1. Response rates

Response rates in Year 1 (mean=86.5%) and Year 3 (mean=82.7%) were high. The Year 4 response rate was lower (58.4%) and there were differences between the three different modules: for Child Health it was 65.7% and for Women's Health it was 65.4%, both of which were administered in introductory lectures in September. But in Clinical Neurosciences module, where the questionnaire was administered in November, it was only 46.1%.

4.1.7.2. Respondents vs. non-respondents

In Year 1 there were no significant differences between respondents and non-respondents. In Year 3 respondents were slightly more likely to be white and female, and had higher end of year exam marks. In Year 4 respondents were more likely to be female and had higher end of year exam marks – see Table 17

Of the 406 students in Year 4 in 2006, 301 had been in Year 3 in 2005. Of those 301, 176 (58.5%) responded to the questionnaire in *both* Year 3 *and* Year 4 thus providing longitudinal data. 37% (n=65/176) of both time respondents were male and 51% (n=89/176) were white.

Table 17: **Differences between respondents and non-respondents in Years 1, 3 and 4 in 2005 and 2006. Scores are *z*-scores. Year 4 students given questionnaire in 2006 only.*sig difference at p<0.05 level; **sig. difference at p<0.001 level. Year 4 scores presented as *z*-scores for ease of comparison.**

Year	Cohort	Response rate (%)	Respondents			Non-respondents		
			male (%)	white (%)	Mean end of year mark	male (%)	white (%)	Mean end of year mark
1	2005	306/362 (84.5)	147/306 (48.0)	143/306 (46.7)	-0.01	29/56 (51.8)	24/56 (42.9)	0.06
	2006	298/337 (88.4)	152/298 (51.0)	154/298 (51.7)	-0.03	22/39 (56.4)	22/39 (56.4)	0.20
3	2005	333/389 (85.6)	137/333 (41.1)	157/331 (47.4)	0.06	25/54 (46.3)	13/47* (27.7)	-0.42*
	2006	274/352 (77.8)	90/274 (33.9)	142/274 (52.9)	0.10	40/79* (50.6)	24/73 * (32.9)	-0.37**
4	2006	237/406 (58.4)	90/236 (38.1)	113/236 (47.5)	0.10	90/168* (53.6)	73/162 (45.1)	-0.16*

4.1.8. Ethnic differences in examination results

White students achieved significantly higher examination scores than ethnic minority students in Year 1, Year 3 and Year 4 cohorts[11]. See Table 18

Table 18: Ethnic and sex differences in Year 1, Year 3 and Year 4 end-of-year examination scores. 2005 and 2006 scores for Year 1 and Year 3 scores are combined. Year 4 scores are 2006 only. Cohen's *d* provided as a measure of effect size and p values indicate statistical significance

Year	n	white mean score (S.D.)	ethnic minority mean score (S.D.)	p value	*d*	female mean score (S.D.)	male mean score (S.D.)	p value	*d*
1	675	0.13 (0.93)	-0.13 (1.06)	<0.001	-0.26	-0.06 (1.00)	0.06 (1.00)	ns	0.11
3	703	0.27 (0.94)	-0.22 (0.99)	<0.001	-0.50	0.08 (0.88)	-0.13 (1.15)	0.005	-0.21
4	368	0.29 (0.93)	-0.24 (1.01)	<0.001	-0.54	0.17 (0.89)	-0.22 (1.09)	<0.001	-0.39

[11] The effect sizes for Years 1 and 3 reported in Chapter 3 are slightly different from those calculated in Chapter 3 as they are for two cohorts only. Not all students eligible to complete the questionnaire had complete end of year examination data.

4.1.9. Descriptive data, and univariate relationships between ethnic group, questionnaire variables and examination scores

The descriptive data for each of the questionnaire variables are presented. Univariate statistical relationships between the questionnaire variables, ethnic group, and examination scores are also given. The results are summarised in tabular form at the end of the section (Table 22 and Table 23) and are followed by a summary of the Year 4 results.

4.1.9.1. Age

The mean age of students was 19 (range 17-48) at the start of Year 1, and 22 (range 19-35) at the start of Year 3. In both Year 1 [$t(709)=-7.34$; $p<0.001$] and Year 3 [$t(675)=-4.6$; $p<0.001$] ethnic minority students were on average, one year younger than white students. Age did not correlate significantly with performance in end-of-year examinations in Year 1 or 3.

4.1.9.2. Living at home

The majority of students lived away from home in all years. There was a non-significant trend In Year 1 for ethnic minority students to be more likely than white students to live at home (21.8% vs 27.4%)**.** This trend was statistically significant in Year 3 [39.4% vs 10.7% χ^2 (1)=50.4; $p<0.001$]. Students who lived at home at the start of Year 3 [$t(592)=2.6$; $p=0.011$], but not at the start of Year 1 achieved lower scores in their end of year examinations.

4.1.9.3. Prior education

Just over half of white and ethnic minority Year 1 (312/590) and Year 3 (326/5900 students had attended a fee-paying school at some point during their secondary education. Over 90% of Year 1 (540/583) and Year 3 (529/587) students were schooled in the UK. There were no ethnic differences on these variables and they were not univariate significantly associated with examination results in Years 1 or 3.

Twelve percent of students in Year 1 (81/597) and Year 3 (82/665) had at least one higher degree prior to starting their medical degree, and this proportion was significantly lower in ethnic minority students in Year 1 (8% vs 19%; χ^2 (1)=14.6; $p<.001$) and Year 3 (7% vs 18%; χ^2 (1)=19.4; $p<.001$). Graduate students did better in Year 3 [$t(669)=-2.3$; $p=0.024$], but not Year 1.

In Year 3, 15.4% of students had transferred from Oxford or Cambridge Universities to complete their clinical training at UCL, and they were significantly more likely to be white (19% vs 11.7%; χ^2 (1)=6.13; p=0.017). See Figure 22. Students who had completed their preclinical training at Oxford or Cambridge Universities (Oxbridge) achieved higher scores in Year 3 [t(175)=6.46; p<0.001].

Approximately two thirds of both white (209/319) and ethnic minority (209/346) students had an intercalated BSc prior to starting Year 3. There were no ethnic differences on this variable in Year 3. Those who had completed an iBSc [t(669)=-2.6; p=0.011] achieved higher Year 3 scores, although it should be noted that this last variable is confounded with the Oxbridge variable, as all Oxbridge candidates completed a degree before arriving at UCL.

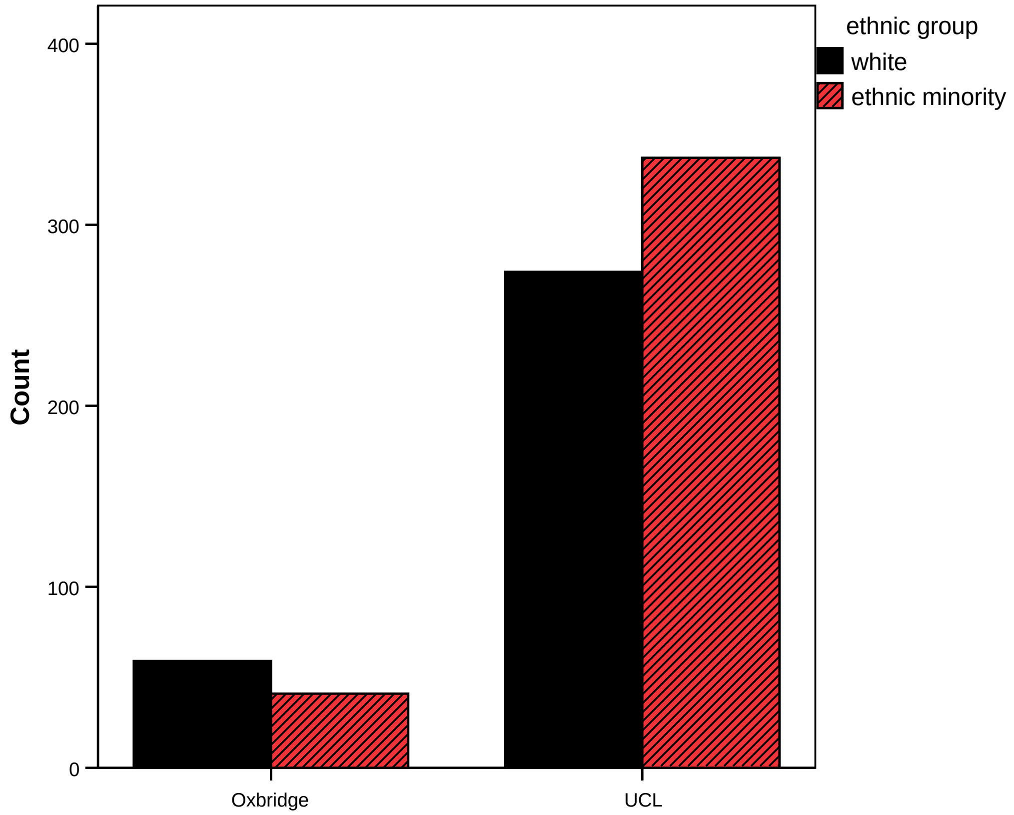


Figure 22: Oxbridge transfer students were significantly more likely to be white compared to UCL students (p=0.017)

4.1.9.4. Language

Twelve percent of Year 1 students (73/597) and 18% of Year 3 students (108/600) reported that English was not their first language. Although 80% (248/303) of Year 1 and three quarters of Year 3 (219/298) ethnic minority students were native English speakers, this was still a significantly lower proportion compared to the 94% of Year 1 [χ^2 (1)=20.1; p<.001] and 91% of Year 3 [χ^2 (1)=30.8; p<.001] white native Anglophones. Students who did not speak English as a first language did statistically significantly worse in Year 3 [$t($593)=-3.0; p=0.003] but not in Year 1 examinations.

4.1.9.5. Socio-economic group (SEG)

In the 2006 group, ethnic minority Year 3 students were more likely to have a father in socio-economic group 5 and less likely to have a father in socioeconomic groups 1 and 3, compared to white students [χ^2(4)=10.8; p=0.029]. In the 2005 Year 3 cohort, and in both Year 1 cohorts, white and ethnic minority students did not differ statistically in terms of their father's SEG. Father's SEG was not statistically correlated with end-of-year examination results in any Year 1 or Year 3 cohort.

4.1.9.6. Parental factors

Ethnic minority students in Year 1 [36.3% vs 91.8%; χ^2 (1)=197.4; p<0.001] and Year 3 [29% vs 89.3%; χ^2 (1)=223.0; p<0.001] were approximately three times less likely than white students to have parents who were native English speakers (See Figure 23). Students who did not have at least one native English speaking parent did worse in Year 3 [$t($590)=-5.2;p<0.001] (see Figure 24) but not in Year 1.

Three quarters of Year 1 (470/594) and Year 3 (441/594) students had at least one parent with an undergraduate degree, and a third of Year 1 (132/593) and Year 3 (147/598) students had at least one parent who was a medical doctor– a proportion which was higher in ethnic minority students in both years [Year 1: 15.4% vs 22.3% χ2 (1)=15.6; p<0.001; Year 3: χ2 (1)=12.3; p<0.001]. Whether students had a doctor parent, or one who had been to university was not associated with examination performance in either Year 1 or Year 3.

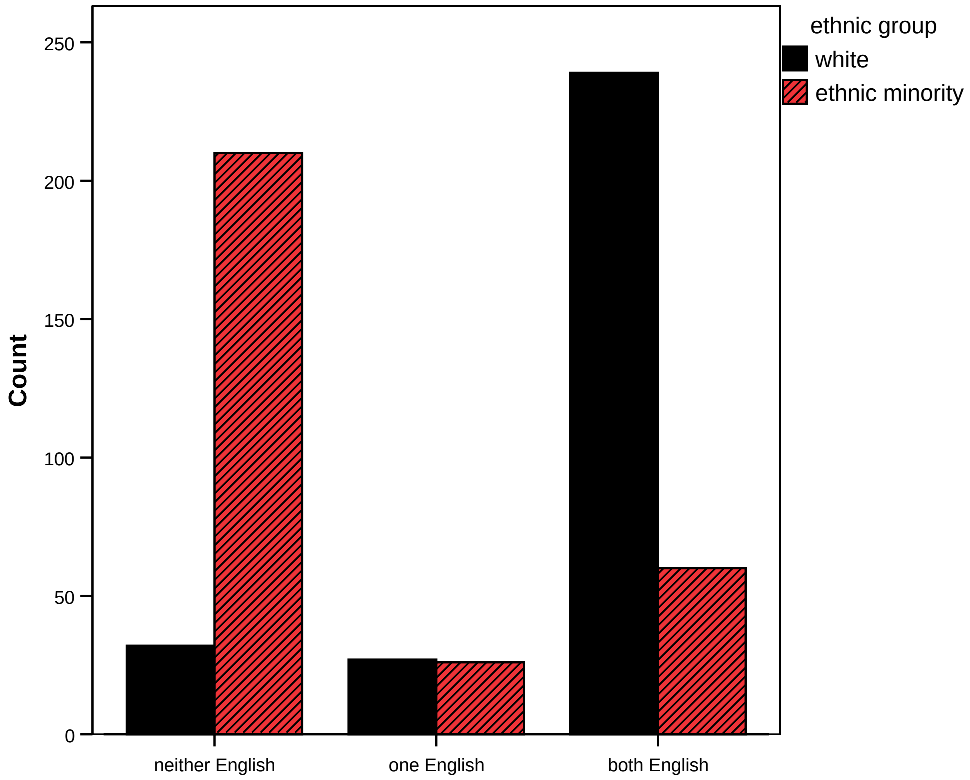


Figure 23: In Year 3, white students were significantly more likely to have two parents with English as a first language, and ethnic minority students were significantly more likely to have two parents who do not speak English as a first language. They were equally likely to have only one parent who spoke English as a first language.(p<0.001)

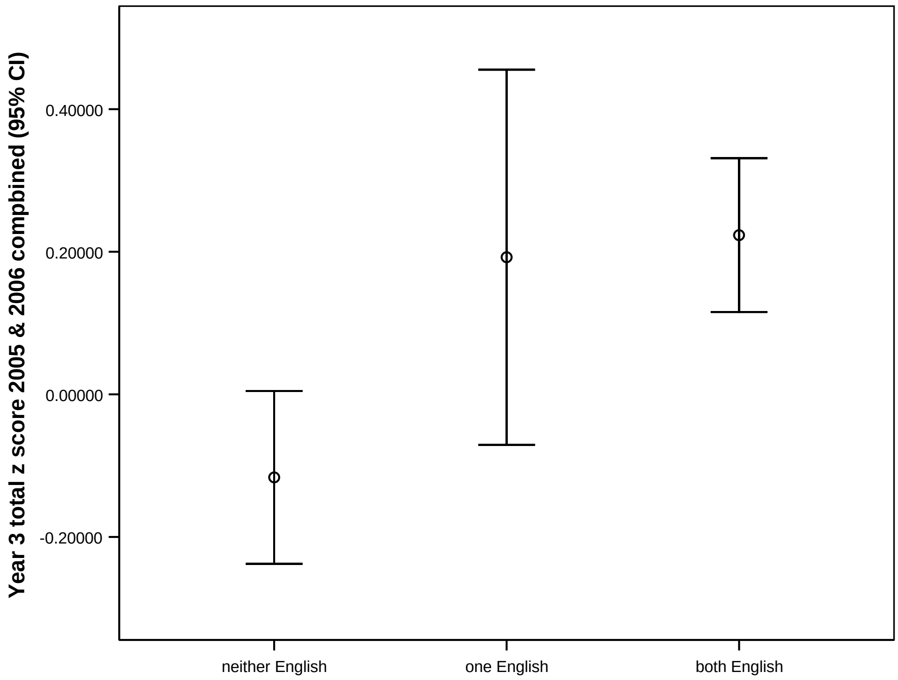


Figure 24: Students with parents who both speak English as a first language did significantly better in overall Year 3 score than those with no parents who speak English as a first language (error bars with 95% confidence intervals)

4.1.9.7. Personality

Means and standard deviations for each of the five personality factors is shown in Table 19 . The Year 1 and Year 3 scores on each factor were very similar. In Year 1, all factors were approximately normally distributed except Agreeableness which was negatively skewed. In Year 3, Agreeableness, Conscientiousness, Openness and Extraversion were slightly negatively skewed and Neuroticism was approximately normally distributed.

Table 19: Means and standard deviations for the five personality factors in Years 1 and 3

	N	Year 1 Mean (S.D)	Year 3 Mean (S.D)
Neuroticism	594	7.67 (2.2)	7.93 (2.3)
Extraversion	596	11.38 (1.7)	11.31 (1.9)
Openness	596	10.70 (2.3)	10.84 (2.3)
Agreeableness	587	13.16 (1.4)	13.15 (1.6)
Conscientiousness	595	11.49 (1.9)	11.26 (2.1)

In Year 3 ethnic minority students scored slightly lower on Openness [$t(591)=2.66$; p=0.008] and were also slightly lower on Conscientiousness [$t(590)=2.30$; p=0.022]. In Year 1 there were no significant ethnic differences on the personality factors.

High Conscientiousness was significantly related to performing well in Year 1 (r=0.13) and Year 3 (r=0.25) examinations. No other personality factors were univariately associated with performance in either years.

4.1.9.8. Study habits

Means and standard deviations for each of the three study habit factors are shown in Table 20 . The surface and deep scores are very similar in Year 1 and Year 3, but Year 1 students had higher scores on the strategic study habits factor. In Year 1 and Year 3 the study habits factors were all approximately normally distributed although the surface study style factors were slightly positively skewed in both years.

Table 20: Means and standard deviations for surface, deep and strategic study habits in Years 1 and 3

	N	Year 1 Mean (S.D)	Year 3 Mean (S.D)
Surface	586	15.16 (3.4)	14.69 (3.7)
Deep	580	19.78 (3.9)	19.29 (3.9)
Strategic	587	20.28 (4.3)	17.95 (4.8)

In Year 1 [*t(*586)=-2.5; p=0.014] and Year 3 [*t(*581)=-3.14; p=0.002] ethnic minority students scored higher on the surface study habit factor. In Year 3 ethnic minority students also scores lower on the deep study habit factor [*t(*575)=2.63; p=0.009]. There were no ethnic differences in either year on the strategic study habit factor (see Figure 25).

Deep study habits (r=0.15) were related to good performance in Year 3 examinations as were strategic study habits (r=0.25). They were not related to performance in Year 1 examinations. Surface study habits were not significantly related to performance in any year.

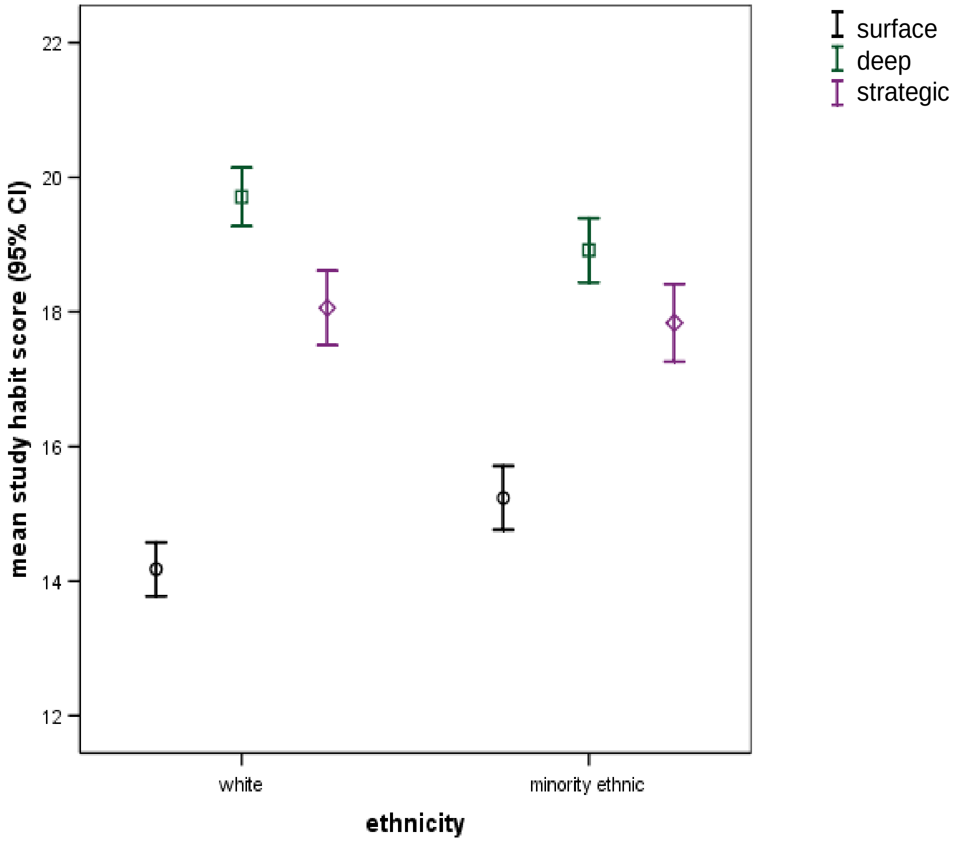


Figure 25: ethnic minority students scored significantly higher on surface (circles) and significantly lower on deep (squares) study habits in Year 3 (error bars with 95% confidence intervals)

4.1.9.9. Negative life events

Negative life event experience (relationship breakdown; having something valuable stolen; personal illness; illness of a close other; death of a first degree relative; death of a close friend or non-first degree relative) was not statistically related to Year 1 or 3 examination results.

4.1.9.9.1. Major relationship difficulties

Fewer Year 1 students had experienced serious relationship difficulties in the three years prior to their completing of the questionnaire, compared to Year 3 students. However in both Year 1 [21.2% vs 14.5%; χ^2 (1)=4.4; p=0.023] and Year 3 [47.3% vs 33.2%; χ^2 (2)=7.4; p=0.025], ethnic minority students were less likely to have had this experience (see Figure 26). There was no significant relationship between this experience and examination results in Year 1 or Year 3.

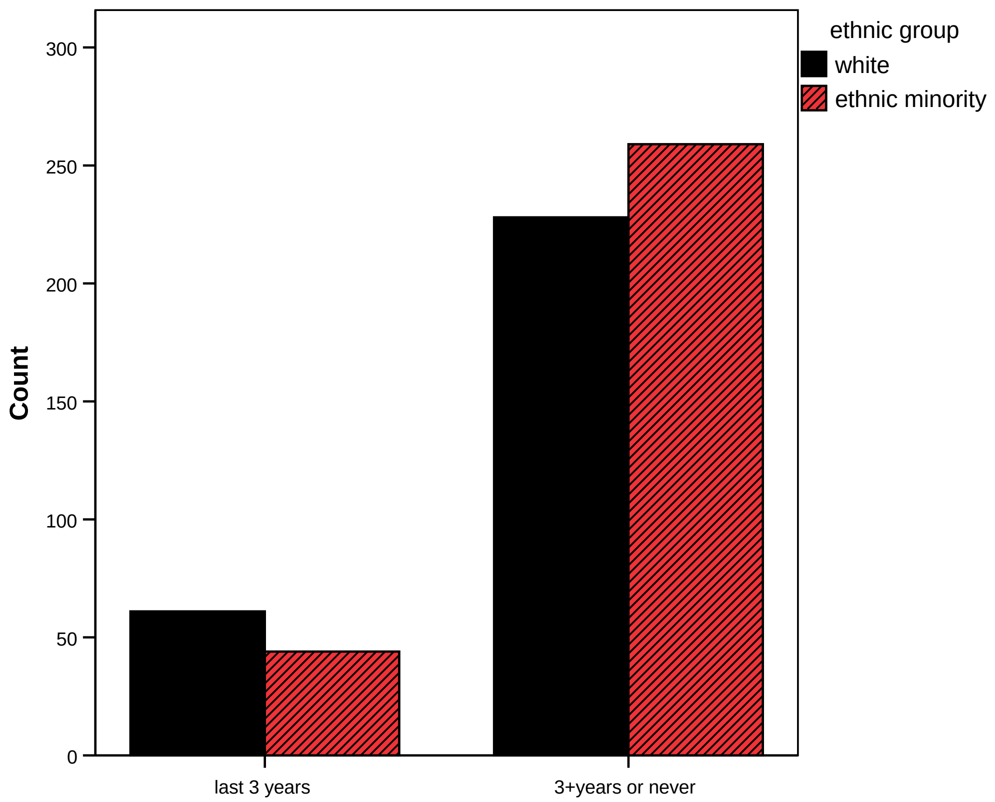


Figure 26: ethnic minority Year 1 students were less likely than their white colleagues to report relationship difficulties in the three years prior to starting medical school (p=0.023)

4.1.9.9.2. Serious injury illness or assault

In Year 1, 36.5% students reported having experienced a serious illness, injury or assault in the previous 3 years. The incidence was much lower in Year 3 (13%), but in

Year 3 white students reported experiencing this more often than ethnic minority students [16.7% vs 9.2%; χ^2 (2)=9.0; p=0.011]. There was no significant relationship between this experience and examination results in Year 1 or Year 3.

4.1.9.9.3. Serious illness or death in close relative or friend; Death of a first degree relative

The same proportion of Year 1 and Year 3 students (41% percent) had a close relative or friend with a serious illness. In Year 1, nearly half (265/591) had experienced the death of a close friend or relative, whereas the proportion was slightly lower in Year 3 (36.1%: 212/587). More of Year 3 students (20.5%; 121/591) had experienced the death of a first degree relative compared to Year 1 students. There were no ethnic differences on those variables in any years. In Year 3, there was a trend (p=0.05) for those who had experienced the death of a close friend or relative in the previous year to score lower than those who had experienced such an event 1-3 years previously and for them to achieve lower scores than those who had experienced such an event over 3 years previously or never (Figure 27).

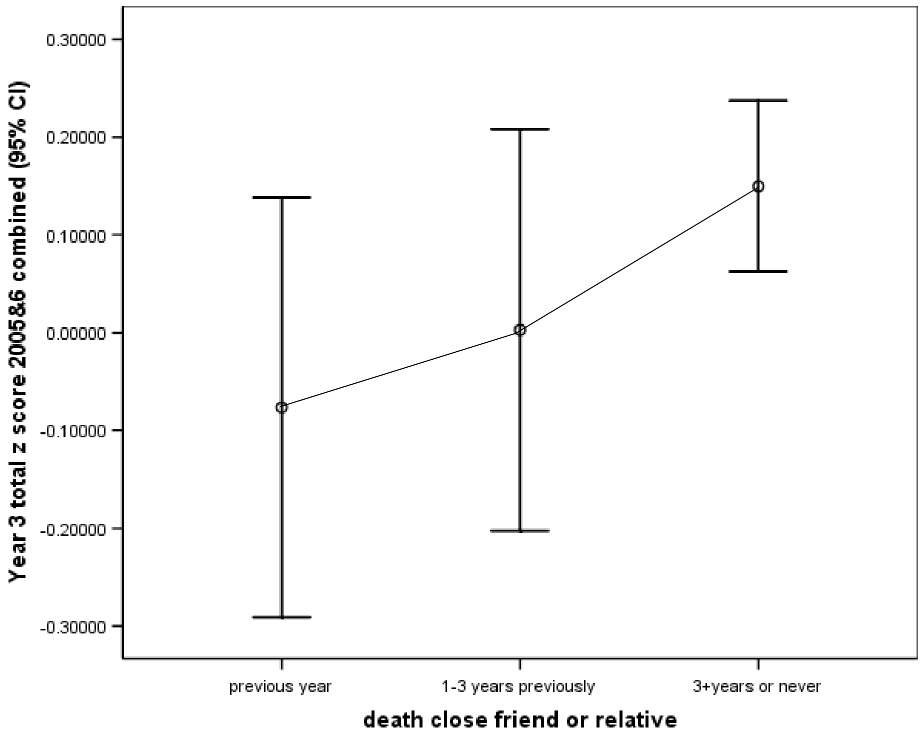


Figure 27: Trend for Year 3 students who had experienced the death of a close friend or relative in the previous year to achieve lower scores than those who had experienced such an event 1-3 years previously and those who had experienced such an event over 3 years previously or never (error bars with 95% confidence intervals; p=0.05)

4.1.9.10. Stress

The mean GHQ scores for Year 1 (10.3; S.D.=5.0) and Year 3 (10.5 ; S.D.=4.6) were very similar. The distributions in all years were positively skewed. There were no ethnic differences on this variable, and it was not related to exam performance in Years 1 or 3 when scored using the Likert or binary methods.

4.1.9.11. Becoming a doctor

In both Year 1 and Year 3, the mean age at which students first thought of becoming a doctor was 13 and the mean age at which they definitely decided to become a doctor was 16. Ethnic minority Year 3 students reported first thinking of [z=2.1; p=0.038], and deciding to become a doctor [z=2.4; p=0.019] approximately one year earlier than white students; but the same was not true for Year 1 students.

Unsurprisingly, 99% of Year 1 students had some desire (possibly, probably or definitely) to practice as a doctor after leaving medical school – only 2/594 definitely did not want to. In Year 3 the vast majority of students (462/594) had some desire (possibly, probably or definitely) to practice as a doctor, and only 1% definitely did not want to. In Year 3 only there were small yet significant ethnic differences on this variable: ethnic minority students were more likely to answer that they "did not" or only "possibly" wanted to practice as a doctor, and were less likely to answer that they "probably" or "definitely did" want to practice as a doctor [χ^2 (1)=8; p=0.004] – see Figure 28. Despite these differences, in Year 3, white and ethnic minority students were equally motivated to complete the course, with nearly two thirds of both stating that they had never considered leaving medical school (364/586) and nearly all of the remainder (174/586) saying they had only considered leaving medical school "once or twice", making this variable also highly negatively skewed. There were no significant parametric or nonparametric relationships between examination results in Years 1 or 3, and any of the following variables: age students first thought of, or decided to become a doctor; desire to practice as a doctor; how often considered leaving medical school.

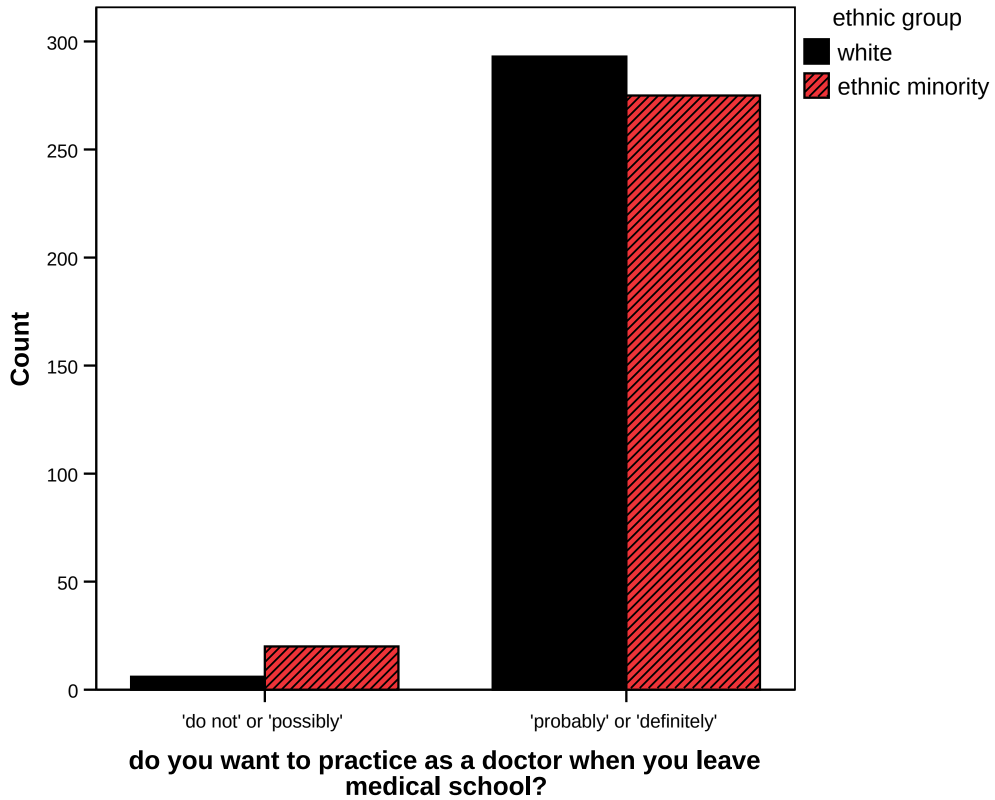


Figure 28: ethnic minority Year 3 students were more likely to say that they 'did not' or only 'possibly' want to practice as a doctor, and were less likely to say they 'probably' or definitely' did, compared to white students (p=0.004)

4.1.9.12. Factor analysis of items relating to motivations for becoming a doctor

The question about students' motivations for wanting to become a doctor contained 16 items (see questionnaires in the Appendix). The items were designed to measure an unspecified number of underlying motivational factors and were therefore subjected to a principle components analysis with a Varimax rotation.

In the Year 3 data, the scree plot suggested three or four factors (see Figure 29) and Kaiser's criterion suggested five factors. Items with loadings above 0.3 were included in the interpretation of a factor. Three, four and five factor solutions were scrutinised and the four factor solution appeared to provide the most logical and comprehensive summary of the data, explaining 53.4% of the variance in the overall score on the motivation question (see Table 21).

1. Factor one: *Financial rewards.* This factor emphasises the importance of financial rewards in making the choice to become a doctor. Job stability and security are also

important aspects of this factor, which can in turn help ensure financial gain. The item "achieving high social status" is also important, underlining the somewhat extrinsic nature of this motivational factor.

2. Factor two: *Helping others*. This factor represents the altruistic desire to become a doctor in order to help other people, not only on a one-to-one personal basis ('working with people rather than things'), but also more widely to benefit society as a whole ('helping towards improving society' and 'improving medical knowledge through research').

3. Factor three: *Free-thinking.* The positive loadings for this factor show the importance of having a career which affords the freedom to be original and creative, perhaps by thinking of novel solutions to complex problems ('improving medical knowledge through research'). The factor also has an element of not wanting to be constrained by conformity ('freedom from supervision at work' 'flexible working patters'). This factor could also have been called *Creativity.*

4. Factor four: *Responsibility*. The positive loadings for this factor stress the desire to be the most important person in high stakes situations ('desire to work under pressure'; 'ability to exercise leadership'; 'high social status'). It is about wanting to be a leader, the person others look to for inspiration, and the person ultimately responsible in high pressure environments. It seems that the item 'freedom from supervision at work' relates to being the person ultimately in charge, who is the supervisor rather than the supervisee. This is slightly different from the interpretation of this item on the *Creativity* factor, where it seems to relate to the creative freedom to express one's own individual ideas and thoughts regardless of what others are doing. All of the factors were approximately normally distributed, except for *Helping Others*, which was negatively skewed, indicating that many students were motivated to become doctors for this reason.

Similarly with the Year 1 data, a principle components analysis with a Varimax rotation was performed and four factors were extracted, which were very similar to the Year 3 factors, and included a *Financial Rewards* factor and a *Helping Others* factor. The *Free-thinking* factor was slightly different in Year 1, having more of an emphasis on freedom to work autonomously, flexibly and at one's own pace (the 'desire to work under pressure' item loaded negatively onto this factor). The emphasis of the *Responsibility* factor was also slightly different, emphasising the creative innovative aspect of having responsibility in high stakes situations rather than the status aspect of it. All the factors were approximately normally distributed, except *Helping Others*, which – as in the Year 3 data – was negatively skewed.

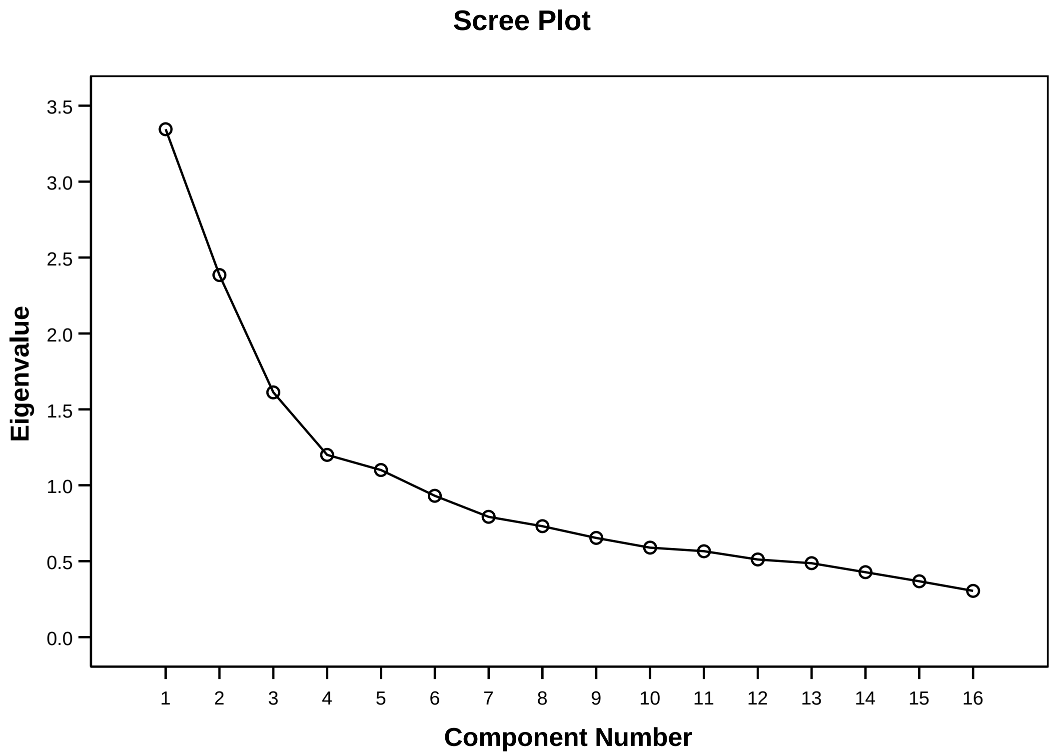


Figure 29: Scree plot showing the number of factors extracted for the Year 3 data

In Year 3, there were no significant ethnic differences on these factors. In Year 1 however, ethnic minority students were more likely to be motivated by the *Free-thinking* aspect of a medical career [t(566)=-2.7; p=0.006], but there were no ethnic differences on the other factors.

There were sex differences in both Year 1 and Year 3, males being significantly lower on *Helping Others* [Year 1: *t(*558)=-5.9; p<0.001; Year 3: t(566)=-5.5; p<0.001] and higher on *Responsibility* [Year 1: *t(*558)=3.9; p<.001; Year 3: t(566)=4.2; p<.001]. In Year 3 there was a trend for females to be motivated by *Free-thinking* [t(566)=-1.9;

p=0.06]. There were no sex differences on the *Financial Rewards* factor in Year 1 or Year 3.

Different motivation factors were associated with performance in the different years. In Year 1, *Responsibility* was very weakly negatively correlated with results ($r=-0.09$; $p<0.05$); in Year 3, *Financial Rewards* was weakly positively correlated with results ($r=0.01$; $p<0.05$).

Table 21: Rotated Component Matrix for the principal components analysis showing the item loadings for each of the four factors extracted for Years 3, 1 and 4

	Financial rewards			**Helping others**			**Free-thinking**			**Responsibility**		
	Year 1	Year 3	Year 4	Year 1	Year 3	Year 4	Year 1	Year 3	Year 4	Year 1	Year 3	Year 4
Ability to exercise leadership										.636	.634	.746
Opportunity to be original and creative								.685	.671	.737		
Freedom from supervision at work								.414	.666	.754	.335	
Achieving high social status	.660	.589	.778								.489	
Desire to work under pressure							-.394			.590	.800	.725
Being helpful to others and useful to society				.683	.787	.789						
Advancing medical knowledge via research				.382	.327		.384	.317	.354			
Financial rewards	.815	.780	.809									
Working with people rather than things				.674	.684	.706						
Living and working in the world of ideas				.555				.667	.649			
Wanting an economically secure occupation	.778	.837	.768									
Wishing to express own values and interests				.487				.687	.732	.301		
Involvement in a really challenging occupation				.646	.457	.486		.348			.336	.577
Helping towards improving society				.679	.779	.795						
A job with steady progress and promotion	.635	.754	.544			.475	.337					
Flexible working patterns		.499	.328				.707	.362	.458			-.344
Percentage of variance explained	14.5	16.4	14.8	16.6	14.1	15.9	8.0	12.4	14.7	13.6	10.4	10.5

4.1.10. Summary of Year 1 and Year 3 univariate results

In Year 3, white students were more likely to be living away from home; were more likely to be graduates; were more likely to have transferred from Oxbridge; scored higher on the personality factor Conscientiousness; scored higher on the deep study styles factor, were more likely to speak English as a first language; and were more likely to have at least one parent who spoke English as a first language – all factors which were themselves univariately positively correlated with examination results.

White students were also older at the start of Year 3; older when they first thought of and decided to become a doctor; scored higher on the personality factor Openness to Experience; were less likely to have a parent who is a doctor; were less likely to say that they only probably or definitely did not want to practice as a doctor when they qualified; and were more likely to have experienced a major relationship breakdown or a serious injury, illness or assault in the previous three years - none of those factors were however themselves univariately associated with performance in Year 3 examinations.

In Year 1 white students were more likely to be older, graduates, speak English as a first language, have at least one parent who has English as a first language, and have experienced a major relationship breakdown in the previous three years. They were less likely to have at least one parent who is a doctor and were less likely to be motivated to become a doctor by the motivation factor *Free thinking*. The only factors univariately associated with Year 1 examination scores were ethnic group, the personality factor Conscientiousness and the motivation factor *Responsibility*.

See Table 22 and Table 23 for a summary of the ethnic differences on demographic and psychological questionnaire variables.

Table 22: Ethnic differences on demographic and factual questionnaire variables in Year 1 and Year 3. Non-significant p values represented as 'ns'. Year 1 students cannot have intercalated degrees or be Oxbridge transfers

	Year	Direction of ethnic difference	Ethnic difference (p value)
Age	1	W>EM	<0.001
	3	W> EM	<0.001
Living at home	1	n/a	ns
	3	EM>W	<0.001
Oxbridge transfer	1	n/a	n/a
	3	W> EM	0.017
Higher degree prior to entry (graduate)	1	W> EM	<0.001
	3	W> EM	<0.001
iBSc	1	n/a	n/a
	3	n/a	ns
Fee-paying school	1	n/a	ns
	3	n/a	ns
English as a first language	1	W> EM	<0.001
	3	W> EM	<0.001
One parent with English as a first language	1	W> EM	<0.001
	3	W> EM	<0.001
One parent with higher degree	1	n/a	ns
	3	n/a	ns
One doctor parent	1	EM >W	<0.001
	3	EM >W	<0.001
Age first thought of becoming a doctor	1	n/a	ns
	3	W> EM	0.038
Age decided to become a doctor	1	n/a	ns
	3	W> EM	0.019

Table 23: Ethnic differences on psychological questionnaire variables in Years 1 and 3. Non-significant differences are indicated by ‘ns’

		Year	Direction of ethnic difference	Ethnic difference (p value)
Personality	Neuroticism	1	n/a	ns
		3	n/a	ns
	Extraversion	1	n/a	ns
		3	n/a	ns
	Openness	1	n/a	ns
		3	W>EM	0.008
	Agreeableness	1	n/a	ns
		3	n/a	ns
	Conscientiousness	1	n/a	ns
		3	W>EM	0.022
Study habits	Surface	1	EM>W	0.014
		3	EM>W	0.002
	Strategic	1	n/a	ns
		3	n/a	ns
	Deep	1	n/a	ns
		3	W> EM	0.009
Negative life events	Major relationship breakdown	1	W> EM	0.025
		3	W> EM	0.025
	Serious injury illness or assault	1	n/a	ns
		3	W> EM	0.011
	Close relative or friend with a serious illness	1	n/a	ns
		3	n/a	ns
	Death of a first degree relative	1	n/a	ns
		3	n/a	ns
	Death of a close relative or friend	1	n/a	ns
		3	n/a	ns
Stress	Stress	1	n/a	ns
		3	n/a	ns
Desire to practice as a doctor	‘Do not’ or ‘possibly’ want to practice as a doctor	1	n/a	ns
		3	EM >W	0.004
Desire to leave medical school	Want to leave medical school	1	n/a	ns
		3	n/a	ns
Motivation for becoming a doctor	Financial Rewards	1	n/a	ns
		3	n/a	ns
	Helping Others	1	n/a	ns
		3	n/a	ns
	Free-thinking	1	EM >W	0.006
		3	n/a	ns
	Responsibility	1	n/a	ns
		3	n/a	ns

4.1.11. Summary of Year 4 results

In Year 4, nearly ten times as many ethnic minority students as white students had at least one parent who did not speak English as a first language [69.9% vs 7.1%; χ^2 (1)=96.3; p<.001], and those who did not have at least one native English speaking parent did worse in Year 4 [*t*(230)=-2.97; p=0.003]. Ethnic minority students also scored slightly lower on Openness [Year 3: *t(*591)=2.66; p=0.008; Year 4: [*t(*230)=2.2; p=0.029] and Extraversion [*t(*231)=2.2; p=0.026], but those variables were not correlated with examination success. Strategic (r=0.20; p<0.001) and deep (r=0.28; p<0.001) study habits were however significantly correlated with good performance in Year 4 examinations, as was Conscientiousness (r=0.35; p<0.001) and being motivated to become a doctor in order to help others (r=0.16; p<0.05). Students who were stressed (who scored above the threshold for caseness on the GHQ-12) did significantly worse in their Year 4 examinations [t(220)=2.7; p=0.007]. There were no ethnic differences on any of those variables.

4.1.12. Longitudinal data: Year 3 and Year 4 respondents

The longitudinal data provided by 176 students was analysed to explore how those students' responses to the questionnaires changed from Year 3 to Year 4 (demographic data e.g. age, prior education, language were not analysed).

4.1.12.1. Living at home

Of those who began Year 3 living at home, only 18/55 (32.7%) had moved away from home by the start of Year 4. Of those who were living away from home at the start of Year 3, only 9/117 (7.7%) had moved back home by Year 4. These proportions were roughly the same in the white and ethnic minority groups.

4.1.12.2. Personality and study habits

Students' personality scores in Year 3 were strongly significant correlated with their personality scores in Year 4 (mean r=0.63; p<0.001). Students Year 3 study habit scores were also strongly significantly correlated with their Year 4 scores (deep r=0.58; p<0.001; strategic r=0.70; p<0.001; surface r=0.52; p<0.001), indicating that students tended not to change on these measures from Year 3 to Year 4.

4.1.12.3. Stress

In terms of stress, overall, students did not become significantly more stressed from Year 3 to Year 4 [paired samples $t(160)=4.6$; $p=0.65$]. Of those who scored above the threshold for a probable case in Year 3 (n=37), 20/37 (54%) were no longer considered a probable case in Year 4. Of those who scored below the threshold for a case in Year 3 (n=121), 25/121 (21%) were a probable case in Year 4 and 96/121 (79%) were still not – see Table 24 . There were no significant ethnic differences between students who scored above the threshold in Year 3 and Year 4, those who scored above it on one occasion, and those who never scored above it.

Table 24: Number of students scoring above the threshold in Year 3 who still scored above the GHQ caseness threshold in Year 4

		Year 3		
		no case	**case**	Total
Year 4	**no case (%)**	96 (79.3)	20 (54.1)	116
	case (%)	25 (20.7)	17 (45.9)	42
	Total	121	37	158

4.1.12.4. Desire to carry on at medical school and practice as a doctor

There was a moderate correlation ($r=0.46$; $p<0.001$) between the desire to carry on studying medicine in Year 3 and in Year 4. The proportion of students who stated they had never considered leaving medicine had dropped by 17% from Year 3 to Year 4 (see Table 25). There was a moderate correlation ($r=0.42$; $p<0.001$) between wanting to practice as a doctor in Year 3 and wanting to practice as a doctor in Year 4. Students were slightly more likely to say they 'possibly' wanted to practice and slightly less likely to say they 'definitely' wanted to practice.

Table 25: Number (and percentage) of students who had considered leaving medical school in the year prior to starting Year 3 and then in the year prior to starting Year 4

In the past year, how often have you considered leaving medicine?	**Year 3 (%)**	**Year 4 (%)**	**Difference (Year 4 – Year 3)**
Never	106 (63.1)	81 (46.3)	-25
Once or Twice	45 (26.8)	70 (40.0)	25
Monthly	8 (4.8)	13 (7.4)	5
Weekly	6 (3.6)	4 (2.3)	-2
Daily	3 (1.8)	7 (4.0)	4
Total	168	175	7
Missing	8	1	-7

4.1.13. Items included only in the 2006 questionnaires

4.1.13.1. Involvement in student activities

UCL offers a number of different activities. Students rated how involved they were with: sport, rag, drama, music, education, politics and voluntary activities. They were also asked whether they had ever been on the board or committee of a medical school club or society.

In Year 3 and Year 4 the most popular activity was sport (Year 3: 175/262 involved; Year 4: 151/237 involved) followed by education (Year 3: 129/251 involved; Year 4: 141/225 involved). In Year 3 rag (130/256 involved) was the next most popular; and in Year 4 it was voluntary activities (136/221 involved).

In Year 3, white students were more likely to be involved in sport [73.2% vs 59.7%; $\chi^2(1)=5.4$; $p=0.014$] whereas ethnic minority students were more likely to be involved in education [55.8% vs 44.2%; $\chi^2(1)=11.2$; $p=0.001$] and in voluntary activities [66.4% vs 41.5%; $\chi^2(1)=15.8$; $p<.001$] or in rag ($p=0.05$). By Year 4 however, white and ethnic minority students were equally likely to be involved in the different activities.

The only one of the activity variables which correlated with Year 3 examination results was music: those who were more involved in music did slightly better in the exams ($r=.15$; $p=0.015$). In Year 4 there were no such significant correlations.

Just over a third of students in Year 3 (101/266) had at some point during their medical school career been on the board or committee of a medical school club or society; and this rose to nearly a half in Year 4 (118/232). There were no ethnic differences on this variable, and it was not significantly related to examination performance in either year.

4.1.13.2. Unfair discrimination

Twenty percent (56/272) of respondents at the start of Year 3 stated that they had been a victim of discrimination at least once during medical school. In Year 4 students were twice as likely (42%: 97/230) to report discrimination. There was no ethnic difference on this variable in Year 3 ($p=0.41$) or Year 4 ($p=0.32$).

4.1.13.2.1. Reason

The most common reason for discrimination given in Year 3 was 'race or ethnic group' (n=19/56), followed by social background (n=9/56), followed by religion (n=7/56). Only five respondents had been discriminated against on the grounds of gender. In Year 4, gender (n=35/97) replaced race or ethnic group (n=28/97) as the most common reason for unfair discrimination. The next most common reasons were social background (n=9/97), religion (n=8/97) and sexuality (n=7/97).

4.1.13.2.2. Severity

In Year 3, the majority (85.6%) of students stated that they considered the discrimination they had experienced to be of a mild (n=32/56) or a trivial (n=16/56) nature. 4/56 (7%) stated it had been severe or extremely severe and another 4/56 (7%) considered it of moderate severity. Unsurprisingly therefore, 62% felt the event(s) had been not very or not at all stressful with only 8/52 (13%) students finding it quite or very stressful, and a quarter finding it mildly stressful.

In Year 4, the discrimination was perceived as more severe: 34/102 (33%) of students considered it to be of 'moderate' severity and 5/102 (5%) considered it 'severe' or 'extremely severe'. Moreover, there was a slight ethnic difference on this variable: white students were more likely than ethnic minority students to rate the experience as being of 'mild' severity (n=26 vs n=12) whereas ethnic minority students were more likely than whites to rate their experience as being of 'moderate' severity (n=21 vs n=13) [$\chi^2(4)=9.87$; $p=0.043$]. The majority (62%) of students still however considered their experiences to be mild or trivial.

4.1.13.2.3. Stressful

Year 4 students were more likely than Year 3 students to find discrimination stressful with 29% finding it quite or very stressful, 26% finding it mildly stressful and 45% finding it not very or not at all stressful. There were no ethnic differences on this variable in either year. There was a non-significant trend for Year 3 and Year 4 students who found their experience of discrimination stressful to achieve lower scores on their end-of-year examinations compared to those who found their experience 'not very' or 'not at all' stressful

4.1.13.2.4. Perpetrators

In Year 3, the most commonly cited perpetrators were other students (40%; n=24) and non-clinical teachers or lecturers (31%; n=19). In Year 4, clinical teachers replaced students as the most common perpetrators of unfair discrimination, with 65% (64/97) of experiences being attributed to them. Students were the next most common at 11%, followed by non-clinical teachers or lecturers (7%), other hospital staff (5%) and medical school staff (4%) - see Figure 30 . Only three students reported discrimination from patients. Year 3 students had yet to start their clinical training, which probably explains why clinical teachers, hospital staff and patients do not feature.

4.1.13.2.5. Effect on examination scores

Year 3 students who reported having been discriminated against scored lower in their OSCE compared to those who reported never having been discriminated against [mean OSCE scores 76.5 vs 74.6; t(265)=2.3; p=0.021]. This difference was also significant on the overall Year 3 score [means: 229.9 vs 225.9; t(265)=2.0; p=0.049]. Those who reported having experienced discrimination also had significantly higher scores on the personality factor Neuroticism [t(268)=2.92;p=0.004].

There was no effect of reported discrimination in the Year 4 cohort on Year 4 examination scores. Furthermore students who, at the start of Year 4 stated that they had previously experienced discrimination did not score significantly differently in the Year 3 examinations they had recently completed compared to those who had not reported discrimination (p=0.467)

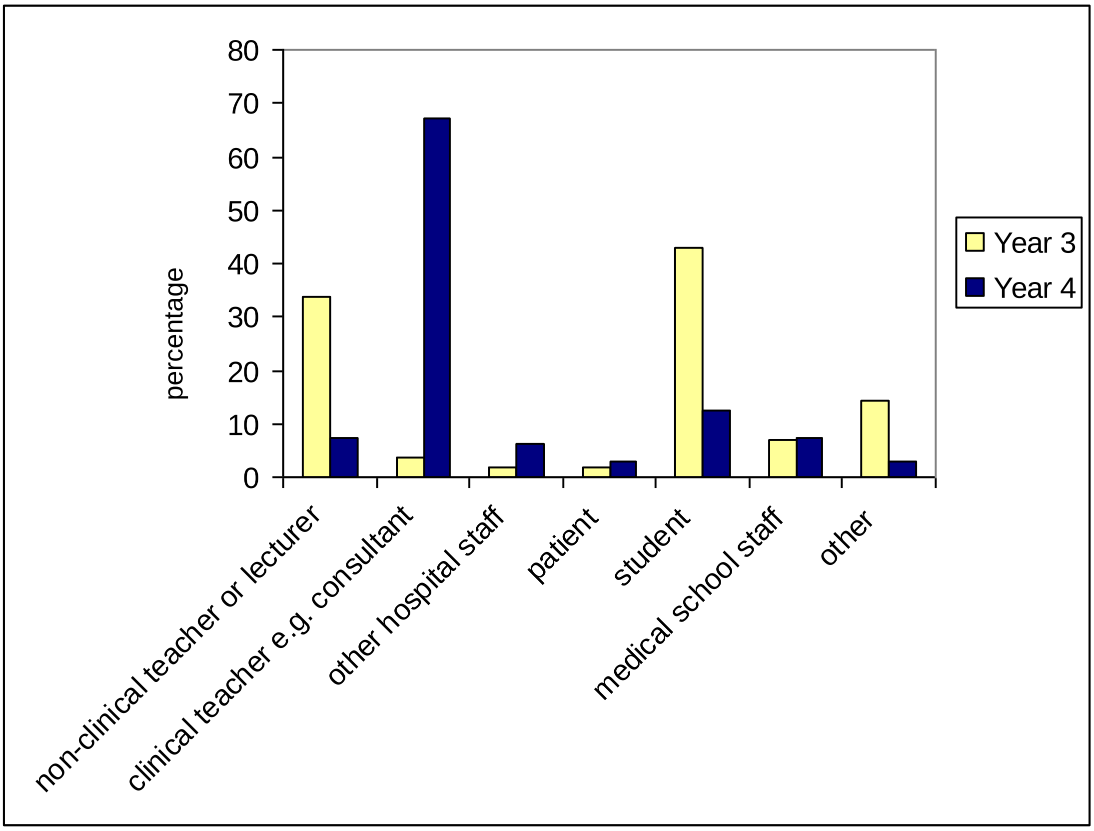


Figure 30: Proportion of Year 3 (light bars total n=56) and Year 4 (dark bars total n=97) who reported discrimination from various sources.

4.1.13.3. Reasons for leaving home

Sixty four students stated that they were living at home at the start of Year 3 and 66 students said they were living at home at the start of Year 4 (see Table 26). In both years, a non-parametric correlation matrix showed few significant relationships between the reason variables, suggesting that most students had one main reason for living at home. In both years, there were no significant ethnic differences on any of the variables, although in both years there was a non-significant trend for approximately twice as many ethnic minority students to say they were living at home for family financial reasons [Year 3: 58% vs 29% $\chi^2(1)=3.8$; p=0.057]; [Year 4: 46% vs 19% $\chi^2(1)=3.5$; p=0.056]. In Year 3, six students chose to complete the 'other' variable and the reasons given were: better learning environment; church; I'm moving out next week once contract starts; I am about to move but new house not ready yet'; I want to live with parents as long as possible since they are everything to me'; 'sister at home'.

Table 26: Students' reasons for living at home by ethnic group and year

Reason for living at home?	Yes				No			
	ethnic minority (%)		white (%)		ethnic minority (%)		white (%)	
Year	3	4	3	4	3	4	3	4
For my own personal financial reasons	30 (58)	27 (55)	8 (67)	9 (56)	22 (42)	17 (45)	4 (33)	7 (44)
For family financial reasons	15 (29)	20 (46)	7 (58)	3 (19)	37 (71)	24 (54)	5 (42)	13 (81)
My family help me with day-to-day practicalities	13 (25)	6 (14)	5 (42)	0 (0)	39 (75)	38 (86)	7 (58)	16 (100)
My family home is better located for university	11 (21)	7 (16)	3 (25)	6 (38)	41 (79)	37 (84)	9 (75)	10 (62)
I'm not ready to leave home yet	11 (21)	2 (5)	1 (8)	1 (6)	41 (79)	42 (95)	11 (92)	15 (94)
My family/community expect me to live at home	8 (15)	5 (11)	1 (8)	0 (0)	44 (85)	39 (89)	10 (84)	16 (100)
To care for my relatives	7 (14)	6 (14)	0 (0)	1 (6)	45 (86)	38 (86)	12 (100)	15 (94)
I want to stay near my friends	4 (8)	3 (7)	2 (16)	1 (6)	48 (92)	41 (93)	10 (84)	15 (94)
Other	4 (8)	1 (2)	2 (16)	0 (0)	48 (92)	43 (98)	10 (84)	16 (100)
My family home is better located for my work	4 (8)	1 (2)	1 (8)	2 (13)	48 (92)	43 (98)	11 (92)	14 (87)
My family home is better located for my extra curricular activities	2 (4)	4 (9)	2 (16)	4 (25)	50 (96)	40 (91)	10 (84)	12 (75)
For my own health reasons	2 (4)	1 (2)	0 (0)	0 (0)	50 (96)	43 (98)	12 (100)	16 (100)

4.1.14. Items dropped from the 2005 questionnaires

The results of the 2005/6 questionnaires informed the revision of the 2006/7 questionnaires. Freetext comments from 2005/6 were scrutinised and wherever possible, revisions were made to satisfy these by for example, making the questionnaire shorter. This was achieved by dropping items which were considered to not be particularly useful in understanding white or ethnic minority students' examination results. An additional item which asked participants about their experiences of discrimination were included in the 2006/7 questionnaires, following on from the results of the qualitative study.

Preliminary analysis of the 2005 questionnaire led to five questions containing a total of 70 items being dropped from the 2006 questionnaire. The results which led to these questions being dropped from 2006 questionnaires are summarised in Table 27 .
The five questions were:

1. Students were asked about how many hours per week they devoted to 13 categories of hobby or activity, and how many units of alcohol they drunk.
2. Students were asked which of eight activities (e.g. voluntary work) they had undertaken before applying to medical school
3. Students were asked to rate how much 12 factors (e.g. reading about medical research) had encouraged or discouraged them from applying to study medicine
4. Students were asked to rate which 14 of 22 factors (e.g. ability to remember facts) they felt had had the most or least impact on their performance at medical school.
5. Students' state anxiety and depression levels were measured using the Hospital Anxiety and Depression Scale (HADS: Zigmond & Snaith, 1983).

Table 27: Reasons that 5 questions with a total of 70 items dropped from the 2006 questionnaire

Question	Number of items	Reasons for dropping
1: hours spent on activities per week	14	Not correlated with examination scores; lengthy to complete; alcohol question may be subject to social desirability bias
2: activity before entry to medical school	8	No ethnic differences. Not correlated with examination scores.
3: factors affecting application to medical school	12	No ethnic differences. Only one factor (encouraged by school teachers) weakly correlated with examination scores
4: factors affecting medical school performance	22	No ethnic differences. Large number of items which exploratory factor analysis showed were not measuring a few underlying variables, thus not considered to be measuring constructs known to be associated with performance. Lengthy to complete.
5: anxiety and depression	14	Anxiety and depression subscales both strongly significant correlated with GHQ-12 scores.

Multivariate path analyses

There were a great number of significant correlations between the variables related to ethnic group and between those related to examination results (see Table 28 and Table 29), which makes the relationships between these variables difficult to interpret, for example, is the fact that ethnic minority students are less likely to speak English as a first language responsible for their relatively poor Year 3 performance, or do ethnic minority students underperform regardless of when they learned English? Path analysis using multiple regression was undertaken to investigate the most important predictors of the examination results, and the most important relationships between ethnic group, the questionnaire variables, and examination results. Variables which were found to be significantly univariately related to examination result or for which there was a theoretical rationale were included in the multivariate analyses[12].

The technique used to calculate the path models was the same as was used in Chapter 3. Briefly, each path model was a series of multiple regressions where each independent variable became the dependent variable in turn. As in the path models

[12] Although only some of the personality, motivation and study habit factors had been found to relate significantly to examination results, all the factors of each variable were included in the analysis as they were measured on the same instruments, respectively.

calculated in Chapter 3, the standardised β regression coefficient was used in the path models to show the relative predictive power of the independent variables on the dependent variable, taking into account all the other independent variables. The weights of the arrows in the models were proportional to the beta weights, which are shown running alongside the arrows with t-ratios included in parenthesis (t ratios indicate the approximate significance levels of the beta weights, where t=3 is approximately equivalent to $p<0.05$). Black solid lines represent positive relationships between variables, and red broken lines represent negative relationships. Only beta weights with t-ratios greater than 3 were included in the path diagrams to improve their legibility.

The variables in the path models were organised into logical order from left to right in the path model. Factors which were considered causally equivalent were placed on the same vertical 'time' line. This order is important because it is used to determine the causal relationships between the variables (*Cf*. McManus, 2003). Starting to the far left of the diagram and hence earliest in time, whether a student's parents spoke English as a first language was determined before the student was even born, hence it came before date of birth. Whether students had one parent who was a doctor was probably determined before they were born, but after their parents learned to speak, so it came next. Sex and ethnic group came together at the same time as date of birth. The Big 5 personality traits came next, being as they are considered partly genetic and partly the result of environmental factors, and although an individual's personality does change slowly over the course of their lifetime, they are generally considered to be stable (Matthews & Deary, 1998). Speaking English as a first language came next, as it is usually determined in infancy. Motivations for studying medicine came next because, for the majority of students, they were established at some point during their school career, or certainly before entry to medical school (although this is not to say they may not change somewhat once at medical school). Only once students had completed the first two years of the MBBS course at UCL could they take an intercalated BSc (iBSc) and this variable therefore came next in the Year 3 path model. Students who had studied the first two years of their medical degree at Oxford or Cambridge ('Oxbridge' or 'transfer' students) will not have taken an iBSc at part of the UCL course, thus the iBSc and Oxbridge variables were entered at the same time in the Year 3 path model. Study habits were measured at the start of the academic year, and therefore could strictly only be considered valid for that time, and not for previous course performance, although there is a degree of stability in those measures. Students were asked whether they were living at home at the start of Year 3, and therefore this was the last predictor variable. The dependent variable was end-of-year examination result, and this came at the far right of the path diagram.

Table 28: Significant (p<0.05) bivariate correlations between questionnaire variables, ethnic group and Year 3 examination score. Ns relationships not shown

	Live at home	Graduate	First language English	One Anglophone parent	One doctor parent	Surface	Deep	Strategic	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness	Desire to practise medicine	Oxbridge	Financial rewards	Helping others	Responsibility	Free thinking	ethnic minority	Year 3 score
Live at home	1			-0.30	-0.14			0.10									0.11			0.29	-0.10
Graduate		1		0.13	-0.12	-0.11	0.13	0.09		0.11	0.10	0.10	0.11		0.10		0.11			-0.17	0.09
First language English			1	0.47					-0.08											-0.23	0.12
One Anglophone parent				1	-0.09									0.11	-0.11			0.09		-0.61	0.17
One doctor parent					1															0.14	
Surface						1	-0.23	0.12			-0.30			-0.09		0.38			-0.15	0.13	
Deep							1	0.41		0.28	0.33	0.19	0.30	0.13		-0.15	0.24	0.13	0.18	-0.11	0.15
Strategic								1		0.18		0.08	0.65	0.16		0.20	0.15	0.18			0.24
Neuroticism									1						0.12	0.13					
Extraversion										1		0.24	0.10	0.08			0.28	0.15			
Openness											1					-0.26			0.30	-0.11	
Agreeableness												1	0.10	0.22			0.37				
Conscientiousness													1			0.11	0.15	0.11		-0.10	0.25
Desire to practise medicine														1			0.21			-0.12	0.08
Oxbridge															1					0.10	-0.24
Financial rewards																1					0.10
Helping others																	1				
Responsibility																		1			
Free thinking																			1		
ethnic minority																				1	-0.24

Table 29: Significant (p<0.05) bivariate correlations between questionnaire variables, ethnic group and Year 1 examination score. Non significant relationships not shown

	Surface	Deep	Strategic	One doctor parent	One Anglophone parent	Neuroticism	Extraversion	Openness	Agreeableness	Conscientiousness	Relationship difficulties	Helping others	Financial rewards	Responsibility	Free thinking	ethnic minority	Year 1 total score
Surface	1	-0.11	0.13		-0.12	0.19		-0.23	-0.08	-0.08		-0.13	0.33			0.10	
Deep		1	0.46				0.24	0.33	0.21	0.31	-0.10	0.33	-0.09	0.23	0.09		0.08
Strategic			1				0.16		0.16	0.60		0.19	0.13		0.09		0.09
One doctor parent				1												0.16	
Anglophone parent					1										-0.12	-0.60	
Neuroticism						1			-0.18	-0.12					0.16		
Extraversion							1	0.09	0.25	0.10		0.25		0.24			
Openness								1	0.12			0.12	-0.10	0.14	0.12		
Agreeableness									1	0.22	0.08	0.27					
Conscientiousness										1	0.10	0.24					0.13
Relationship difficulties											1			-0.15		0.11	
Helping others												1					
Financial rewards													1				
Responsibility														1			-0.09
Free thinking															1	0.11	
ethnic minority																1	-0.13

4.1.14.1. Year 1 path model

To begin, all the variables in the path model were regressed on to end-of-year Year 1 examination result (see Table 30). As expected from the results of the univariate analysis, the total variance in Year 1 result explained by the variables in that first model was low at 6% (r squared=0.06), and ethnic group independently explained 1.9% of the variance in examination result. The final path model for Year is shown in Figure 31 . It clearly shows that non-minority (white) ethnic group (β=-0.133; t=-3.53) and high Conscientiousness (β=0.131; t=3.48) were the only two direct predictors of Year 1 result. Other factors such as sex, whether parents speak English as a first language, age and other personality factors indirectly predict Year 1 performance via these two variables, but those effects were very small. The motivation and study habits factors did not predict performance, and neither did graduate status.

Table 30: Multiple regression of all the path model variables onto overall Year 1 examination result. Only those significant at p<0.05 were included in subsequent analyses. Ethnic group and Conscientiousness and ethnic group are highlighted as the only direct predictors in the final path model

Variable (name in the path model)	Beta	t	p value
Surface	0.027	0.628	0.530
Deep	0.040	0.825	0.409
Strategic	-0.010	-0.195	0.845
Graduate	0.036	0.703	0.482
Helping others (Helping)	0.019	0.450	0.653
Financial rewards (Finance)	0.007	0.183	0.855
Responsibility (Responsible)	-0.072	-1.760	0.079
Free thinking	-0.001	-0.030	0.976
First language English	-0.056	-1.291	0.197
Neuroticism (N)	0.027	0.660	0.509
Extraversion (E)	-0.087	-2.099	0.036
Openness (O)	0.060	1.447	0.148
Agreeableness (A)	0.026	0.614	0.539
Conscientiousness (C)	**0.128**	**2.610**	**0.009**
ethnic minority	**-0.136**	**-2.915**	**0.004**
female	-0.074	-1.834	0.067
Older age (Older)	-0.016	-0.310	0.757
One parent speaking English as a first language (Anglophone parent)	-0.011	-0.222	0.824
One doctor parent	0.012	0.324	0.746

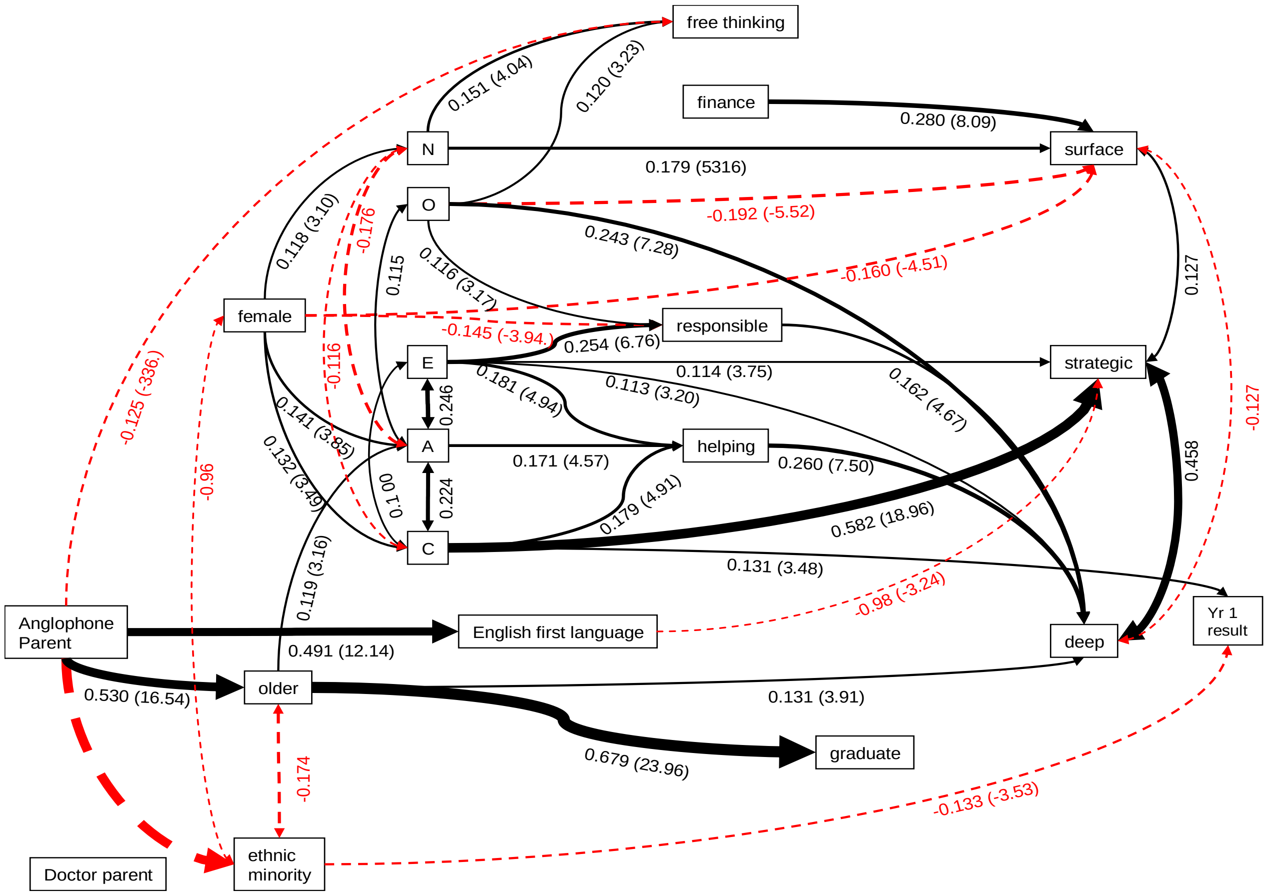


Figure 31: Path diagram showing effects of questionnaire variables, ethnic group and sex on performance on Year 1 examinations. N, E, O, A, and C are the personality factors. Path coefficients shown beside each line, t values in parentheses. Only statistically significant causal relationships from the β (beta) matrix where t>3 are shown. The causal paths can only pass from left (predictor variables) to right (dependent variables). Causally equivalent variables are shown above each other, and connected with double-headed arrow paths showing simple correlation coefficients (only r values given). Black unbroken lines show positive paths, red broken lines show negative paths.

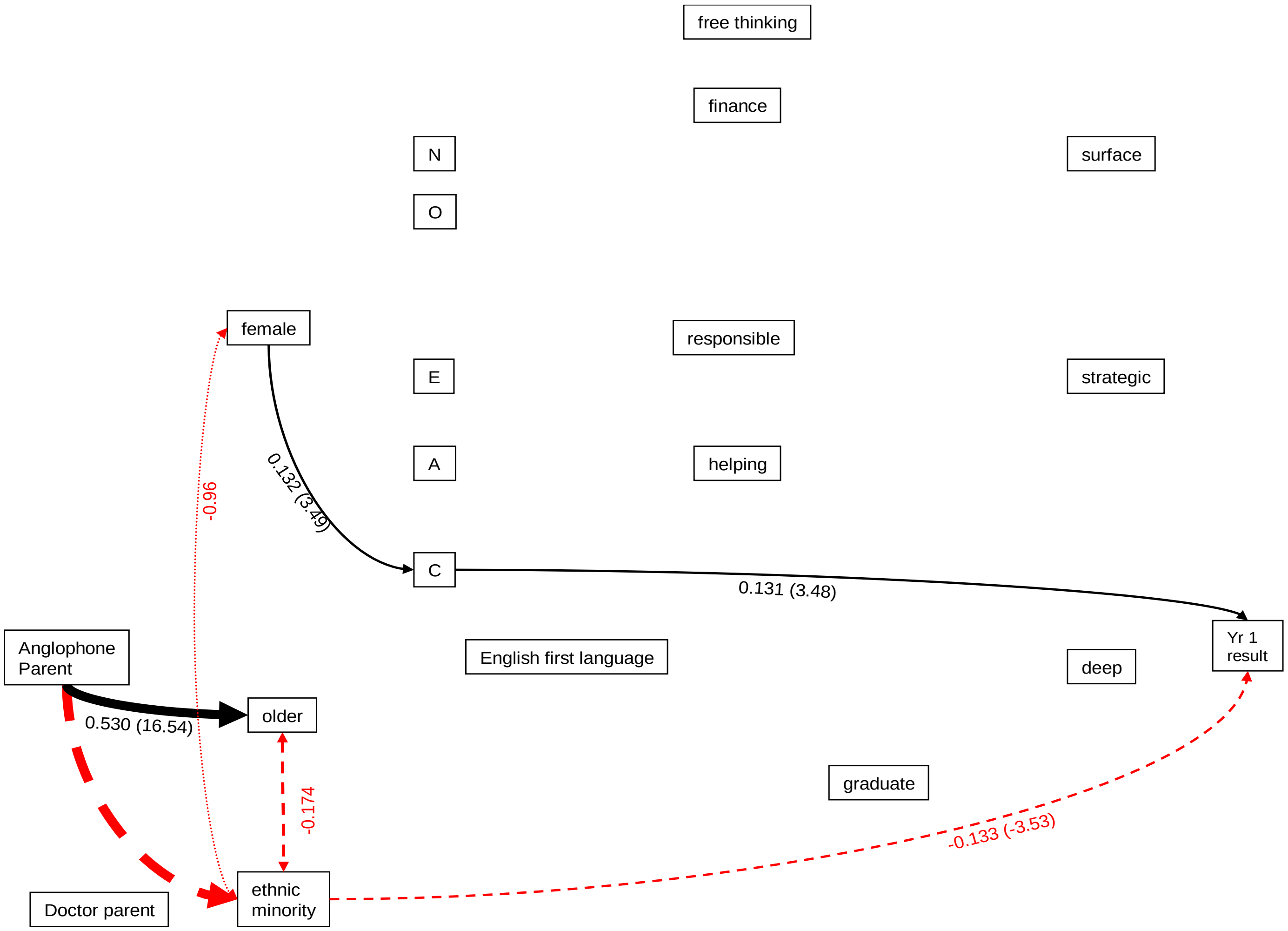


Figure 32: Simplified path diagram showing only the relationships between ethnic group and performance in Year 1 examinations. Minority ethnic group predicts performance indirectly via female sex, age and all the personality variables except openness.

The direct and indirect ethnic effects on Year 1 performance are shown in a simplified path diagram in Figure 32 . As well as the direct effect, ethnic minority students do worse on the Year 1 exam because they slightly less likely to be female and are younger, and are slightly lower on Conscientious. The overall effect, summing all possible paths between ethnic group and Year 1 exam result had a beta weight of β=0.135, which was almost identical to the direct effect of β=0.133.

4.1.14.2. Year 3 path model

All the variables in the Year 3 model were regressed on to end-of-year Year 3 examination result. The total variance in Year 3 result explained by the variables in that model was 17.6% (r squared=0.176) and ethnic group independently explained 3.2% of that variance (see Table 31). To calculate the path model a series of regressions were performed using the same method as used with the Year 1 data.

Table 31: Multiple regression of all the path model variables onto overall Year 3 examination result. Only those significant at p<0.05 were included in subsequent analyses. Ethnic group and Oxbridge are highlighted as the only direct predictors in the final path model

Variable (name in path model)	Beta	t	p value
Live at home (Home)	-0.056	-1.526	0.127
Surface	-0.038	-0.958	0.338
Deep	0.074	1.719	0.086
Strategic	0.107	2.147	0.032
Intercalated BSc (iBSc)	0.086	2.055	0.040
Oxbridge transfer (Oxbridge)	**-0.190**	**-5.214**	**<0.001**
Graduate entry (Graduate)	0.135	2.432	0.015
Financial rewards (Finance)	0.056	1.431	0.153
Helping others (Helping)	-0.052	-1.323	0.186
Free-thinking	0.028	0.772	0.440
Responsibility (Responsible)	0.013	0.356	0.722
English first language (English)	0.077	1.939	0.053
Neuroticism (N)	0.026	0.718	0.473
Extraversion (E)	-0.024	-0.639	0.523
Openness (O)	-0.040	-1.014	0.311
Agreeableness (A)	-0.014	-0.379	0.705
Conscientiousness (C)	0.099	2.193	0.029
Older age (Older)	0.059	1.167	0.244
ethnic minority	**-0.180**	**-4.064**	**<0.001**
female	0.103	2.817	0.005
One parent speaking English as a first language (Anglophone parent)	-0.040	-0.826	0.409

The path diagram in Figure 33 shows that the only direct predictors of Year 3 overall examination result were being of white ethnic group (β=0.173; t=4.79) and being an Oxbridge transfer student (β=0.176; t=-4.96). Being older was an indirect positive predictor as it was negatively correlated with ethnic group (r=-0.261). Having at least one parent who speaks English as a first language was also an indirect positive predictor, as it loaded negatively onto ethnic minority (β=-0.578; t=-19.08), Oxbridge (β=-0.116; t=-3.13) and positively onto older age (β=0.151; t=4.12) (overall effect of parent first language: β=0.087). Figure 34 shows a simplified version of the path model, showing only the paths related to ethnic group.

The path model does show clear predictive relationships between some of the questionnaire variables. For example, study styles are clearly predicted by personality and motivations for becoming a doctor: deep study is directly predicted by high Conscientiousness, high Openness to Experience, high Extraversion, high *Helping Others* and indirectly therefore by female sex. Strategic study style is predicted by high Conscientiousness, by high *Responsibility* and indirectly therefore by male sex. Surface study style is predicted by high *Financial Rewards*, low Openness, and minority ethnic group. Females were higher on Neuroticism and Agreeableness.

Only paths where $t>3$ were included in the path diagram shown in Figure 33 and Figure 34; however other very small, yet statistically significant (at $p<0.05$) paths were present. For example, overall Year 3 examination result was directly predicted by high strategic study style (β=0.130; t=2.90), female sex (β=0.097; t=2.80), high Conscientiousness (β=0.099; t=2.21), being a graduate (β=0.088; t=2.17), having an intercalated BSc (β=0.083; t=2.03), and by speaking English as a first language (β=0.07; t=1.97). Ethnic minority students were less likely to be graduates and less likely to have an iBSc which could account for a very small part of the ethnic difference in overall Year 3 examination result.

Students had three main types of examination in Year 3: the written examination, which is designed to measure clinical problem solving, the OSCE, which is a practical test of clinical knowledge and skills, and the firm examination which is a grade given by consultants for attendance, attitude and clinical case presentations. These examinations were statistically significantly but only moderately-well correlated (see

Table 32), suggesting that they could be predicted by different questionnaire variables. A path model containing these three separate examinations was therefore conducted, entering the three examinations at the same time in the path model; and a simplified version of this model is shown in Figure 35.

Table 32: The three types of Year 3 examination (OSCE, written and firm) were moderately and statistically significantly (p<0.001) correlated

		OSCE	Written	Firm
OSCE	Pearson's r	1	0.432	0.390
	p value		<0.001	<0.001
	N		722	720
Written	Pearson's r		1	0.334
	p value			<0.001
	N			723

That path model containing the three types of examination showed that there were direct effects of ethnic group on the written and the OSCE, but not the firm grade, and Oxbridge students achieved higher scores on all three types of examination. In terms of ethnic group, ethnic minority students were younger, and being younger was associated with lower firm grades. Strategic learning style was a significant predictor of good written examination performance, and it was positively correlated with surface learning style (which was itself predicted by ethnic minority) and negatively correlated with deep learning style. The sum of the two paths from ethnic minority to Year 3 written score via learning styles (the positive path via strategic and the negative path via deep and then strategic) had an overall tiny positive effect (β=0.0021) which can be considered negligible.

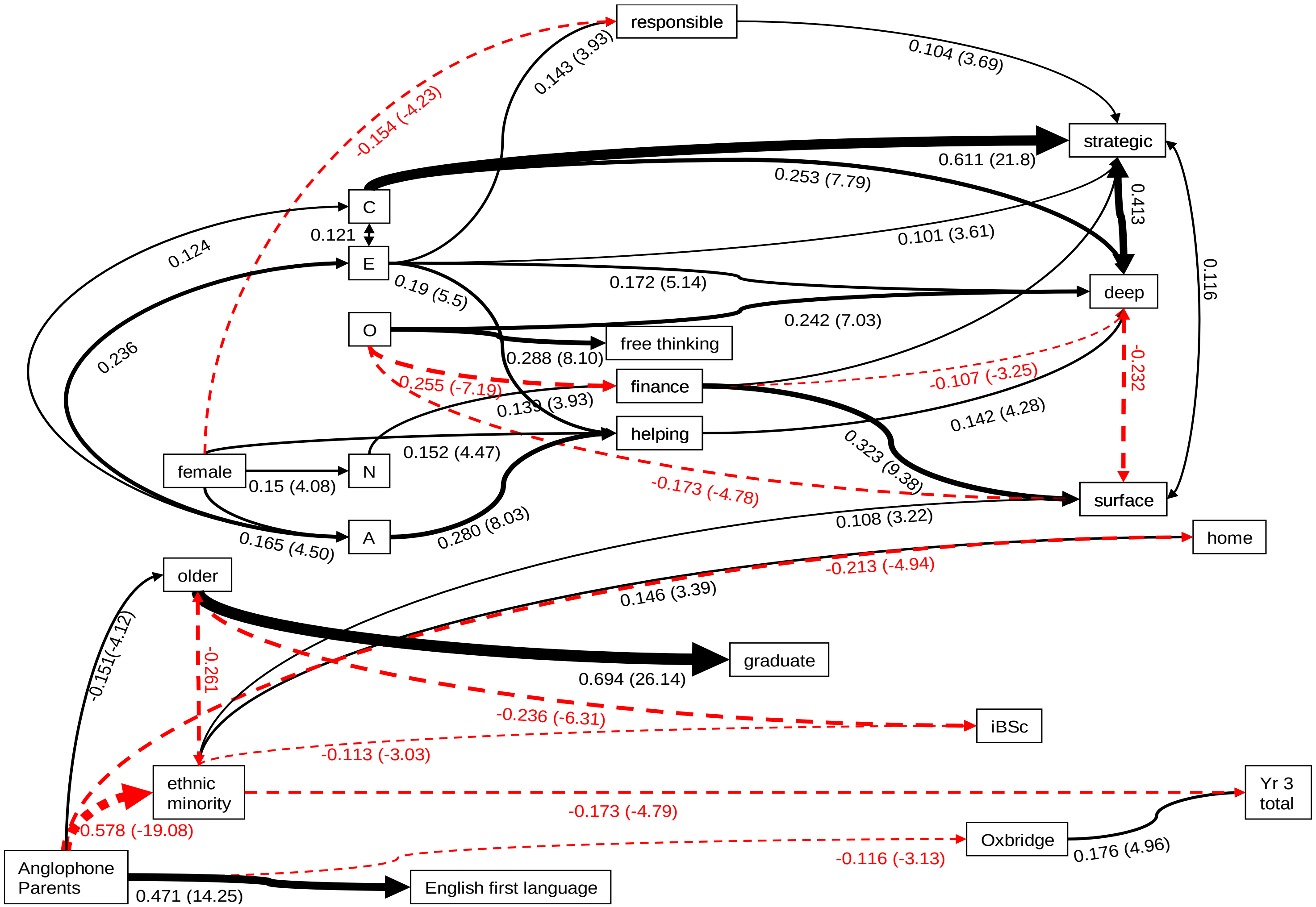


Figure 33: Path diagram showing effects of questionnaire variables, ethnic group and sex on performance on Year 3 examinations.

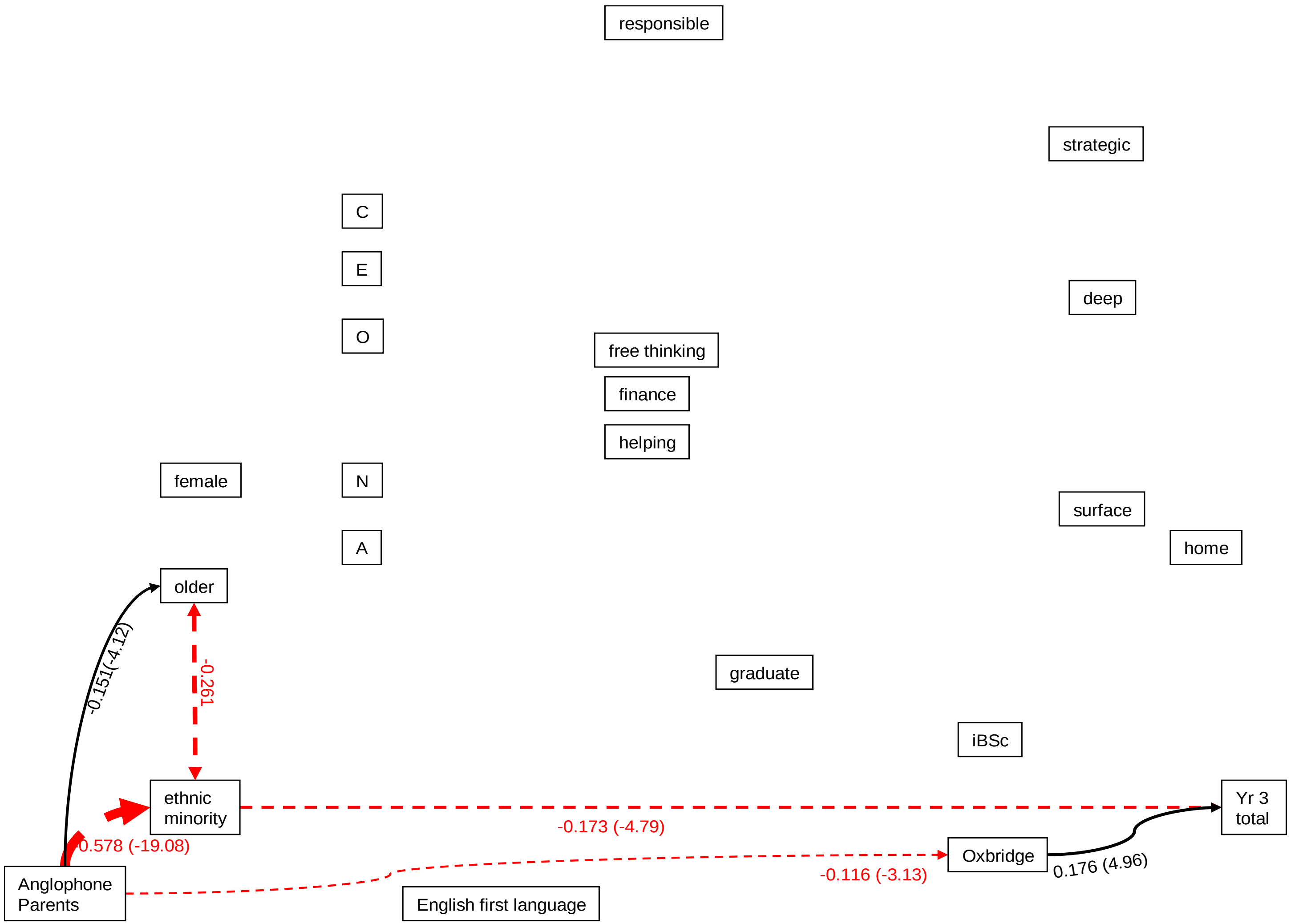


Figure 34: Simplified path diagram showing only the paths relating ethnic group and overall Year 3 result.

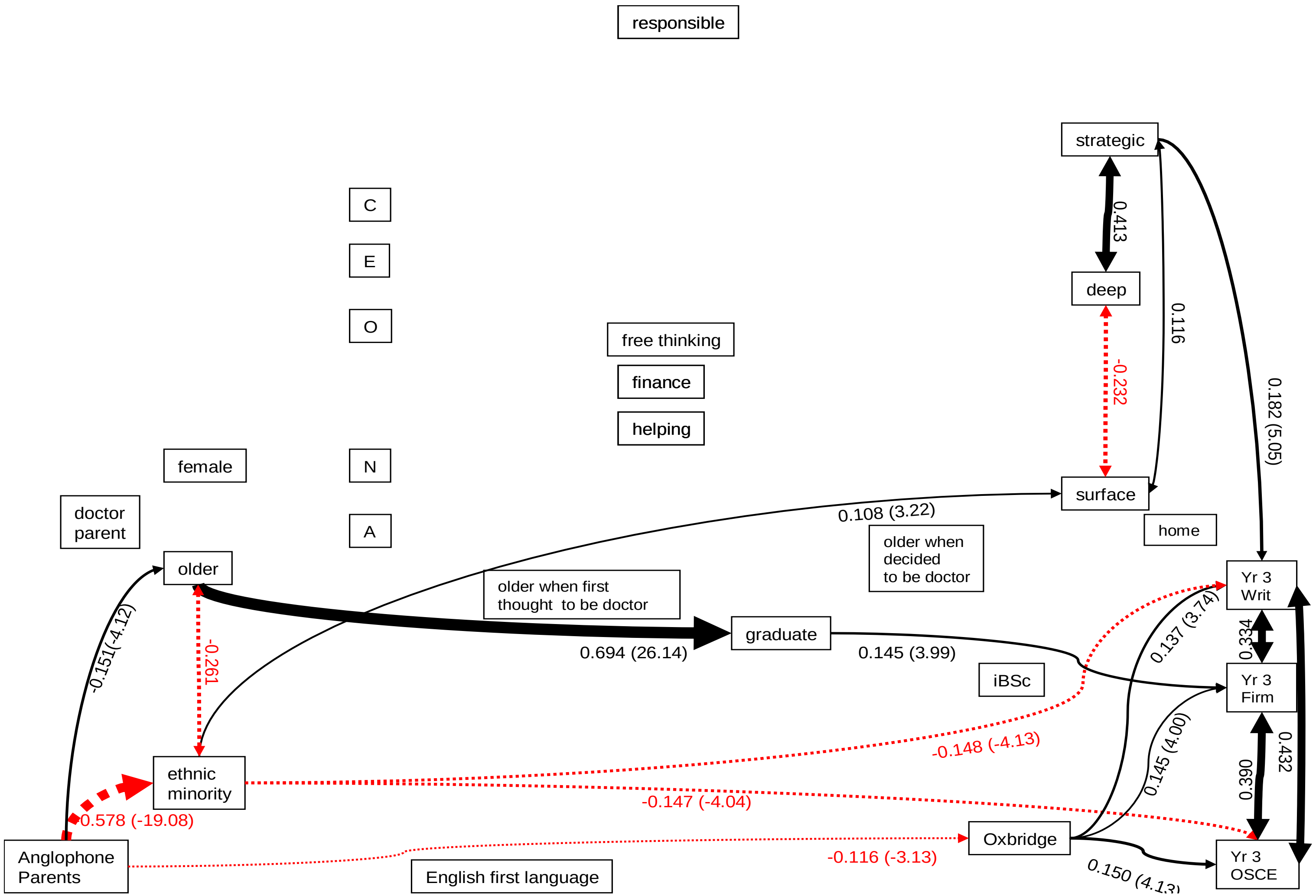


Figure 35: Simplified path diagram showing only the direct and indirect effects of ethnic group on performance in Year 3 written, OSCE and firm examinations.

Discussion

4.1.15. Summary of results

This quantitative analysis of data from n=1443 students showed that white and ethnic minority UCL medical students from Years 1, 3 and 4 differed on a number of academic, demographic and questionnaire variables. Univariate analysis showed that both Year 1 and Year 3 ethnic minority students achieved lower scores in examinations, were younger, less likely to be graduates, less likely to have experienced relationship difficulties, less likely to speak English as a first language or to have at least one parent who speaks English as a first language, more likely to have at least one parent who is a doctor, and more likely to use surface learning study habits compared to white students. In Year 3 only, ethnic minority students were also more likely to be living at home, younger when they first thought of and decided to become doctors, less likely to have studied at Oxford or Cambridge Universities (Oxbridge) in the preclinical years, were lower on the personality variables Conscientiousness and Openness to Experience, were less likely to be deep learners, and were less likely to want to practice medicine after leaving medical school. In Year 1 only, ethnic minority students scored lower on the *Free-thinking* motivation factor.

Some of the questionnaire variables upon which there were ethnic differences were themselves associated with success in end-of-year examinations. This was particularly the case in Year 3, where high Conscientiousness, coming from Oxbridge, having an intercalated degree or being a graduate, speaking English as a first language, having a parent who speaks English as a first language, using strategic and deep learning strategies and being motivated by *Financial Rewards* were all positively univariately associated with performance. In Year 1, high Conscientiousness and low score on the *Responsibility* motivation factor were the only questionnaire variables to be associated with good examination performance.

Multivariate analysis of the data using path modelling was undertaken to further explore the relationships between the variables. Path models showed that in both Years 1 and 3, ethnic group was one of only two independent predictors of examination performance (the others being Conscientiousness in Year 1 and Oxbridge in Year 3). Moreover, the effect of ethnic group on performance was mediated only slightly by personality, age and sex in Year 1, and by the Oxbridge variable in Year 3. Ethnic differences were not mediated by differences in motivation, study habits, or language. None of the variables associated with motivation for studying medicine or for becoming a doctor, nor study habits independently predicted examination performance. It is only because of their associations with personality, sex and ethnic group that they were univariately correlated with examination performance.

4.1.16. Study limitations

The majority of the data were cross-sectional rather than longitudinal, and therefore it is harder to infer causation from the results (although the path modelling with chronological ordering of variables helped infer causation – *Cf.* McManus, 2003). Moreover, the Year 3 longitudinal data were limited in numbers. This was mainly due to the one third of students who studied for an intercalated BSc after completing Year 3 and were therefore not yet in Year 4 when the questionnaire was administered. iBSc students were spread over a variety of courses, and even over a variety of institutions, which made it logistically difficult to administer a paper questionnaire. Previous attempts to send pilot questionnaires electronically have resulted in dismal response rates (~10%). The other practical difficulty in following up the Year 3 students was that, unlike in Years 1 and 3 where the students sit together in one large lecture theatre, Year 4 students are split into three groups to study three different modules from the start of the year. This makes administration of the questionnaire much more complicated to organise and is probably what resulted in the lower response rate for Year 4 students. The decision to collect mainly cross-sectional data rather than longitudinal data did however make it easier to collect large amounts of data (four cohorts of Year 1 and Year 3 students). This enabled powerful statistical path analyses to be performed and therefore increased the reliability of the results.

The fact that the questionnaire data were collected at the start of the academic meant that students' responses pertained mainly to their experiences prior to beginning Year 3, rather than their experiences nearer to their end-of-year examinations. However the fact that the longitudinal data showed that study habit scores in Year 3 were very similar to those measured in the same participants in Year 4 provides confidence in the reliability of the results. The reasons for collecting the data at the start of the year were pragmatic: the large cohorts of Year 3 students were only together for a few hours at the start of the year and then again during the written examinations. It was not ethical to collect data during the examinations, and as mentioned previously, electronic questionnaires have previously yielded poor response rates, so the start of the year the most useful time to collect data and ensure a reasonable response rate (which is so important for validity and reliability of the results). This administration of the questionnaire in lectures meant no distinction can be made between non-respondents who chose not to participate and those who did not attend the lectures. Those who did not attend the lectures may be disorganised and/or low on Conscientiousness, which are themselves predictors of lower examination performance (Ferguson et al., 2002; Wright & Tanner, 2002; Stanley, Khan, Hussein & Tweed, 2006). Other techniques have been used to collect data from students during the year, for example a colleague administered a questionnaire to Year 1 students via their PDS tutor groups, which achieved a response rate of around 75% (Richardson, Potts, Woolf *et al.*, in press). In Year 1, students stay with the same PDS group and tutor throughout the year. This is not the case in Year 3, and therefore this method of administration would not have been appropriate. Furthermore, that method included an extraneous variable - the tutor - into the equation.

Path modelling helped infer causal relationships between variables using cross-sectional data, but path modelling as a technique does have a number of limitations. The ordering of the variables in the path model was subjective, and this will have affected the results. Further, the large numbers of variables in the model increased the different possible ways of ordering the variables, which invariably affected the variance attributed to the other variables in the model. Furthermore, therefore the fact that the threshold for inclusion in the model was set, relatively leniently, at $p<0.05$ probably resulted in slightly different path model than had it been set at $p<0.001$. The path model also did not include interaction terms. This is potentially problematic. For example, the univariate effect of sex on Year 3 examinations was lost in the multivariate analyses, and there were no obvious mediating factors. This may be because the effects of sex were different on different variables (i.e. other factors moderated the effect of sex on examination results). So for example, it may be that male students who are motivated to become a doctor by the desire to help others do well in Year 3 examinations, whereas there is no such effect for women. Including interaction terms in the model would account for this, however as with all statistical tests, there is always a balance between the number of tests performed and the chances of obtaining a positive result by chance.

Results from previous studies have shown that one of the main predictors of performance in medical school examinations is previous academic performance. This was also shown in Chapter 3 where Year 2 results were strongly correlated with Year 3 results, and A levels and Year 1 were moderately correlated with Year 1 and Year 2 results, respectively. The decision was taken not to include previous academic performance in the multivariate analyses in this chapter, which almost certainly reduced the amount of variance explained by the models[13]. The main reason for excluding previous examination data was their complexity, and it was thought that adding several more layers of complexity to an already intricate dataset with multiple variables would muddy rather than clarify the overall picture. This is particularly true for the Year 3 students, taking into account not only the fact the students in the same Year 3 cohorts would have been in different Year 1 and Year 2 cohorts, but also drop-out from Years 1 and 2, as well as the 15% of Oxbridge transfer students for whom Year 1, Year 2 and GCSE data were not available. Further, it is clear from Chapter 3 that there is an additional effect of ethnic group on Year 3 results which cannot be explained by previous academic performance, and it was thought that the path analysis in this study would shed some light on this, and indeed, it appears that this extra variance could be partially due to the Oxbridge factor, which is significantly related to both Year 3 performance and ethnic group (via the parental language factor), and is not present in Year 1. Moreover, even though Year 1 and Year 2 data do explain much of the variance in Year 3 results, this still cannot explain the effect of ethnic group on Year 1 results.

In 2006, the questionnaires were shortened in order to comply with one of the most frequent comments from the freetext box in the 2005 questionnaires: that the questionnaire was too long. Shortening was achieved by removing questions which seemed from preliminary analyses to be unrelated to exam scores or ethnic group. In

[13] In psychological studies which aim to explain theoretically complex dependent variables such as examination results, it is common for the independent variables in statistical models to explain a much lesser amount of the variance in the dependent variable than would be expected in, say, a physics or engineering study where more of the independent variables acting on the dependent variables are known and can be measured.

retrospect however, it may be that those initial analyses were underpowered to detect any differences which may have been present, and which may have become statistically significant when data from two cohorts were analysed together. This being said, the removal of those items did allow the inclusion of other items, such as the discrimination item in the 2006 Year 3 questionnaire.

4.1.17. Comparisons with other studies

Using items from questionnaires which had previously been used with medical students and doctors improved the validity of the questionnaire study and also enabled direct comparisons to be made with the results of other studies which have used some of the same measures. This comparison showed that participants' scores on the personality, stress and study habits measures were broadly comparable with those found in other studies of medical students or doctors. Data from Chris McManus's longitudinal survey study of applicants to five UK medical schools in 1990 showed that 17% of doctors in 1997 and 18% in 2000 showed caseness on the GHQ-12 (McManus, Winder, Gordon, 2002), which is similar to the proportion found in our Year 3 students (18.5%). Data from a sample of UK Year 4 medical students however found higher levels of caseness (30.6% - Guthrie et al, 1998). Other data from McManus's longitudinal study shows that Year 1 and Year 3 UCL students in this study had similar study habit scores as the McManus participants, measured at entry to medical school and in final year (Fox et al., 2001); and had similar Big 5 personality factor scores as the McManus participants, measured when they were pre-registration House Officers (McManus et al., 2004) – see Table 33 .

In terms of previous findings about the relationships between demographic variables and examination results, Chapter 1 provides plenty of evidence that minority ethnic group has previously been found to be associated with poor academic performance. In terms of sex, again, in Chapter 1 it was shown that the literature is mixed, although generally female sex is associated with good academic performance at least in the later years of medical school (Ferguson et al., 2002), as was shown in this study by the fact that sex was associated with Year 3 but not Year 1 results.

Table 33: Comparison of mean personality and study habits scores of UCL Year 1 and 3 respondents in 2005 and 2006 with those of participants in McManus's longitudinal study [consisting of 1349 first year and final year medical students in 1990 and 1995-7 (Fox et al., 2001) and 982 UK junior doctors in 2002/3 (McManus et al., 2004)]

	Year 1 UCL	**Year 3 UCL**	**UK Junior doctors 1996/7 (McManus et al., 2004)**	**Year 1 London medical schools 1990 (Fox et al., 2001)**	**Final year London medical schools 1995-1997 (Fox et al., 2001)**
N=	595	592	982	1349	1349
Mean scores (S.D.)					
Neuroticism	7.6 (2.2)	7.5 (2.2)	8.9 (2.3)	n/a	n/a
Extraversion	11.4 (1.7)	11.3 (1.9)	10.6 (1.9)	n/a	n/a
Openness to Experience	10.7 (2.3)	10.8 (2.3)	12.2 (2.4)	n/a	n/a
Agreeableness	13.2 (1.4)	13.2 (1.6)	14.7 (1.6)	n/a	n/a
Conscientiousness	11.5 (1.9)	11.2 (2.1)	13.7 (1.8)	n/a	n/a
Surface	15.16 (3.4)	14.69 (3.7)	n/a	13.10 (2.22)	13.99 (2.50)
Deep	19.78 (3.9)	19.29 (3.9)	n/a	21.07 (2.49)	18.5 (2.60)
Strategic	20.28 (4.3)	17.95 (4.8)	n/a	11.74 (2.70)	8.31 (3.10)

As discussed in Chapter 3, it is not clear how graduate or mature status affects medical school performance, although most studies seem to show that graduate or mature entry students do better than school-leavers at medical school (James & Chilvers, 2001; Wilkinson et al., 2004; Lumb & Vail, 2004; Kay-Lambkin et al., 2002), as was the case in this study. School type has been found to be unrelated to performance at medical school (Lumb & Vail, 2004) as was found in this study.

In terms of psychological factors, the personality factor and strategic study habits have been found, as in this study, to predict good performance in medical school examinations, particularly pre-clinical performance Conscientiousness (Ferguson & Sanders, 2000; Ferguson et al., 2002; Ferguson, Sanders, O'Hehir *et al.,* 2003). However, there was no evidence from this study that, as has been shown previously, Extraversion is related to good clinical performance (See Ferguson et al., 2002). In terms of stress or its correlates, anxiety (state and trait) and depression, previous studies have found that anxiety does not cause poor performance, but can itself be caused by poor performance (Stewart, Lam, Betson et al., 1999; Tooth, Tonge & McManus, 1989). It is therefore unsurprising that GHQ score at the start of the academic year was not associated with performance in end-of-year examinations in this study. However, in a sample of UK London psychology undergraduates Andrews and Wilding (2004) found that depression could cause a drop in scores.

4.1.18. Conclusions

The results of the questionnaire study clearly show that ethnic group has an independent effect on both Year 1 and Year 3 examinations, and although ethnic differences exist on a number of demographic variables including graduate status, speaking English as a first language, having parents who are doctors, the relationships between ethnic group and examination performance was found to be virtually unmediated by age, sex, schooling, parents' education, language, personality, study habits or motivation. Further research using alternative methods to explore other factors which may explain the ethnic disparity in performance is therefore necessary, and was conducted in the qualitative study described in the next chapter.

Chapter 5. Qualitative interviews and focus groups with Year 3 medical students and clinical teachers

> "In clinical teaching attachments, the most important factor related to student learning may be the quality of the clinical teacher."
> (Ronald Harden and Joy Crosby, 2000)

> "Teachers should be prepared to examine and reappraise their own attitudes and actions in an effort to ensure that their behaviour towards and expectations of ethnic minority pupils are not influenced by stereotyped and negative views."
> (The Swann Report, 1985)

Summary of Chapter 5

27 Year 3 UCL medical students and 25 clinical teachers took part one-to-one or focus group interviews about teaching and learning in the clinical context, and about the reasons for ethnic minority students' underperformance at medical school. Qualitative data were analysed using the psychological theory of stereotype threat as a framework.

Results showed that participants believed the student-teacher relationship was vital for clinical learning. Teachers had strong perceptions about 'good' clinical students (interactive, keen, respectful), and some described being aggressive towards students who they perceived as quiet, unmotivated and unwilling. Students had strong perceptions about 'good' clinical teachers (encouraging, interactive, non-aggressive). Students and teachers had concordant and well-developed perceptions of the stereotypical Asian clinical medical student who was considered bright but over-reliant on books, poor at communicating with patients, too quiet during clinical teaching sessions and unmotivated due to being pushed into studying medicine by ambitious parents. There were less well-developed stereotypes of white students as autonomous, confident and outgoing team-players. Hypotheses to explain ethnic minority underperformance were generated from the results, which were that stereotypical and negative views of Asian students may jeopardising their relationships with their teachers thus compromising their learning and subsequent academic performance; and that Asian students' underperformance at medical school may be partly due to stereotype threat.

Introduction

It was shown in Chapter 3 that the ethnic gap in attainment at UCL Medical School more than doubles between Year 2 (effect size d=-0.17) and Year 3 (d=-0.44). In Chapter 4 the results of the questionnaire study showed that the variance in exam marks which was due to ethnic group could not be explained by variables including age, personality, study habits, graduate status and motivation for studying medicine amongst others. It was therefore necessary to look further afield to explore the research question of this thesis: ‘Which factors influence the differential performance of white and ethnic minority medical students in undergraduate assessments?’

In the 1990s, American social psychologists Clause M Steele and Joshua Aronson put forward stereotype threat theory to explain ethnic minority, particularly African-American, academic underachievement. In psychology, stereotypes are conceptualised as “cognitive tools” which help us process and understand the vast amounts of perceptual information we are bombarded with in our every waking moment (Macrae, Milne, Bodenhausen, 1994). They can help us process information about all sorts of objects, not just people, although much of the psychological research on stereotypes has focussed on social stereotyping. Social stereotypes (from now on referred to as “stereotypes”) are stored as cognitive representations or cognitive neural networks in our brains. If we see a person who we think belongs to a particular group, the stereotype about that group can be activated automatically. Furthermore the fact that this activation can happen without conscious awareness makes it difficult to stop (Stangor, 2000). Greenwald and Banaji explain how stereotypes affect behaviour:

> “Stereotypes guide judgment and action to the extent that a person acts toward another as if the other possesses traits included in the stereotype”.
> (Greenwald & Banaji, 1995)

Stereotype threat refers to one of the consequences that stereotyping can have on individuals who belong to negatively stereotyped groups e.g. African Americans. According to the original conceptualisation of stereotype threat theory, in test situations members of negatively stereotyped groups can feel sufficient anxiety either they will be negatively stereotyped by others or that they will conform to that negative stereotype, that they do in fact underperform (Steele, 1997; Steele & Aronson, 1995).

Many stereotype threats experiments have used a variation on the following paradigm, pioneered by Steele & Aronson (1995) to test stereotype threat. Participants are given a cognitive test. In one condition, they are explicitly or implicitly made aware of a negative stereotype about their group (e.g. Steele & Aronson, 1995; Spencer, Steele, Quinn, 1999). In the other condition, participants are made aware of a positive stereotype about their group (e.g. Levy, 1996), or that the test is irrelevant to the stereotype (e.g. Spencer et al., 1999; Steele & Aronson, 1995). Those experiments have generally shown that participants in the first group perform worse than participants in the second group. This is taken as evidence that stereotype threat can negatively affect the test performance of members of various groups which are stereotypically associated with low cognitive ability or low intelligence (Aronson, Lustina, Good, Keough et al., 1999). These groups are diverse and include African Americans (Steele & Aronson, 1995), Latinos (Gonzales, Blanton, Williams, 2002), women in the context of mathematical ability (Spencer et al., 1999), individuals of low socio-economic status (Croizet & Claire, 1998) and elderly individuals (Levy, 1996; Hess, Auman, Colcombe et al., 2003).

The underpinnings of stereotype threat theory are firstly, that individuals are motivated to sustain a self-image of competence or ‘goodness’ (Aronson et al., 1999), and secondly, that their identity is closely tied in with the identity of the group(s) to which they feel they belong (Haslam, Salvatore, Kessler & Reicher, 2008). Stereotype threat can occur therefore when individuals are put in a situation in which their ability to sustain this positive self-image is jeopardised by their awareness that, if they perform badly, they will be confirming a negative stereotype about their group (Aronson et al., 1999). In line with this idea, stereotype threat is hypothesised to be most problematic for people who identify strongly with the domain being tested – so for example, in a maths test women to whom being good at maths is important will be most negatively affected by the stereotype that women are bad at maths. One way in which members of negatively stereotyped groups can protect themselves from stereotype threat therefore is to disassociate themselves from the domain that they fear they were underperform in (Spencer et al., 1999). However researchers have found other methods to minimise the negative effects of stereotype threat, which centre on improving individuals’ self-image and their awareness of positive aspects of their group (Haslam et al., 2008). For example, experiments have found that individuals perform better on tests when they are made aware of positive stereotypes about their group (Shih, Pittinsky & Ambady 1999); when they are made aware of negative stereotypes about a group to which they do not belong (Walton & Cohen, 2003); and when their self-esteem is improved by self-affirmation exercises (Cohen et al., 2006).

Stereotype threat has been shown to be a problem for members of various different groups. This makes it feasible that ethnic minority underperformance in medical students might, at least partly, be due to stereotype threat. Furthermore, the fact that medical students tend to be highly selected to be motivated high achievers means that it can be assumed that they identify strongly with the domains in which they are being tested. However there is a problem in applying stereotype threat theory to UK medical students. In order for stereotype threat to occur, a negative stereotype about UK ethnic minority medical students needs to be present in the learning environment. It is not clear whether such a stereotype exists in UK ethnic minority medical students, who can, by their very status as medical students, be considered high achievers.

This qualitative study sought to explore stereotype threat and other factors which might affect ethnic minority students' learning in clinical environments in a sample of Year 3 medical students and a sample of their clinical teachers. Specific aims were to:

1. Gain insight into Year 3 medical students' and clinical teachers' ideas and beliefs about ethnicity, and about learning and teaching undergraduate medicine at UCL
2. Describe the stereotypes held by students and teachers about clinical medical students from different ethnic groups
3. Generate hypotheses to explain ethnic minority Year 3 medical student underachievement

Methods

5.1.1. Participants: sampling strategy and recruitment

Data from Year 3 medical students and their clinical teachers using one-to-one, face-to-face interviews were gathered initially. After 12 student interviews it became clear that some students were not comfortable discussing ethnicity and therefore it was decided to use single-ethnic group focus groups to collect the rest of the student data. The clinical teachers continued to be interviewed one-to-one. See below for details.

5.1.1.1. Clinical teachers: one-to-one interviews

Teachers were purposively selected from a sampling frame including surgeons, physicians, general practitioners (GPs), and clinical skills tutors. Senior faculty members have overall responsibility for the teaching on their firms, and thus it decided to sample senior rather than junior teachers. In terms of sex and ethnic group, data were available from the Royal Free Hospital (one of the UCL Medical School clinical sites) which showed that in 2003, 69% of consultants were male; 88% were white, 1% were black and 9% were Asian (www.**royalfree**.nhs.uk/doc/240604/AppendixF.doc). The sampling frame was designed to broadly reflect these demographic proportions. Forty clinical teachers at the three UCL Medical School clinical sites were sent a letter from Jane Dacre asking them to take part in a semi-structured interview. During the sampling phase, participants were assigned a sex and ethnic group on the basis of their names, and they were subsequently asked to self-report ethnic group using the 2001 census categories. Non responders received up to 3 email and telephone reminders.

5.1.1.2. Students: One-to-one interviews

Students were selected to provide "information-rich" cases (Carter et al., 1999) using the demographics of the Year 3 student population as a sampling frame. Students were recommended by three non-professorial faculty members for interview. In addition, KW had shadowed a firm of Year 3 clinical medical students for a week at the start of the academic year 2005/6, and some of those students were also asked if they would like to participate. Forty nine students were emailed to ask whether they would like to be interviewed about their experiences of clinical teaching for a PhD project about the factors that affect performance at medical school. They were told that the interview would last about 30 minutes, and would be conducted at a time and place convenient for them. Students were informed in writing that nothing they said would be attributable to them by name, and their participation was voluntary and could be withdrawn at any time.

5.1.1.3. Students: focus groups

Ninety five Year 3 students from the three largest ethnic groups within the medical school - white, Indian and Pakistani - were invited to participate by email. To increase homogeneity within groups and therefore increase the chances of participants feeling comfortable and able to talk freely (Krueger & Casey, 2000), students were organised by ethnic group and third year medical school firm grades (marks given by consultants on the basis of performance during clinical attachments) into six groups: Indian high achieving, Indian low achieving, Pakistani high achieving, Pakistani low achieving, white high achieving, and white low achieving. Those in the high achieving groups had scored above the total year's mean firm grade, those in the low achieving groups had scored below. As there were few Pakistani students in the year, Bangladeshi students were also invited to attend the Pakistani group. In addition, students who had expressed interested in being interviewed previously, but had not been, were invited. No attempt was made to exclude friends or acquaintances in the hope that some collective remembering of events might be captured (Wilson, 1997) and also that participants would be more likely to raise sensitive topics if accompanied by friends. Students were sent a maximum of three email reminders and one text message inviting them to attend "a small group discussion as part of research on the factors that affect medical students' performance". They were told that their participation was voluntary and their comments would be anonymised. They were also told that they would receive drinks and snacks during the meeting. If students declined, they were sent another email asking them why they could not attend.

5.1.2. Questions

All interviews used mostly open-ended questions in order to allow the participants to explain their experiences and perspectives without too much constraint. Participants were interviewed about their experiences of teaching and learning in the clinical context, and about the factors they though affected students' clinical learning. One of the aims of the study was to generate hypotheses to explain ethnic minority underperformance and therefore participants were specifically asked either about the reasons for ethnic minority students' underperformance at medical school (focus groups) or about the reasons that ethnic minority students might learn less than white students in clinical situations (interviews).

A questioning route as laid out by Krueger & Casey (2000) was devised for both the interviews and the focus groups. The opening questions were designed to be factual and relatively easy to answer in order to help the participant talk freely when they may have been slightly nervous, and to introduce the subject matter. As the rapport between the research and the participant(s) grew, questions about more sensitive topics were asked (DiCicco-Bloom & Crabtree, 2006; Krueger & Casey, 2000). Attempts were make to keep the questions as understandable as possible, to avoid jargon and questions which included many concepts or dimensions as this can be confusing for participants (Krueger & Casey, 2000). Techniques such as repeating the interviewees' words were used as prompts (DiCicco-Bloom & Crabtree, 2006), and the interviewer tried not to use words that implied she was judging the participants by their responses (Kruger & Casey, 2000). The questions were shown to colleagues and their clarity improved in response to feedback. Further details are provided below, and actual questions are provided in the Appendix.

5.1.2.1. Clinical teachers: one-to-one interviews

To begin, participants were asked an open question about their clinical teaching. This was followed by two questions asking them about two occasions that they had taught or seen someone else teaching: one in which the students had learned a lot and another in which the students had not learned so much. They were asked why this might have been for each case. They were then asked to think of reasons why different students might learn different amounts in the same teaching situation. Finally, participants were told that white students and female students tended to learn more in clinical situations and were asked what they thought of this, and whether they could think of any reasons why this might be.

5.1.2.2. Students: One-to-one interviews

Participants were initially asked an open question about their clinical teaching, where it takes place, how many sessions they have per week, and how well they think it is generally attended. Then, in order to help them discuss the factors which can affect clinical learning, they were asked to think of a specific teaching session in which they learned a lot and one in which they had not learned so much, and were asked to reflect on the factors that had affected their learning in those two situations. Then, to help participants think specifically about individual differences which can affect learning, they were then asked why some students might learn a lot in one particular setting while others might learn less in that same setting. Finally, participants were told that ethnic minority students might learn less in clinical settings, and were asked what they thought of those findings, and whether they could think of any reasons for them.

5.1.2.3. Students: focus groups

In order to encourage participants to think about their experience of being a clinical medical student, participants were first asked what they liked and disliked about being clinical medical students. To help them become used to talking about ethnicity in a relatively non-controversial way and to give the researchers an idea of how they conceptualised ethnicity, participants were next asked what it meant to them to be of their particular ethnic group. Finally, participants were asked the key question: why they thought ethnic minority students underperformed compared to white students in third year clinical assessments.

5.1.3. Procedure

5.1.3.1. One-to-one interviews: students and clinical teachers

All interviews were conducted by KW in 2005 and 2006 at a time and in a private place convenient for the participants. Participants were orally briefed that the reason for the interview was to investigate what the students felt influences learning clinical situations. They were told that the interviewer was interested in anything they felt affected learning, but also specifically in how sex and ethnic group might affect learning. Participants were reassured that there were no right or wrong answers. They were reminded of the confidential nature of the interviews, and were asked to give their oral consent to being audio-recorded. Participants were encouraged to expand and clarify their answers throughout, and silence was used to encourage vocalisations when appropriate (Krueger & Casey, 2000). Interviews ranged from 5 minutes to 1.5 hours (average approximately 15 minutes).

5.1.3.2. Students: focus groups

All focus groups were moderated by KW, and co-moderated by SB (a black British Caribbean female undergraduate psychology student at another London university). Groups were audio-recorded and SB took notes. Snacks and soft drinks were provided. Groups were held in the early evening on a non-medical school building on the main Central London UCL site in 2006. Participants were told that the purpose of the group was to investigate previous findings which had shown that students from different ethnic groups have different experiences at medical school, and that they were invited because they were all from a particular ethnic group. Participants were reminded of the confidentiality of their responses, and that the researcher was interested in all opinions so if they disagreed or agreed with each other they should not be afraid to speak up.

Participants were asked to give their oral consent to be audio-recorded. Throughout the session story-telling was encouraged, and participants were promoted to expand on and explain their comments and to comment on others' contributions. Wherever appropriate the moderator remained silent and allowed conversations between participants to occur. At the end of the session participants were thanked, and each was given a stamped addressed envelope and invited to contact KW by post, email or telephone if they thought of anything else that they wanted to say (Krueger & Casey, 2000).

5.1.4. Data analysis

Throughout the data collection period KW transcribed the interviews verbatim (Mays & Pope, 1995) and together with JC, read and re-read the transcripts, immersing themselves in and familiarising themselves with the data. At the end of the collection period all data were analysed using stereotype threat as a theoretical framework. KW searched the data for ways in which the participants portrayed ethnic minority and white students in clinical teaching contexts. Similarities and differences between the stereotypes used by educators and students were sought. KW and JC discussed the stereotypes which emerged from the data, and through discussion, coded the stereotypes in terms of how they related to different aspects of teaching and learning in the clinical environment. Throughout the analysis KW and JC constantly compared their interpretation back to the verbatim data. Negative or 'deviant' cases were sought and used to refine the codes (Mays & Pope, 1995). The student and educator data were used as triangulation for each other, and the data were searched for evidence of internal consistency and inconsistency, for example, where the educators described asking students about themselves; and where students described the educators asking them about themselves (Mays & Pope, 1995).

Results

5.1.5. Response rates

5.1.5.1. Clinical teachers: one-to-one interviews

After up to three email or telephone reminders 25/40 clinical teachers agreed to be interviewed (63%), 13/40 did not answer and three declined: one because they were too busy, and two did not give a reason (see Table 34). Twenty five interviews were undertaken during 2005 and 2006.

Table 34: Number of clinical teachers interviewed by speciality, sex, ethnic group and year of qualification (*year of qualification not given for clinical skills teachers to ensure anonymity)

speciality	male	female	white	ethnic minority	total	year of qualification: range (median)
Consultant Physician	10	2	9	3	12	1965-1987 (1983)
Consultant Surgeon	5	1	5	1	6	1977-1990 (1987)
General Practitioner	0	5	4	1	5	1984-1998 (1990)
Nurse (clinical skills tutor)	0	2	2	0	2	n/a*
Total	15	10	20	5	**25**	1965-1998 (1985)

5.1.5.2. Students: One-to-one interviews

Twenty one out of 49 students agreed to be interviewed (43%), of whom 12 were interviewed (see Table 35).

Table 35: Student one-to-one interviewees by ethnic group and sex

white		**ethnic minority**		**total**	
male	2	male	3	**male n=**	5
female	4	female	3	**female n=**	7
total	6	total	6	*grand total n=*	*12*

5.1.5.3. Students: focus groups

High achievers were more likely to attend the focus groups than low achievers (19.3% vs 9.0% attendance rate) The Pakistani/Bangladeshi lower achieving group had to be cancelled due to non-attendance. If necessary, students were interviewed in pairs (see Table 36).

Table 36 : Focus group invitees and attendees by ethnic group and sex

group	invited	attended (% of those invited)	male attended	female attended
Indian high	15	3 (20)	2	1
Indian low	14	2 (14)	0	2
Total Indian	**29**	**5 (17)**	**2**	**3**
Pakistani/Bangladeshi high	13	2 (15)	0	2
Pakistani/Bangladeshi low	11	0 (0)	0	0
Total Pakistani/Bangladeshi	**24**	**2 (8)**	**0**	**2**
white high	26	6 (23)	1	5
white low	16	2 (13)	2	0
Total white	**42**	**8 (19)**	**3**	**5**

5.1.6. Use of the word 'Asian' to describe students

As we have seen in Chapters 1 and 3, the majority of ethnic minority medical students in UK medical schools including UCL are of Asian Indian origin. Black or African-Caribbean students are underrepresented at medical school in general, and this is also the case at UCL. As such, when participants were asked about "ethnic minority", "ethnic minority" or "non-white" students, they often referred to "Asians", "South Asians" or "Indians" and the stereotype described below refers to these groups. Moreover students from these ethnic backgrounds tended to refer to themselves as "Asian" so this is the term that has been used throughout. Participants often used international or overseas students (students who are not of UK nationality, the majority of who are from minority ethnic backgrounds) as examples of the Asian stereotypes they described, and as such, comments about international students were not analysed separately.

Participants' general views about which factors influence teaching and learning in the clinical environment are presented, followed by their opinions about ethnic stereotypes. Participant quotes are indented, and KW's comments are in italics. Where quotes are from focus group attendees, participant's initial and their group is given as well as their own demographic information, e.g.: 'C male Indian high achieving group'.

5.1.7. Reflexivity

Reflexivity is an important aspect of qualitative research (Malterud, 2001) and therefore a short description of the interviewer's background and position is presented in order that the reader can better understand the "lens" through which the data were collected and interpreted. KW is a self-defined white middle class female who at the time of data collection was in her mid twenties and studying for a PhD at UCL Medical School. Her primary PhD supervisor (Jane Dacre) was one of the Vice-Deans of the medical school. She had also been employed as a faculty member for 2 years, primarily to conduct research. She has a non-clinical background in psychology and therefore at the start of the research had little personal experience of the medical profession in clinical contexts except as a patient herself, and even this was limited (she had for example never been a hospital inpatient). Most of the clinicians she came into contact with were those involved in medical education, were female and physicians or general practitioners. She had little involvement with male surgeons for example. In terms of contact with medical students, just before the data collection begun she had spent one week shadowing a firm of Year 3 medical students in their second week of clinical medicine and taught one session of presentation skills to groups of 24 Year 3 medical students four times per academic year. She was often initially mistaken for a medical student by faculty and other medical students alike. Judith Cave, a Specialist Registrar in Oncology and a medical educator at UCL Medical School co-analysed the data. She was in the process of conducting her own qualitative interview study with junior and senior doctors.

5.1.8. Interview findings

5.1.9. The importance of the student-teacher relationship to learning

Both clinical teachers and students said the student-teacher relationship was one of the most important factors in determining the quality of the students' learning experiences.

> "The relationship probably between the teacher and the student is sort of critical".
> (Teacher 1 male physician white)

> “I think teaching is part of a process, and part of a relationship with a student […]. I see [building the relationship] very much as an iterative process. I need students for a fair whack of time, and it’s getting shorter and shorter on the clinical firm and er, that is a problem”.
> (Teacher 13 male physician white)

> “I can remember school teachers, and people who taught me at medical school and people who looked after me who I look back on as fabulous teachers, had a huge impact on my life.
> (Teacher 19 male physician white)

> “If you don’t have a relationship [with the teacher] you’re not working towards anything”.
> (Student 8 male Asian)

> “I always um, think about the teacher, who’s teaching before I decide whether I’m going to go or not because I mean, I could learn far more sitting in the library than I could from one person. And I think the presence of attendance sheets kind of is good in a way, but it’s bad if you’re being forced to go to something that’s not really useful anyway, and it’s wasting everybody’s time and it’s also wasting the consultant’s time because they, they clearly see that you don’t want to be there, and you’re not picking anything up and it just turns into this cyclical relationship where you end up having a really bad relationship with your consultant.”
> (Student 1 female Asian)

5.1.10. Getting to know the students as individuals helps establish learning relationships

Many clinical teachers recognised that in order to foster these relationships it is important to get to know the students as individuals, so they asked the students about themselves, found out about their educational and pastoral needs and made efforts to tailor the teaching to those needs. It was not always easy for clinical teachers to do this however, often due to their commitments to patients, although one clinical teacher commented on how little attention students actually needed in order to feel wanted. Students described how they appreciated teachers’ efforts.

> "The more interest you show in them [students] and the more individual it is as an experience, I think the more responsible they are about letting you know what is happening and feeling that they have, it's in their interest to turn up. […] We try and find out a little bit about them, what, where, what their background is […] It's also makes it much nicer to teach because you're teaching individuals, rather than just teaching a group. And it's particularly important when you've only people coming through for five weeks. Otherwise they're just anonymous".
> (Teacher 6 female physician white)

> "It always surprises me how, how grateful they are for even, what we would consider to be minimal expressions of interest".
> (Teacher 23 male physician white)

> "As a teacher have to care for the needs of the patient, which are paramount, but you have to try and bring out some of the learning points for the students. And that necessarily means that the attention focus isn't on the student".
> (Teacher 5 male physician white)

> "When you're encouraged, and I've had a lot of encouragement from, from consultants and from….and it's really nice."
> (Student 10 Other ethnic group female)

> "[The teaching session] was really like one-on-one, you got loads of attention. And you didn't have the chance to switch off, you know um, they also seemed really keen to make sure that we knew stuff. Like, they actually cared whether we did or we didn't. […] He was like "so, where did you grow up? Where's your family home? Like, why did you decide to do medicine?" […]. "So what do you do in your free time? Basketball?" [laughs] […] And he wrote it all down"
> (Student 11 female white)

In an example of how failing to get to know students as individuals can have a detrimental effect on their performance, an Asian student explained how she was upset and her marks could have suffered because a teacher had not taken the trouble to get to know her, didn't recognise her when she changed her clothes and therefore thought she had not been attending teaching sessions when in fact she had.

N: “Don’t look different any day. Wear the same thing. Because one consultant didn’t know that I was the same person that I’d seen two days previously”
S: “That’s quite amusing”
N: “No it wasn’t”
All: [laughs]
N: “That was the week we were getting graded and he was looking at all the people, he was looking through our logbooks and saying ‘oh yeah, you’ve been here’. […] And I must have looked, I mean I admit I had my hair tied up that day and I had my glasses on and everything. And he said ‘you haven’t been to clinic have you?’ and I said ‘I was there on Tuesday’ and he was like ‘no’. And I had to convince this doctor that I was actually at the clinic.”
(N and S females Indian lower achieving group)

5.1.11. Clinical teachers’ perceptions of the ‘good’ clinical student

Clinical teachers enjoyed and put most effort into teaching students who interacted with them, asked questions, and seemed keen and enthusiastic (e.g. by having done some preparatory reading). Quiet students were perceived as unresponsive, unenthusiastic and unappreciative.

“They [students] should all be intelligent, showing some er, interest in what you’re talking about actually then it’s a more enjoyable situation so you might put more energy into it”.
(Teacher 1 male physician white)

“I find it sometimes difficult to involve somebody who clearly doesn’t want to be involved. And it goes against the grain and you feel cruel and you feel you’re exposing them and then they dry up when they’re actually doing it so you feel you wish you hadn’t”
(Teacher 15 female GP white)

KW: so what’s it like when the students are quiet?
“It’s actually quite difficult. Um, you think ‘oh God is there something wrong with the teaching?’ you know you’re teaching yourself. So you have to ask the other tutors ‘God, are they like with you?’”
(Teacher 22 female GP Asian)

“There has to be a certain minimum willingness on their part to contribute to the teaching sessions, to, if they’re determined to be wallflowers then they take away less”.
(Teacher 4 male physician white)

Although most clinical teachers realised that students generally do not like being humiliated, ignored or otherwise disrespected, some clinical teachers (mainly white males) did describe how they were aggressive towards students they felt were not making sufficient effort to learn.

> "We're busy, we're fairly bullish, um, so there may be gender and ethnicity reasons why some don't turn up, because it's a fairly pressurised environment, as opposed to, we don't cuddle them. […] If you give me five keen students, they get a fantastic deal. If you give me five quiet reticent students they get a crap deal".
> (Teacher 25 male surgeon Other)

> "I get very fed up when they know absolutely nothing and so my style becomes much more domineering and inquisitive, sort of inquisitorial, and um - if that's a word - and um, so, um, you know, aggressive essentially um, but I so respond to, to the situation when they know something".
> (Teacher 1 male physician white)

> "At the end of the day there is an awful lot of learn, there is a limited time to do it and they need to just cut to the chase. A little bit of fear ain't a bad thing from where I come from. I may push someone over the edge and they'll probably commit suicide and I'll be terribly sorry, but that's a risk I will take. […] I expect a standard. If they're prepared to work together, I will work with them, literally the whole time on the firm. If they're not, don't bother me about it, go and get a life because you're not going to enjoy it".
> (Teacher 18 male surgeon white)

5.1.12. Establishing the student-teacher relationship: Students' perceptions of the 'good' clinical teacher

Students liked being taught by teachers who interacted with them, realising that their learning would suffer if they did not. They described how there was competition between students to interact with teachers. Student did not like being taught by teachers who put no effort into teaching, who ignored them, or humiliated them. They explained that they would not feel able to interact in those sessions, or would not attend sessions in which they were disrespected.

> “I think most of when I learn when there’s lots of perhaps student-teacher interaction. […] A few weeks ago a consultant was asking me a question and I was thinking, I was taking my time, that’s fine I’ll take my time, and one of my friends who’s very keen, she jumped in and answered for me before I could even actually answer. Now the fact that I knew the answer didn’t make a difference but she’d jumped in. […] Some consultants will listen to the other student and then the quiet student, or the student that takes their time is suddenly kind of all brushed aside. And that kind of dents your confidence”.
> (Student 2 male Asian)

> “There’s always one or two [students] who are clever and they kind of um, I don’t know, they answer all the questions and they answer your questions, so you look stupid as well. And I think by that they kind of, they learn more. […] A House Officer, he said to me ‘that’s really un-proactive’, and that ‘you’re not going to learn, you have to start talking’ so he actually said to me you know ‘you’ve got to start talking, you’ve got to start listening, because if you don’t talk to the consultant, they’ll assume you’re not listening’”.
> (Student 9 female Chinese)

> “Sometimes the way the teaching is geared, there are kind of bullying tactics that are employed, and I think that’s detrimental because I think a lot of people don’t tend to respond to that. And that will tend to make them quieter, they don’t tend to ask questions and they tend to leave sessions confused. And I think that leads to them thinking ‘there’s no point in me learning because I’m not going to know everything.’”
> (Student 1 female Asian)

Sometimes however, the desire to have teachers interact with them on the personal level was so strong that, even if students were put on the spot and they found it difficult, they preferred this to being ignored.

> “I’ve had consultants who are pretty fearsome and you do do some work for them because you don’t want to feel like a twat; but then other consultants are just so natural and kind of kind that you um, that you don’t want to let them down and so you do work from that point of view and I think that works much better.”
> (Student 12 male white)

> "[The clinical teacher] just kind of ripped me apart. […] It's amazing because I stopped being able to think properly as well because of the pressure. And it was just, quite hard experience. But at the same time I was actually thinking this is good because it will stand me in good stead. So it was a bit of a weird situation. But that wasn't very nice and um, I actually think, I don't think that's the best way to do it, if you're trying to teach um, by humiliation".
> (C male Indian high achieving group)

5.1.13. Having something in common makes it easier establish a relationship

As well enjoying teaching 'good' students, clinical teachers explained how it was easier to establish a relationship with students they felt they had something in common with. Students had also noticed that teachers felt this way. White students believed that they had an easier time than Asian students because they were more similar to their clinical teachers and more similar to the traditional idea of a medical student.

> "It's really hard to be a doctor. I just did a ward round yesterday, the first two patients had a go at me because the health service isn't adequately resourced, never will be. I mean, you have to deal with that. It's not my fault, it's very unfair to criticise me but you have to deal with it, take it on the chin. Be robust. So I like students that are robust and versatile. Tough cookies, answer back a bit, motivated to learn".
> (Teacher 5 male physician white)

> "If I'm very brutally honest I suppose there probably is that element of people who are you know, maybe of a similar you know, sort of background as me, who are quite robust probably respond better to me."
> (Teacher 18 male surgeon white)

> "I think again it's kind of like a kind of subconscious preference for some people. I mean, like, if you can find, the whole thing is how well you get on with the doctor. So if you can find something you have in common with him, like, the mean consultant, he started talking Chinese to us, and we were 'woo!' and he was like 'oooo!' you know. And he felt good about that so obviously we would get on better"
> (Student 9 female Chinese)

> C: “there are lots of white men at the top of medicine”
> L: “for us maybe it’s easier because those old consultants are a bit like our fathers or grandfathers, you know, they’re sweet”
> [A and C nodding]
> A: “yes, some of them wear bow ties and you’re like ‘ahhh’”
> L: “and it’s easier to relate to them because we’re one step closer already to them, we’re used to it”.
> (C, L, A, females white high achieving group)

5.1.14. Perceptions of the ‘typical’ Asian medical student

As well as having a perception of the ‘good’ clinical student, clinical teachers had a perception of the ‘typical’ Asian medical student. Students, including Asians, had similar views to the teachers on this subject. Participants tended to describe the ‘typical’ Asian medical student firstly in terms of their prevalence within the medical student population - commenting on the high numbers of ethnic minority students and the corresponding new minority status of white male medical students.

> “Sixty percent or something of our intake is ethnic minority”
> (Teacher 1 white male physician)

> “I think the ethnic minority at the moment is the white English boy. I haven’t had in the last four lots [of students] a white lad who would have made up the mainstay of medical school entry in my day”
> (Teacher 9 white male surgeon)

> “Wow, I’m really in a minority here, there are hardly any white males at all”
> (M white male high achiever)

Discussing this ethnic balance seemed to prompt participants to make value judgements about ethnic minority and white medical students based on stereotypes. By far the frequently mentioned stereotype to emerge from the data was that of the Asian medical student. White medical students, perhaps because whites are a majority in Britain if not in medical school, tended to be less stereotyped, and their stereotype was essentially a reversal of the Asian stereotype. For example, participants would talk about how Asians were forced into studying medicine by their parents and would then mention that white students on the other hand were more likely to make their own decisions about what to study at university. For this reason, most of the results section is focused on the stereotyping of Asian medical students.

The ‘typical’ Asian medical student was described in terms of three aspects of clinical learning: firstly their relationship with books (medical students have to acquire a great deal of knowledge from textbooks in order to pass their examinations); secondly their relationship with patients (much of clinical medicine is learned from communicating with and examining patients); and thirdly their relationship with teachers (clinical medicine is still a professional apprenticeship, and the relationships that clinical teachers forge with students are important to students’ learning).

In terms of their relationships with books, the ‘typical’ Asian clinical medical student was viewed as conscientious, hard working and bright. Non-Asian participants were more likely to qualify this picture with a flip-side: that being over-reliant on books made the ‘typical’ Asian student inflexible and less able to adapt to new ways of behaving. Thus it was perceived that while Asians come to medical school with excellent school-leaving examination results, learning the nebulous art of clinical medicine requires flexible learning from novel situations rather than rote learning from books, and that such students may struggle in these circumstances.

> “There are some people who just interact more and I get the feeling that you know, [they] happen to be more white [laughs] or whatever, tend to interact more, and in terms of clinical teaching tend to get a lot more out of it. Because it is not just going home and reading the book you know. You cannot make up clinical teaching by reading the book. That’s the problem, no matter how bright you are if you’re not actually there, examining the patient, seeing the patient, learning the clinical setting you won’t learn from looking at the book”
> (Teacher 25 male surgeon Other)

> “The Asian students they are very keen, very studious, industrious.”
> (Teacher 24: male Physician Asian Other)

> “Students that are of South Asian or Indian origin, tend to be, or come across as being far more academically knowledgeable and they can justify what they’re doing and they’re very very bright, but actually putting that into practice and both with communication and practical skills doesn’t seem to gel that well”
> (Teacher 11 female Clinical Skills tutor white)

> “It’s not just Asian students, but perhaps more commonly in certain, certain groups, is that you therefore have to learn to reconcile these irreconcilable factors. And some people can’t do it.”
> (Teacher 15 female GP white)

> “I think, also with ethnic minorities in general they tend to study a lot. Which is fine, that’s just the way the culture is, it’s more, especially if I’m going [laughs] especially in Asian cultures […] And so when it comes to clinical setting they find it difficult.”
> (Student 2: male Asian)

> N: “the Asian students I know, know a lot from books, a lot of the technical detail, whereas I don’t know any of that stuff, that’s just not how I learn”.
> M: “yeah, so in the MCQs and EMQs and stuff which are knowledge based I wouldn’t be surprised if the [ethnic] differences [in attainment] aren’t there”
> (N female, M male white high achieving group)

> “[ethnic minority students] tend to be, people in my group at least, tend to be the ones that know a lot. But know a lot, yeah, […] know a lot from books rather than know a lot from teaching on the wards”
> (Student 5 female white)

One Asian Indian high achieving student believed (from personal experience) that Asian medical students may have worked particularly hard at school and would now do the minimum to pass their exams.

> “Instead of like, wanting to be the best I can be in the year [like I did at school], I’m more like “well as long as I pass, that’s all right”. Do you know what I mean? I’ll deal with whatever happens later on, I’ll get through to next year, deal with next year as it comes and stuff like that. And maybe that’s like the attitude of…I dunno I’m saying, I’m guessing, of a few, fair proportion of the non-whites”.
> (K male Indian high achieving group)

In terms of their relationships with patients, non-Asian participants perceived the ‘typical’ Asian student as a poor communicator, either because of varying degrees of linguistic problems (e.g. accent) which (allegedly) make them feel under-confident, or because they are culturally more formal than white students. The line of reasoning went that since communication skills are an important clinical skill, Asian students will struggle in clinical medicine.

> "It's much more common to come across an Asian student, even if they're English-born that has formal relationships with students than it is to find a, a white British-born person having formal relationships with patients".
> (Teacher 10 female GP white)

> "It isn't their culture, drinking or whatever or playing rugby or hanging around together, they've been individuals the whole time"
> (Teacher 9 male surgeon white)

> "I've had people [students] who are, for example, from the Far East who are extremely polite you know very polite and so on, but may come across um, in not quite the same, just because they're you know of their culture being extremely polite, may not come across [to patients] as well."
> (Teacher 3: male Physician black African)

> "You get a lot of Asians or some whites that are not maybe as good at speaking to the patients. I know this is a real stereotype, but…[sigh], it's really hard to explain because you do have to play a role, when you're, when you go up to a patient and you introduce yourself you slip into a kind of professionalism that you have to, that you just have to portray no matter who you are, to be able to gather information, to be able to come across as a professional"
> (Student 10 female Other Ethnic group)

In terms of their relationships with teachers, the 'typical' Asian student was perceived by non-Asian teachers and one non-Asian student as shy, quiet, reserved and under-confident. This was contrasted with the traits needed to learn successfully in clinical medicine (outgoing personality, confidence, autonomy). Clinical teachers thought this was because Asians were overly respectful of authority.

> "The young girls from Muslim backgrounds who are always very quiet and reserved"
> (Teacher 21 male surgeon white)

> "When you look back at those failures and those failures of um, being, um, you know, that ethnic minority failing group, those I believe are chronically undertaught, they're chronically ignored, chronically under-taught, chronically ignored, and they set it up".
> (Teacher 15 female GP white)

> "Culturally, um, Chinese, Indian cultures are much more respectful, shy, slightly in awe of you that sort of thing, they'll tend to be much more deferential. And I find that difficult".
> (Teacher 18 male surgeon white)

> "Some of these sweet little Asian girlies are very hard to get through to. I'm quite a physically biggish sort of chap, maybe that's another factor. I'm older, obviously that's a factor. I'm male. I'm…they don't communicate terribly well".
> (Teacher 2: male physician white)

> "I think that like you do get a lot of quiet Asian girls in particular"
> (Student 10 female Other ethnic group)

The attributes described above were perceived as partly the result of pressure from family to conform to Asian cultural norms that require young Asians to work hard, have professional jobs, respect their teachers, and get married at an appropriate time to an appropriate person, whether they want to or not. The 'typical' Asian student was seen by Asian and non-Asian participants as more likely to have had led a sheltered life, to be less mature and less autonomous, and more likely to be studying medicine to conform to their parents' wishes. Differences in motivation ('to please parents' rather than for internal reasons) was seen as indicating that Asian students would be less likely to be deep learners, less likely to be caring communicators, less likely to be active participants in their learning, and ultimately less likely to be good doctors.

> "The Asian, first degree coming over from Kenya or wherever, they came over in the sixties when Idi Amin kicked them out, they're very keen on their children achieving excellent attributes. So their children bloody well have to work, there's a work ethic at home, um and they get three 'A' grades at A Level so the authorities let them in because they think three As at A Level is a good thing"
> (Teacher 2 male physician white)

> "Asian parents are quite pushy. Um, that's sort of fact".
> (Teacher 7 female physician Asian)

> "There's no doubt overall Asian students tend to have had much less life experience. I'm generalising here wildly […] they tend to have had much much more um, er, limited world experiences, they have been kept on much tighter leashes and it's very clear to them that those are the expectations within the family, they're going to stay within a certain parameter of behaviours"
> (Teacher 15 female GP white)

“You sometimes find that students who are incredibly disillusioned say “I went in to medicine because of this that and the other, because my parents wanted me to”. […] My parents certainly wanted me to become a doctor but I wanted to. Um, it worked that way. But I think there are a lot of doctors around who….But I mean again, I’m speaking from an Asian background not for anyone else, um, it’s quite well known”
(Teacher 22 female GP Asian)

“There’s a stigma of sort of ethnic families wanting their children to do best and then there’s the whole doctor, lawyer, you know, get the upper, upper rank jobs or whatever they’re called and so I suppose if they’re thinking ‘oh bollocks, I’ve got to choose between 3 jobs, I’ll choose the doctor then’”
(Student 12 male white)

S1: “I need to get a home and get married, that kind of thing and those things are very very important […] as far as families are concerned. And being a woman as well, there are loads of factors that come in to play”.
S2: “I think that’s one of the problems in our culture”
(S1 and S2 female Pakistani high achieving group)

“You do get a lot of Asian families who push their children to be doctors […] Even if we’re born and bred here and we’ve lived here for about 30 years, it’s still the kind of thing: if your son’s a doctor that’s fine”.
(Student 2: male Asian)

A: “There’s a lot of family pressure on Asian students”
N: “yeah, they have to hide the fact that they are going out with a Sikh and they’re Hindu”.
L: “And Asian students have lot of pressure to do well”.
[nodding from the rest of the group]
L: “It’s a cultural thing to do well. I mean my family, obviously they want me to do well, but if I don’t they’re like [shrugs]”
A: “Yes, I’m in medicine because I want to be a doctor, not because it’s a ‘noble profession’”
(A, N, L, females white high achieving group)

5.1.15. Direct discrimination

It is worth pointing out that direct discrimination or racism could in theory explain ethnic minority underperformance. There was however little evidence to suggest that ethnic minority students felt like they were the victims of racism, in fact, some Asian students specifically said that they were not the victims of racism. In an opposite example, one Indian Muslim student who did think that she might be the victim of discrimination from doctors, but she did not feel that she could confront the clinical teachers whom she suspected of discriminating against her so could not be sure. She had been the victim of racist abuse in the street and felt that this experience had made her more suspicious that other people might be racist. She did also discuss how another clinical teacher had been sensitive to the fact that she was Muslim and therefore did not drink alcohol.

> "I'm not sure about the race thing. Because you do get a lot of mixed race um, consultants here themselves. There's a lot of black consultants, a lot of Asian consultants. So I don't think that exists."
> (Student 10 female Other ethnic group)
>
> "Speaking as an Asian myself - well you know, um, I don't, I never really suffered anything, I don't think I've had disadvantages"
> (Student 2 male Asian)
>
> S: "Sometimes you walk down the street and people shout things at you "go back to your own country" bla bla bla. And it makes you more of a cynic" […]
> N: "Being in the hospital it's quite professional, you don't really get that. I've only really sort of experienced that sort of issue you know, um, randomly, you know maybe when I was going in another place. But not to do with medical school at all. I've not had any problems."
> S: "yeah, I don't think – again, it's one of those things – it's never in your face it's not ever someone telling you to go back to your country or anything like that but at the same time, because you have this experience, or because you are ethnic […] you do kind of think 'well…why did I get a lower mark when actually nobody else did in my group?' […] and you just think 'that's not fair'"
> (N and S females Indian low achieving group)

The clinical teachers were more forthcoming about the possibility that some clinical teachers might behave in an unfair discriminatory way towards medical students; although again, this was not generally seen as the reason for ethnic minority underperformance.

> "The [white] student was telling me that he noticed right from the start that the consultant they were attached to seemed only to talk to him. […] The consultant launched into some diatribe about non-white people and how surprised he was that they were allowed into medical school in droves and really very unpleasant and bigoted and racist comments […] So that kind of thing unfortunately does occasionally happen still, but I don't think it's a common eventuality"
> (Teacher 23 male physician white)

> "It's very alienating not to accept other people's differences and I think a lot of senior doctors are not tolerant of other people's differences"
> (Teacher 20 female GP white)

5.1.16. Perceptions of the 'typical' white student

The perception of the 'typical' white student was less well-developed than that of the 'typical' Asian student; however the 'typical' white student was perceived by teachers and students as being an autonomous learner who is dedicated and self-motivated, and who is a tough but sociable team-player, as evidenced by their love of the physical team sport rugby. Clinical teachers perceived the 'typical' white student (especially the female) as confident, outspoken, and a good communicator. This description was not entirely positive: sometimes white students were perceived as pushy or arrogant, but even then, those characteristics were deemed likely to help students succeed.

> "I always felt white UK students often have a lot more liberties without family commitments to do what they want to do".
> (Teacher 12 female GP white)

> "We've set up a medical school and higher education which is largely based on the values of a bunch of middle class white people who talk to their children and expect their children to be out there and up there. Does that make sense? And accept that their children argue back. […] and will trade a little bit of politeness for a bit of independence and creativity"
> (Teacher 15 female GP white)

> "Many of them are born here, don't get me wrong, but they are, the breakdown is such that you don't have your white rugby-playing lad anymore."
> (Teacher 9 male surgeon white)

> "white female students seem to have, for me, the best communication skills with patients. And be most patient-oriented in their approach".
> (Teacher 11 female clinical skills tutor white)

> "The shy and quiet ones often are not you know, Caucasian, not Caucasian, you know, rugby players or the you know, there is undoubtedly a proportion of medical students who are outgoing ebullient-type people"
> (Teacher 25 male surgeon Other ethnic group)

> “I think that might be true that the white people who get into medical school, they’re just across the board they’re more motivated and are doing it for the right reasons and they always have that in mind”
> (B female Indian high achieving group)
>
> “We’re more likely to have good old fashioned hippie parents [laughs]”
> (J male white lower achieving group)
>
> “I think because I play sports and other such things that I’ve naturally always had like, like even now I’ve got a few white mates and stuff like that.”
> (K male Indian high achieving group)

Discussion

5.1.17. Summary of results

This study has shown that teachers of clinical medical students and their students themselves have strong perceptions about ‘typical’ Asian students, and that there is a systematic mismatch between these perceptions and the equally strong perception of what makes a ‘good’ clinical student. These findings are consistent with the hypothesis that negative stereotypes of Asian medical students exist and they may have numerous implications for teaching and learning.

5.1.18. Strengths and limitations of the study

This qualitative work has provided a greater understanding of the possible reasons for ethnic minority medical students’ academic underperformance – an important and under-explored area. The strong theoretical underpinnings of the data analysis were one of its strengths. A theory is a set of concepts used to define and/or explain a phenomenon – theories help us organise knowledge into a framework so we can better understand them (Silverman, 2005). In this case, the qualitative data generated from open-ended questions on the relatively unexplored topic of ethnic minority underperformance and stereotypes could be confusing, and having a theoretical framework for analysing those data helped to conceptualise them, understand them and importantly to generate hypotheses for future testing regarding the ways in which stereotyping, teacher and student interactions, and performance might be related. Another strength of the study was that both students and teachers were interviewed, which provided triangulation for the results; and the data were analysed by two researchers with different backgrounds: one non-clinical psychology researcher and one clinical teacher and medical educationalist, which improved validity and reliability.

This research naturally suffers from some limitations. The study design was based on what students and teachers said they felt and did, not on direct observation of what they actually did. The triangulation of results suggested these descriptions were valid, for example, some teachers said they made the effort to get to know their students as individuals to establish a relationship, and some students said they appreciated it and felt they learned more when teachers made the effort to get to know more about them.

The sex, ethnic group and age of the interviewer (female white British) may have affected participants' willingness to discuss certain topics. For example, whilst conducting the interviews KW perceived that white Clinical teachers who had positive views about white female medical students and rather more negative views about Asian or male medical students felt comfortable discussing these views with her in a way which they may not have had the interviewer been an Asian medical student. The fact that students in the one-to-one interviews felt uncomfortable discussing ethnicity means that potentially important topics may not have been covered. This taboo has been found previously with medical students (Roberts, Sanders & Wass, 2008). The iterative analysis of the student interviews meant that it was possible to change from one-to-one interviews to focus groups when it became obvious that the student interviews were not generating sufficient useful data, which seemed to have the desired effect of encouraging students to talk more freely about ethnicity whilst not compromising overall validity: students in the one-to-one interviews and focus groups gave similar answers to the non-controversial questions, but additional themes arose in the focus groups.

The low participation rate in the focus groups and the relatively low numbers of non-white clinical teachers may have introduced a systematic bias. This is important since low achieving students were less likely to attend the focus group than high achievers, and ethnic minority teachers may have had different ideas to white teachers. This was an exploratory study designed to open up areas for further research: one of the key findings was the difficulty in engaging participation from particular groups of students. This may merit further investigation.

Generalisability is an inherent problem with all qualitative studies. For example, the terms “ethnic minority”, “non-white” and “Asian” are not considered interchangeable in many contexts; however in the context a medical school where the majority of ethnic minority students are of South Asian origin (Indian, Pakistani, Sri Lankan), when participants spoke of “ethnic minorities” or “non-whites”, these terms was interpreted as meaning “Asian” – a term used by many of the Indian and Sri Lankan participants to refer to themselves. However, as mentioned, the aim of this study was not to produce an estimate of the extent or impact of stereotype threat on a particular population or to test hypotheses about it, but to provide a preliminary exploration of the topic with a view to prompting reflection by teachers, students and policymakers, and informing future research.

5.1.19. Comparison with other studies

Previous qualitative studies have explored issues surrounding ethnicity in undergraduate medical education. Simon Sinclair’s (1997) anthropological account of UCL medical school in the early nineties describes how racial stereotypes were voiced or non-verbally indicated by medical students, although he particularly comments on stereotypes of black students. In our study, most comments about black students were concerned with their absence in the medical student population. In a more recent study at another London medical school, students talked about the stereotypical quiet Asian girl, and how they were ‘less able’ and treated less well by consultants (Lempp & Seale, 2006), which is similar to the findings of this study. A study on ‘everyday racism’ at a Canadian medical school described ethnic stereotypes of medical students, but this time in the context of white students being the stereotypical medical student and therefore the type of person that patients expected to see (Beagan, 2003). The data in the above-mentioned studies were not specifically analysed in relation to the effects of ethnic stereotyping on learning, and therefore our study adds a new dimension on previous findings. Those studies and others have shown that ethnic minority students can experience marginalisation and segregation (Beagan, 2003; Lempp & Seale, 2006; Roberts et al., 2008). The relationships between students and the ways in which those relationships affect learning are no doubt extremely important. Our study did look at the ways in which students from different ethnic groups perceive each other, but not the ways in which they felt they behaved towards each other.

Outside of medicine, research has shown that teachers can have stereotypical perceptions of students from different ethnic groups. A study of school children showed teachers believed Chinese school children in the UK (who typically do well academically) to be hardworking, respectful, partly due to parental expectations (Archer & Francis, 2004). Another study found that teachers perceive Asian students as hardworking surface learners (Littlewood, 2000; Kember & Gow, 1991). Other research has shown that employers perceived Asian workers as hardworking, ambitious and academic (Modood,2005). Those perceptions were similar to the stereotype clinical teachers in this study had of Asian medical students. Teachers believed those characteristics had helped Asian students achieve at school, but were detrimental to succeeding in clinical medicine.

5.1.20. Three hypotheses generated from the data

The findings from this study were used to generate three hypotheses to explain ethnic minority or Asian medical students' academic underperformance. In the introduction to this chapter, there was a quote from Greenwald and Banaji (1995) in which they explain how stereotypes influence people to act towards individuals as though they possess traits included in the stereotype. It is this feature of stereotypes which can provide misinformation about individuals. For example, when we are presented with a person who may superficially conform to a stereotype but who is in fact different in important ways, relying on stereotypes can stop us from searching out information about that individual which conflicts with the stereotype (so-called 'confirmation bias': Eysenck & Keane, 2000). It follows that by behaving towards a person as examples of a stereotype, one is less likely to gain knowledge about them as an individual and thus be less likely to form an individual relationship with them. The first and second hypotheses relate to the effect that stereotyping can have on the relationships between students and teachers and subsequent student learning. The hypotheses differ in terms of whether the stereotype is necessarily negative. The third hypothesis relates directly to stereotype threat. Each of the hypotheses is discussed in turn and illustrated in Figure 36 below.

5.1.20.1. Hypothesis 1 – Asian students are more likely than white students to be stereotyped by teachers which impedes the construction of individual student-teacher relationships

The first hypothesis was that Asian medical students are more likely to be stereotyped than white medical students, which makes them less likely to be treated as individuals, and therefore less likely to form constructive educational relationships with their clinical teachers.

The fact that there was a well-defined stereotype of Asian medical students and an ill-defined white medical student stereotype is evidence to suggest that Asians are more likely to be stereotyped than whites. Furthermore, there was good evidence that both students and clinical teachers considered their relationships with each other to be an important aspect of their learning and teaching experiences. Teachers' commitment to this aspect of teaching was evidenced by the fact that many clinical teachers told how they made the effort to get to know their students as individuals in order to foster positive and mutually-beneficial educational relationships with them, despite sometimes finding it difficult to achieve a balance between teaching and patient care.

The importance of student-teacher relationships to learning is well-known in medical education. In their essay on the subject, Haidet and Stein (2006) explain how learning is constructed rather than delivered, and the student-teacher relationship provides the context that shapes that learning process. Within the context of a positive student-teacher relationship, students are able to disclose that they do not understand, can ask more questions, be more attentive and are generally more actively engaged in learning. The importance of individual educational relationships in combating stereotyping was also noted by Steele (1997) who proposed that stereotype threat could be reduced by teachers establishing positive relationships with their students and getting to know them as individuals. Further, it was interesting to note that clinical teachers often found it easier to establish relationships with people they perceived as similar to them, and this was seen as an advantage for white students and by implication a disadvantage for Asian students. On the basis of these findings, it is recommended that clinical teachers become consciously aware that they may need to put more effort into establishing relationships with some students than with others.

5.1.20.2. Hypothesis 2 – the negative stereotype of Asians negatively affects the student-teacher relationship

The second hypothesis states that it is the *negative* stereotype of Asian medical students which make clinical teachers less likely to enjoy teaching them, thus negatively impacting on their relationship and therefore on the students' learning and ultimately their performance. The stereotypical Asian medical student was described as quiet, and there was evidence that clinical teachers did not enjoy teaching quiet students whom they perceived as unenthusiastic - some even saying that they could become aggressive towards students they felt were not putting effort into learning. Similarly, students explained that they learned less from clinical teachers who ignored, humiliated or otherwise disrespected them. Emotions are an important component of the student-teacher relationship: negative emotions such as anxiety and anger interfere with learning, whereas positive emotions improve it (Haidet & Stein, 2006). Clinical teachers with stereotypical views of Asian students as being quiet and unmotivated because they were pushed unwillingly into medicine by their parents may feel less positive about teaching them. This may lead to a negative spiral whereby clinical teachers do not treat the Asian students particularly well, which then makes those students feel less keen and less motivated to learn, thus making them quieter and less interactive, which then leads the clinical teachers to treat them even less well and so on.

5.1.20.3. Hypothesis 3: Asian students underperform because they are under stereotype threat

The third hypothesis was that Asian medical students underperform because they are under stereotype threat. In his seminal paper Steele (1997) explains how, in order for students to underperform due to stereotype threat, they do not need to believe that the stereotype is true, neither do they have to believe that they share characteristics with the negative stereotype of their group, they only have to be anxious that other people will make negative assumptions about them based on the stereotype, or that by behaving in a particular way they are conforming to that negative stereotype. It is clear from this study that a negative stereotype about Asian clinical medical students exists, and both the teachers and the students themselves were aware of it.

According to Steele, the feelings aroused by stereotype threat may then prompt students to try and behave in a way which counters the stereotype. One Asian student participant described such a situation in which she had heard clinical teachers talking about the number of ethnic minority students at medical school and how they presumed that as an Asian student with medical parents, she had been forced into medicine [the stereotype] and so they made it harder for her, meaning she felt under psychological pressure [stereotype threat] and forced to prove that she was worthy of being at medical school. Indeed, to prevent people making stereotypical assumptions about her, she avoided telling people about herself [her reactions to the feeling of being negatively stereotyped]. A female Indian Muslim medical student (S, low achieving group) said she believed her seniors assumed she was 'substandard' on the basis that she wears a headscarf. A male Asian student (Student 2) described how he felt he needed to work extra hard in order to combat any possibility that he would be negatively stereotyped as an underachiever. It is important here to note that those two last students did not describe feeling that way because of overt racial discrimination from clinical teachers, yet they felt that negative assumptions about their group could adversely affect them in a clinical setting. These are just three examples of the different ways in which the feeling of being stereotyped may lead to ethnic minority students to feel and behave in a particular way. However the relationship between stereotyping and performance is not simplistic or deterministic and is probably moderated by a number of different student-dependent factors, such as psychological resilience, personality and so on. Further research is required to unpack the relationships between those factors.

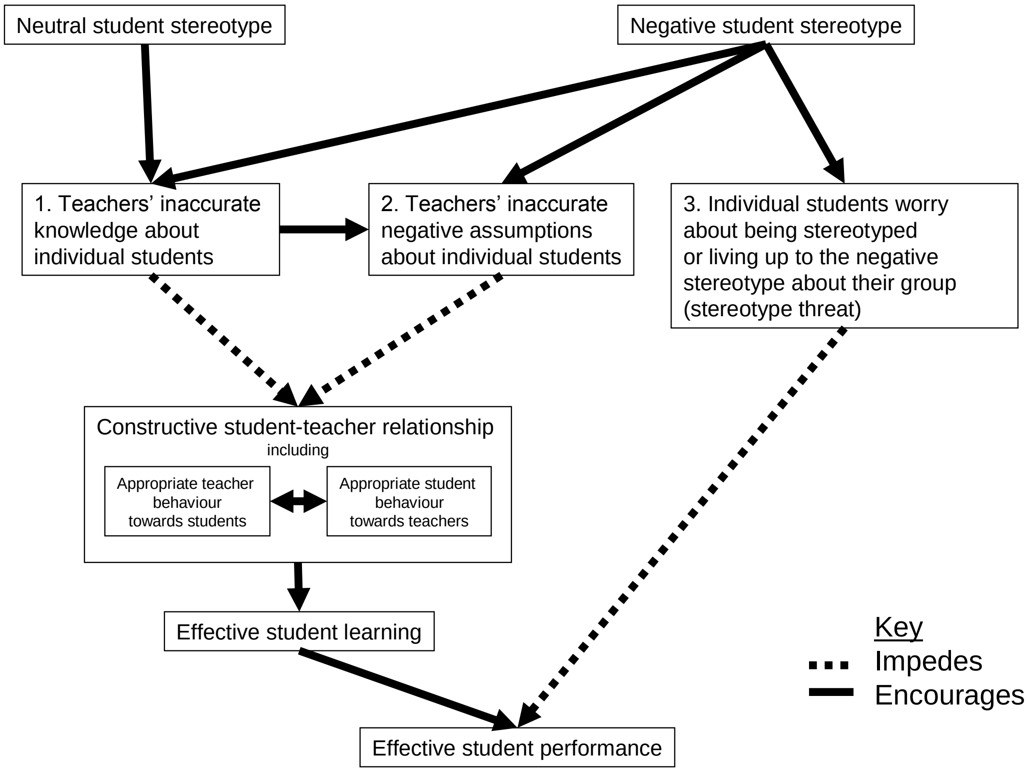


Figure 36: Three hypothesised mechanisms by which stereotypes could negatively affect students' learning and performance

On the basis of the findings presented here, we recommend that clinical teachers should make efforts to get to know their as individuals and that employers should provide the training and infrastructure to help them achieve this task. This could improve the learning of most students, but has the additional advantage for ethnic minority students of countering the effects of stereotyping. The following quote from a clinical teacher vividly illustrates how by getting to know students as individuals, stereotypical views can be overcome, constructive relationships can be fostered, and students can have positive learning experiences.

> "Before [the patient entered] we [the student and I] talked briefly […] just a brief chat about 'who you are, where you come from, um, where you're up to, what are your interests, what have you just done?' […]. Suddenly my interest in her shifted and my perception of her changed and my respect for her went up and that's awful, but I didn't just see 'a student' a-nother student, another Indian, you know, young Asian, frighteningly thin student in front of me, I actually saw this person who was actually quite interesting […]. When patients came in, I don't know, it was just easy to engage her"
> (Teacher 15 female GP white)

5.1.21. Conclusion

Three hypotheses for how teachers' stereotypical perceptions of students might negatively affect their learning and performance have been suggested, and these hypotheses require quantitative testing. Measuring the relationships between stereotyping, teacher and student interactions and student learning will be a challenge not least because of the socially unacceptable nature of ethnic stereotyping. However psychologists have developed tools to measure implicit (subconscious) stereotyping (McConnell & Leibold, 2001). Adapting these tools for use in medical education research could further aid understanding of the complex interactions between ethnicity, attitudes, behaviour, learning and examination performance. Several studies, mainly with US college students, have measured stereotype threat and investigated they ways in which stereotype threat can be manipulated experimentally. The next chapter describes a replication of one such study.

Chapter 6. A prospective, cluster randomised controlled trial to test an intervention to minimise the effects of stereotype threat in ethnic minority Year 3 medical students at UCL

> "All claims to be better than somebody else because you have a different-shaped skull or speak a different dialect are entirely spurious, but they are important so long as people believe in them"
> (George Orwell. The Road to Wigan Pier, 1937)

> "The fact that large-scale societal factors need changing should not prevent us from seeking proximate solutions that are easy to implement"
> (Tony D. Wilson, 2006)

Summary of Chapter 6

A prospective cluster-randomised controlled trial was conducted with a cohort of Year 3 UCL medical students. It was a replication of a US study by Cohen *et al.* (2006) in which African American (minority) school children's academic performance was improved by their completing a written exercise designed to counter the effects of stereotype threat by affirming their self-worth. In the UCL experiment, 348 White (49%) and ethnic minority (51%) Year 3 medical students were randomly allocated via 12 tutors to complete a short written affirmation (n=177) or control (n=171) exercise in the middle of the academic year. Results showed that, as with Cohen *et al.*, the affirmation intervention narrowed the ethnic gap in performance on the end-of-year written assessment; however this was due to a change in the performance of the White students rather than an improvement in the ethnic minority affirmation group. In clinical assessments, the affirmation exercise improved the performance of both White and ethnic minority students. These results showed that having students complete a brief reflective exercise could significantly alter their examination results, but did not support the hypothesis that ethnic minority medical students' performance can be improved by an intervention designed to alleviate the effects of stereotype threat.

Introduction

In Chapter 1 it was shown that ethnic minority students tend to underperform in assessments compared to their white counterparts, and that little is known about the reasons why. In Chapter 3, these ethnic differences in performance were shown to be present in the medical student population, including at UCL where the ethnic gap in performance approximately doubled from Years 1 and 2 to Year 3. In Chapters 3 and 4 it was shown that while previous examination performance accounted for a proportion of the ethnic difference in performance, unexplained variance remained. In Chapter 5, the theory of stereotype threat (Steele, 1997) was introduced, where it was used as a framework to analyse the qualitative data, revealing that both Year 3 clinical medical students and their clinical teachers had negative stereotypical perceptions of so-called 'Asian' students (ethnic minority students with Indian or other South Asian ethnic backgrounds), which was hypothesised to negatively affect those students' learning and performance.

In this chapter, an intervention to minimise the posited effects of stereotype threat on Year 3 UCL medical students' academic performance was tested in a prospective cluster-randomised controlled experiment. The experiment was a replication of a study published in *Science* by social psychologist Geoffrey Cohen and his colleagues (Cohen et al., 2006), in which the authors implemented a written self-affirmation exercise to reduce the negative effects of stereotype threat in an ethnic minority group. In two experiments (the second a replication of the first) Cohen *et al.* randomly allocated 124 African American and 119 European American adolescents to self-affirmation and control conditions. Students in both conditions were asked to rank a list of values, and then those in the affirmation condition wrote a short reflective piece about the value on the list which was most important to them; and those in the control condition wrote a short reflective piece about the value on this list which was least important to them but which might be important to someone else.

Cohen *et al.* explained their theoretical rationale as follows:

> "One potentially effective way to buffer people against [stereotype] threat and its consequences, we suggest, is to allow them to reaffirm their self-integrity. Self-affirmations, by buttressing self-worth, can alleviate the stress arising in threatening performance situations. They can take the form of reflections on personally important, overarching values, such as the importance of family or a self-defining skill".
> (Cohen et al., 1996: p. 1307)

As predicted *a priori*, the affirmation exercise improved the post-intervention academic performance of the African American students, whilst leaving unchanged the performance of both the African Americans in control condition, and of the European Americans in both control and treatment conditions. The pre-intervention ethnic gap in academic performance was narrowed by 40% after the intervention. The experiment provided support for the theory that African American (but not European American) students were stereotype threatened which resulted in their underperformance, and that this threat could be reduced by having them affirm their self-worth. Cohen et al.'s study is important because it shows that a stereotyped group's underperformance can be reduced by a brief, cheap and feasible intervention designed to change students' perceptions of themselves and their ability.

Evidence from other studies suggests that the effect of reducing stereotype threat via affirmation may be generalisable from school pupils to university students (Wilson & Linville, 1985; Aronson, Fried & Good. 2002*;* Walton & Cohen, 2007). Moreover, as described in Chapter 5, there is evidence that the negatively stereotyped group does not have to be African American for stereotype threat to occur - it has been proposed to explain the relative academic underperformance of Latinos (Gonzales, Blanton, Williams, 2002) of women in mathematics (Spencer et al., 1999), and of white men in sport (Stone, Lynch, Sjomeling & Darley, 1999). It was shown in Chapter 5 that a negative stereotype about Asian clinical medical students did exist. Furthermore, as was also explained in the introduction to Chapter 5, being motivated to succeed in a particular domain can make individuals susceptible to stereotype threat in that domain (those who do not care about achieving do not feel threatened), and medical students are known to be academically competitive. It therefore seemed appropriate to test whether the academic underachievement of ethnic minority medical students at UCL, the majority of whom were from white British and Asian Indian British backgrounds, could be reduced by replicating Cohen *et al.*'s methods in that different context.

The methods and results are presented according to the CONSORT guidelines for cluster randomised controlled trials (Campbell, Elbourne & Altman, 2004).

6.1.1. Objective and experimental hypotheses

As shown in Chapter 3, white medical students have consistently achieved higher marks than their ethnic minority counterparts in Year 3 assessments at UCL. The objective of the experiment, which pertained to the individual student level, was to reduce the gap between white and ethnic minority Year 3 students' post-intervention assessment results.

The experiment tested the hypotheses that a brief, written self-affirmation intervention would: 1. improve the end-of-year written examination performance of ethnic minority Year 3 medical students at UCL medical school relative to their mid-term written examination performance; 2. not affect the performance of white Year 3 medical students on the same outcome measure. The hypotheses pertained to the student level.

Methods

6.1.2. Participants

Eligible participants were, at the individual level, all students who started Year 3 at UCL Medical School in 2006. At the cluster level, all Year 3 Reflective Practice Tutors were eligible to take part. The exclusion criterion at the individual level was studying on a course other than the MBBS course, for example the MBPhD course. There were no exclusion criteria at the cluster level. The ethnic profile of the students is reported in Table 4 in Chapter 2. In brief, there were a total of 349 students. 169 were white (of whom n=139 were white British) and n=117 were Asian (of whom n=53 were Indian, and n=32 were Asian Other).

6.1.3. Design

The study was a prospective, cluster randomised controlled trial.

6.1.4. Randomisation

Randomisation is a key to determining the causal relationships between variables in a randomised controlled trial. Usually randomisation occurs at the level of the individual (i.e. an individual is randomly assigned to an intervention group or one of a number of control groups) and thus the observations for each participant can be considered independent. However, in this case it was not possible to randomise at the level of the individual and therefore the randomisation was conducted at the level of the cluster (the tutor). This cluster design was chosen to minimise contamination between students within tutor groups and for the task to appear plausible to students and feasible for tutors (Grimshaw, Campbell, Eccles *et al.*, 2000). Because the number of white and ethnic minority students in Year 3 at UCL Medical School is approximately equal, this method also ensured that there were approximately equal numbers of white and ethnic minority students in each cluster.

There were four tutor groups (A, B, C and D) on each of the three clinical sites, each with one tutor. At the start of the academic year, Year 3 students were randomly allocated by Medical School Administration, using the RAND function in Microsoft Excel, to 24 Professional Development Spine (PDS) tutor-groups run by 12 tutors. Then, six of the tutors were randomly allocated to the intervention (affirmation) condition and six to the control condition by having a member of staff who was uninvolved in the study pull their names from a hat.

6.1.5. Procedure

In Year 3 in 2006/7, as part of the Professional Development Spine (PDS) teaching, it was a course requirement that all students complete reflective essays during each of the four Blocks which comprise Year 3. During each Block, a few essays were chosen by PDS reflective practice tutors for subsequent small group discussions. The intervention took the place of the PDS reflective essay for Block 3 in April and May. The intervention was thus sandwiched between two sets of summative assessments: the mid-term exams which took place in March (week 20/4) and the end-of-year exams which took place in August (week 40/40). This meant that there was both pre-intervention baseline (March examination) and post-intervention outcome (August examination) data for analysis. See Figure 37 for the sequence of events.

The procedure was as follows: in April and May 2007 all students received an email from the PDS administrator Katharine Judith Locke asking them to submit short reflective paragraph on one of a list of example values. All except two values were replications of those in Cohen *et al*, the two additional values were chosen from the General Medical Council's document "Good Medical Practice" (2006) – Table 37 .

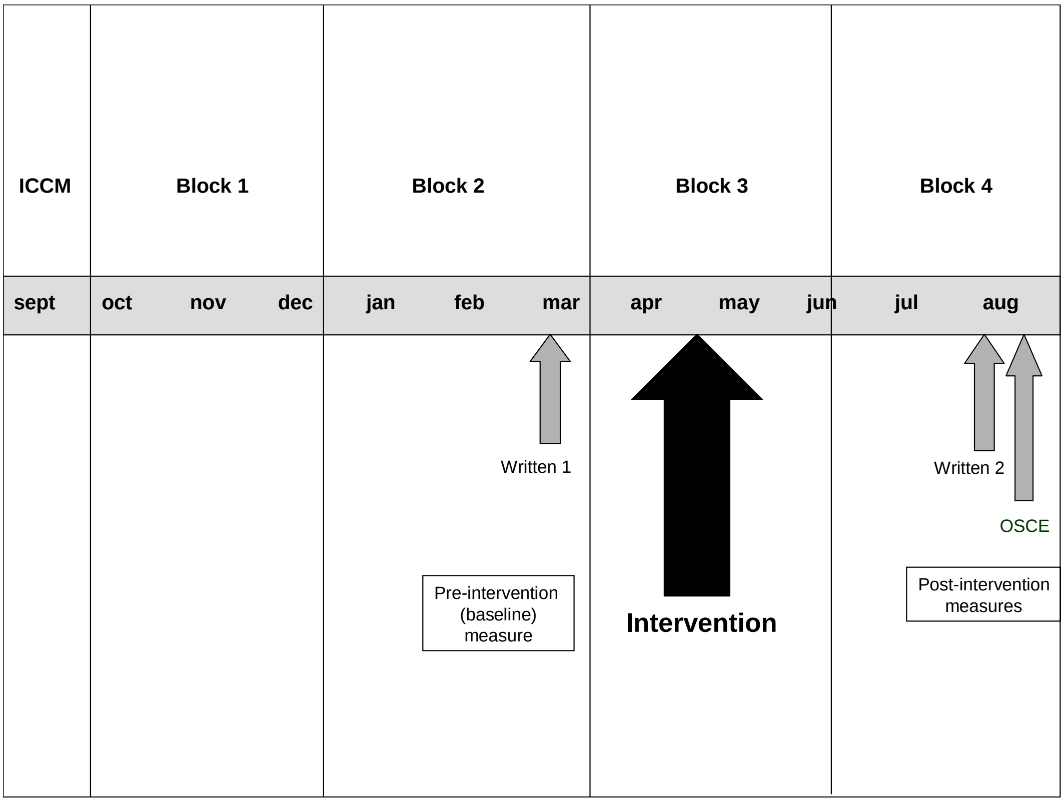


Figure 37: The intervention took place in Block 3, in April and May, after the March mid-term summative written examination (pre-intervention baseline measure) and before the August end-of-term summative written examination and OSCE (post-intervention outcome measures). The Introductory Course to Clinical Medicine (ICCM) takes up the whole of September.

Table 37: Example values given to Year 3 medical students for them to write a reflective piece about, and the document the example value was taken from

Example value	**Source**
Being clever or getting good grades	Cohen *et al.* (2006)
Being a good communicator	Good Medical Practice (2006)
Being a good team worker	Good Medical Practice (2006)
Creativity	Cohen *et al.* (2006)
Independence	Cohen *et al.* (2006)
Living in the moment	Cohen *et al.* (2006)
Membership in a social group (such as your community, racial group, or medical school society)	Cohen *et al.* (2006)
Relationships with friends or family	Cohen *et al.* (2006)
Religious values	Cohen *et al.* (2006)

6.1.5.1. Affirmation group

Students in the affirmation group received an email containing the following instructions together with the example values:

> "Please spend a few minutes thinking about an incident that made you proud of yourself and your values. Then spend about 15 minutes writing a few paragraphs describing the incident, describing your value(s) and then reflecting on the reasons that incident made you proud of your value(s)."
>
> Once you have done this, please indicate how much you agree with the following four statements by typing a number from 1 to 4 next to the end of each statement where 1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree. We are asking you to do this to help you think further about the situation you described in your essay.
>
> - In general I try to live up to this value.
> - This value is important to who I am.
> - I care about this value.
> - This value is an important part of who I am"

6.1.5.2. Control group

Students in the control group received an email containing the following instructions together with the example values:

> "Please spend a few minutes thinking about an incident that helped you to recognise the value(s) of another person which were different from your own. Then spend about 15 minutes writing a few paragraphs describing the incident, that person's value(s) and then reflecting on the reasons you think that person had that/those value(s)."
>
> Once you have done this, please indicate how much you agree with the following statement by typing a number from 1 to 4 next to the end of it, where 1=strongly disagree; 2=disagree; 3=agree; 4=strongly agree. We are asking you to do this to help you think further about the situation you described in your essay.
>
> - This/these value(s) influence(s) some people."

Students emailed their completed reflective essays to Katharine Judith Locke, who set up an automatic forwarding system in Microsoft Outlook so all emails were automatically forwarded to KW. The emails were saved as text files, and submission was recorded in an Excel spreadsheet by KW. Deadlines for submission set by PDS administration were as follows: A groups: 2nd May 2007; B groups: 9th May 2007; C groups: 18th April 2007; D groups: 25th April 2007. Assessment and ethnic data were collected from medical school records.

6.1.6. Independent variables

The independent variables were ethnic group (white or ethnic minority) and intervention condition (affirmation or control).

6.1.7. Outcome measures

The primary outcome measure of this experiment was performance in post-intervention Year 3 written assessments (taken in August 2007), controlling for performance in pre-intervention Year 3 written assessment results (taken in March 2007).

There were two secondary outcome measures: the first was the OSCE score controlling for pre-intervention written score; the second was the post-intervention module score controlling for pre-intervention module score. Year 1 and Year 2 results were not used as a baseline measure because, although they were available for UCL medical students, they were not available for transfer students who had previously been at Oxford or Cambridge. The pre-intervention module results were considered the most valid and reliable baseline measure for the module analyses because they were closest in format to the post-intervention module results.

An overview of Year 3 assessments is given in Chapter 2; however in 2006/7 the Year 3 assessments were numerous and a detailed description of them is provided before further details of the outcome and baseline measures are given. In the academic year 2006/7, Year 3 UCL medical students took four clinical modules, one in each of the four 10-week Blocks. In March 2007, after completing their first two clinical modules, students sat two written summative assessments: one measuring generic clinical knowledge and one measuring knowledge specific to the two modules they had just taken. After completing their remaining two clinical modules, students sat a further two written summative assessments in August 2007. Again, one of these was a generic clinical knowledge paper, and the other measured knowledge specific to the two modules they had just taken. The module-specific written assessments were not identical for all students because at the beginning of the academic year, Medical

School Administration divided students into two groups, which rotated around the modules in converse order. This meant that students in different groups sat slightly different versions of the module-specific papers at those times. To give an example, if Group 1 completed their orthopaedics rotation during the first two modules of the academic year they would sit a paper containing orthopaedics questions in March. This means that the other group, Group 2, would complete their orthopaedics rotation during their second two modules of the academic year, and thus would sit a paper containing orthopaedics questions in August. These two March and August papers - whilst both measuring knowledge of orthopaedics - would, for educational reasons, contain questions which were designed to be slightly different in content yet equivalent in terms of difficulty. This was not the case for the generic clinical knowledge written paper: the whole year group sat the first generic clinical knowledge paper in March and the second in August. Both examinations were designed to test the same knowledge, and therefore students were expected to achieve higher marks in the August examinations, after having had 20 weeks more of clinical teaching. In addition to the written assessments, students also had two types of clinical assessment: an OSCE, which the whole year group sat in August; and four end-of-module firm-based grades which were given by consultants on the basis of students' attendance, attitude, and a case presentation.

6.1.8. Blinding and tutor briefing

All except two tutors were blinded to the research hypothesis (PDS leads Paul Dilworth and Deborah Gill were also tutors, and needed to be informed of the research hypothesis in order for the study to take place. One was in the affirmation and the other in the control condition). All tutors were briefed about the existence of the study in a meeting in December 2006, with the agreement of PDS leads. Tutors were informed that a randomised controlled experiment was taking place to investigate the effects of having students reflect on different topics. They were told that the reflective exercise in Block 3 would therefore be slightly different from previous reflective essays; that students would be emailed specific instructions on how to complete the essays; and that while different tutor groups might have different exercises, all students in each tutor's group would have the same exercise. Tutors in particular were told:

> "All we ask is that you do not discuss the other Condition with your group (e.g. if your group is asked to do the task in Condition 1, please do not discuss the Condition 2 task with them)."

Tutors were given KW's contact details and encouraged to contact her with any questions. See Appendix for tutor briefing.

Students were not informed of the existence of two separate conditions, and were blind to the existence of the study. To explain the slight difference between this reflective exercise and the previous two they had already written, students were told via email that:

> "the instructions are slightly different this block because we would like to know whether it is useful to ask students to reflect on particular subjects."

Those setting the examinations were blind to the existence of the study, and the written examinations were machine marked.

6.1.9. Ethical approval

The study met the conditions set out by the UCL's Graduate School. Students were not informed of the study; however, with the agreement of the ethics committee, an e-mail had previously been sent to all students informing them that their assessment data may be used as the basis of research studies, and giving any who wished the opportunity to opt out of this process. None did so. The PDS lead and Reflective Practice lead also agreed to the study. Reflective practice tutors were informed of the study's existence, and received a briefing report after the study was completed informing them of the aims, experimental hypotheses and results, and inviting them to feed back any comments to the research team.

6.1.10. Analyses

Data were analysed on an intention to treat basis. Unless otherwise stated, two-tailed p values below 0·05 were considered significant. Using Intercooled Stata 8.2 for Windows, a coefficient of intracluster correlation was analysed for the primary outcome measure of post-intervention written score corrected for pre-intervention written score.

6.1.10.1. Transformation of scores

All raw scores were transformed into *z*-scores[14] before further analysis to account for the fact that students sat slightly different versions of the written assessments. Transformation enables scores on different scales to be combined and compared. An average of all pre-intervention written assessment *z*-scores was taken and itself transformed into a baseline written *z*-score. The same was done for the post-intervention written assessment *z*-scores.

6.1.10.2. Primary analysis: The written assessment

Two-way analyses of covariance (ANCOVA) was performed with post-intervention written score as the dependent variable, ethnic group and intervention group as independent variables, and pre-intervention written score as the covariate.

6.1.10.3. Secondary analysis 1: The OSCE assessment

Two-way analyses of covariance (ANCOVA) performed with OSCE score as the dependent variable, ethnic group and intervention group as the independent variables, and pre-intervention written score as the covariate.

6.1.10.4. Secondary analysis 2: The module assessment

Two-way analyses of covariance (ANCOVA) performed on the post-module score with ethnic group and intervention group as independent variables, and pre-intervention module score as a covariate.

6.1.10.5. Validation analyses

Two sets of analyses were performed in order to provide further validation of the results.

6.1.10.5.1. Comparison of ratings given to values

The ratings given to values by students in each group (affirmation and control; and white and ethnic minority) were compared using t-tests in SPSS.

6.1.10.5.2. Comparison of types of words used in the reflective essays

The frequencies of 53 categories of words used in the reflective exercises submitted by each group were counted using Linguistic Inquiry and Word Count software (LIWC: Pennebacker, Booth & Francis, 2001), which groups words into dimensions,

[14] *z*-scores have a mean of 0 and a standard deviation of 1, and are Normally distributed. 95% of Normally distributed scores lie within a range of z=-1.96 to +1.96.

categories, and subcategories. LIWC also provides a total word count, the number of words per sentence, and the percentage of words which are longer than 6 letters.

The frequencies of word categories used in the reflective essays of affirmation and control students, and of white and ethnic minority students were compared using *t*-tests. Due to the number of tests performed, the level of statistical significance was set at $p<0.001$.

6.1.10.6. Exploratory analyses

Exploratory subgroup analyses were performed using ANOVAs and t-tests in SPSS for the purposes of generating hypotheses for future research.

6.1.10.6.1. Oxbridge

As seen in Chapter 4, students who had studied the first two years of their medical degree at Oxford or Cambridge ('Oxbridge' or 'transfer' students) tend to do better in Year 3 assessments compared to those who studied at UCL Medical School throughout the whole group. The effect of including Oxbridge as a variable was therefore analysed.

6.1.10.6.2. Sex

As seen in Chapters 3 and 4, female students generally attain higher marks in Year 3 assessments compared to males. Cohen *et al.* analysed the effect of sex on their results but found no consistent results. It was therefore not feasible to test an *a priori* hypothesis concerning either the sex by ethnic group by intervention interaction, or the effects of the affirmation on males and females' performance; however it was considered of interest to explore whether sex had any effect on the outcomes of the experiment.

Results

Groups were well matched at baseline on sex, ethnic group, age, previous degree possession and preclinical place of study, pre-intervention Year 3 written assessment scores, personality, study habits and stress scores [data regarding personality, study habits and stress measured pre-intervention were available for 134/177 (75.7%) affirmation group and 138/171 (80.7%) control group participants]. Individual participant and tutor characteristics are presented in Table 38 .

Figure 38 shows the trial profile. Data from 335/352 eligible students were analysed (intervention condition n=174; control condition n=161): four students were not on the MBBS course, and 13 were lost to follow up (six with no August examination data and seven with no ethnic data). All clusters were included in the analyses.

Data were analysed on an intention to treat basis; and no important adverse events in the intervention group came to light. The coefficient of intracluster correlation for the main outcome measure was found to be 0 (95% CI: 0 to 0.03). The effect of using a cluster randomised design (the design effect) was calculated using the following equation:

$$\text{design effect} \sim 1 + (\text{average cluster size} - 1)*\text{intraclass correlation}$$

This gave a 95% confidence interval for the design effect of 1 to 1.82, which, as it was smaller than 2, was considered negligible. The remaining analyses were therefore calculated at the level of the individual student, i.e. without taking clustering into account (Kerry & Bland, 1998).

Table 38: Baseline information for each group at individual (student) and cluster (tutor) levels

	Intervention group n= (%)	Control group n= (%)	Total n= (%)	Group differences	p value
Total n= (%)Tutor factors at baseline					
Total	6	6	**12**	n/a	n/a
male	1 (16.7)	2 (33.3)	**3 (25.0)**	n/a	n/a
white	6 (100.0)	5 (83.3)	**11 (91.7)**	n/a	n/a
Student factors at baseline					
Total	177/348 (50.9)	171/348 (49.1)	348 (100.0)		
Mean age	22 yrs, 4 months	22 yrs, 4 months	22 yrs, 4 months	$t(346)=0.81$	0.94
white[15]	80/175 (45.7)	87/166 (52.5)	167/341 (49.0)	$\chi^2=1.87$; df=3	0.60
Asian	64/175 (36.6)	52/166 (31.3)	116/341 (34.0)	$\chi^2=1.87$; df=3	0.60
Chinese	16/175 (9.1)	12/166 (7.2)	28/341 (8.2)	$\chi^2=1.87$; df=3	0.60
All Other	15/175 (8.6)	15/166 (9.1)	30/341 (8.8)	$\chi^2=1.87$; df=3	0.60
male [16]	69/176 (39.2)	59/171 (34.5)	128/347 (36.9)	$\chi^2=0.82$; df=1	0.36
Graduate entry[17]	23/176 (13.1)	20/166 (12.1)	43/342 (12.6)	$\chi^2=0.10$; df=1	0.75
With iBSC[17]	107/176 (60.8)	101/166 (60.8)	208/342 (60.8)	$\chi^2=0.20$; df=1	0.89
Oxford or Cambridge transfer	21/177 (11.9)	30/171 (17.5)	51/348 (14.7)	$\chi^2=2.24$; df=1	0.13
Mean pre-intervention written *z score*	0.049 (S.D.=0.96)	-0.051 (S.D.=1.04)	0.00 (S.D.=1.00)	$t(343)=-0.92$	0.36
Mean Neuroticism score	8.1 (S.D.=2.3)	7.8 (S.D.=2.3)	8.0 (S.D.=2.3)	$t(270)=-0.8$	0.45
Mean Conscientious-ness score	11.3 (S.D.=2.6)	11.3 (S.D.=2.0)	11.3 (S.D.=2.3)	$t(272)=0.2$	0.86
Mean Openness score	11.1 (S.D.=2.2)	10.9 (S.D.= 2.4)	11.0 (S.D.=2.3)	$t(272)=-0.9$	0.39
Mean Agreeableness score	13.3 (S.D.=1.6)	13.0 (S.D.=1.6)	13.2 (S.D.=1.6)	$t(268)=-1.8$	0.07
Mean Extraversion score	11.6 (S.D.=2.1)	11.6 (S.D.=1.8)	11.6 (S.D.=1.9)	$t(271)=-0.13$	0.90
Mean Surface study score	14.9 (S.D.=3.9)	14.7 (S.D.=3.4)	14.8 (S.D.=3.6)	$t(265)=-0.5$	0.61
Mean Strategic study score	18.5 (S.D.=5.4)	17.7 (S.D.=4.7)	18.1 (S.D.=5.1)	$t(266)=-0.8$	0.45
Mean Deep study score	19.4 (S.D.=4.1)	19.3 (S.D.=3.9)	19.3 (S.D.=4.0)	$t(267)=-0.3$	0.79
Mean GHQ (stress) score	11.4 (S.D.=5.3)	10.2 (S.D.=4.4)	10.8 (S.D.=4.9)	$t(262)=-1.9$	0.06

[15] 7 missing
[16] 1 missing
[17] 6 missing for graduate and iBSc data combined

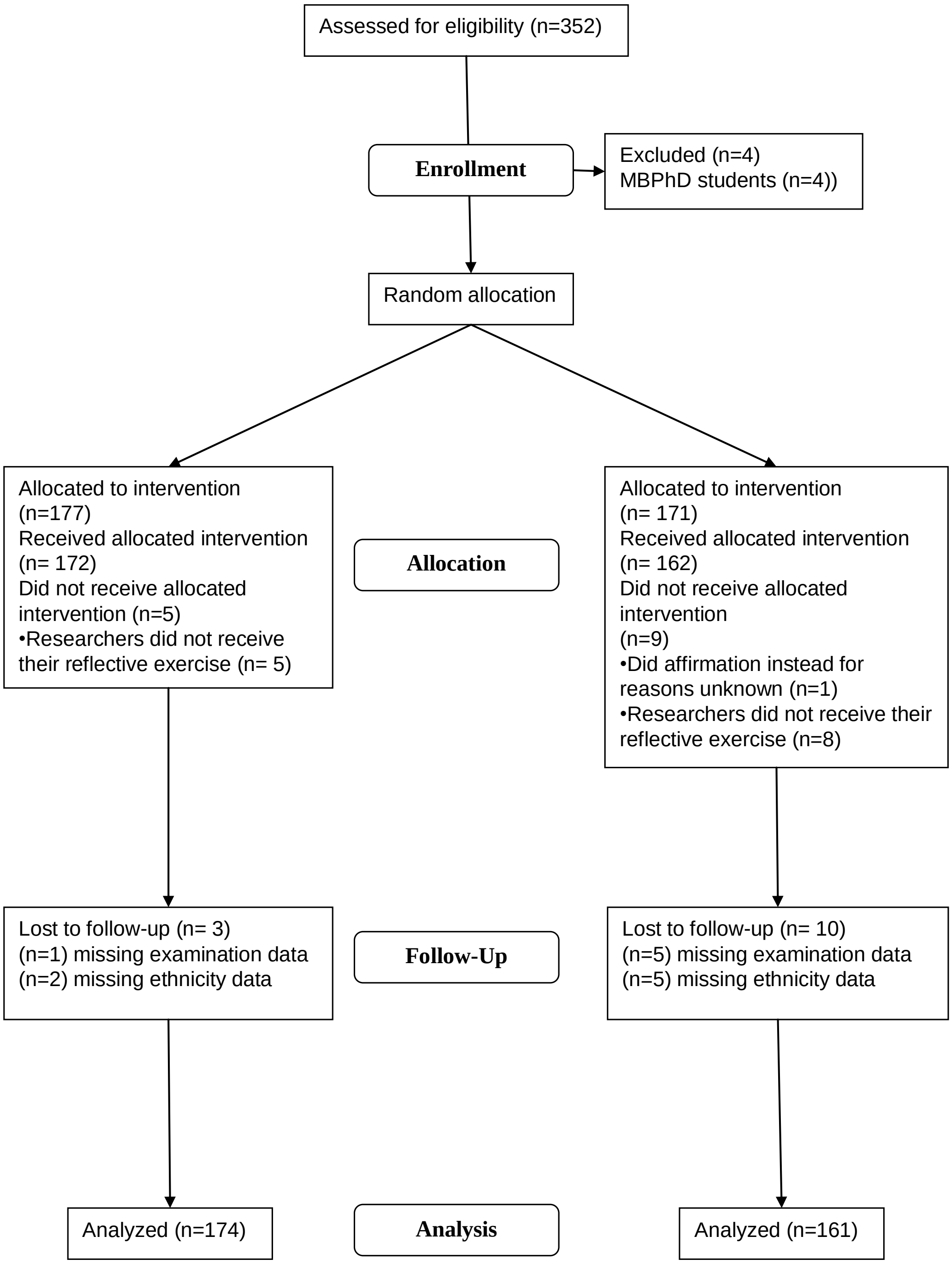


Figure 38: CONSORT flow diagram showing the study profile

6.1.11. Primary analysis: the written assessment

Analysis of covariance of post-intervention written performance with baseline written performance as a continuous covariate ($p<0.001$), showed a main effect of ethnic group, with white students (mean z=0.078; 95% CI=-0.022 to 0.179) achieving higher mean scores than ethnic minority students (mean z=-0.077; 95% CI=-1.176 to 0.022) [$F(4,334)=4.64$; $p=0.032$]. There was no main effect of intervention ($p=0.121$). Importantly, as found in the Cohen et al (2006) study, there was a significant ethnic group by intervention interaction [$F(4,334)=5.74$; $p=0.017$] which is shown in Figure 39[18].

Post hoc comparisons using the Ryan-Einot-Gabriel-Welsch procedure (Howell, 2002) confirmed that the four groups (white intervention, white control, ethnic minority intervention, ethnic minority control) performed significantly differently [$F(3,334)=5.76$; $p=0.017$], and the interaction effect was due to the white students in the control condition performing significantly better than all other groups [mean difference between control and affirmation group scores in white group=0.283 (95% CI=0.093 to 0.474)], rather than improved ethnic minority intervention group performance [mean difference between control and affirmation group scores in ethnic minority group=-0.060 (95% CI=-0.268 to 0.148)]. See Table 39 .

Table 39: Means, standard deviations, standard errors and 95% confident intervals for each group on the main outcome measure of post-intervention written *z*-score corrected for pre-intervention written *z*-score

Condition	Ethnic group	N	Mean	SD	SE	95% CI
Affirmation	white	79	-0.064	0.644	0.072	-0.208 to 0.081
	ethnic minority	95	-0.047	0.687	0.071	-0.187 to 0.093
Control	white	84	0.220	0.589	0.064	0.092 to 0.348
	ethnic minority	77	-0.107	0.686	0.078	-0.263 to 0.049

[18] Figure 39 shows the ethnicity by intervention interaction on the non-standardised residual of the post-intervention measure after taking baseline performance into account which is statistically equivalent to the Analysis of covariance of post-intervention performance with baseline performance as a continuous covariate

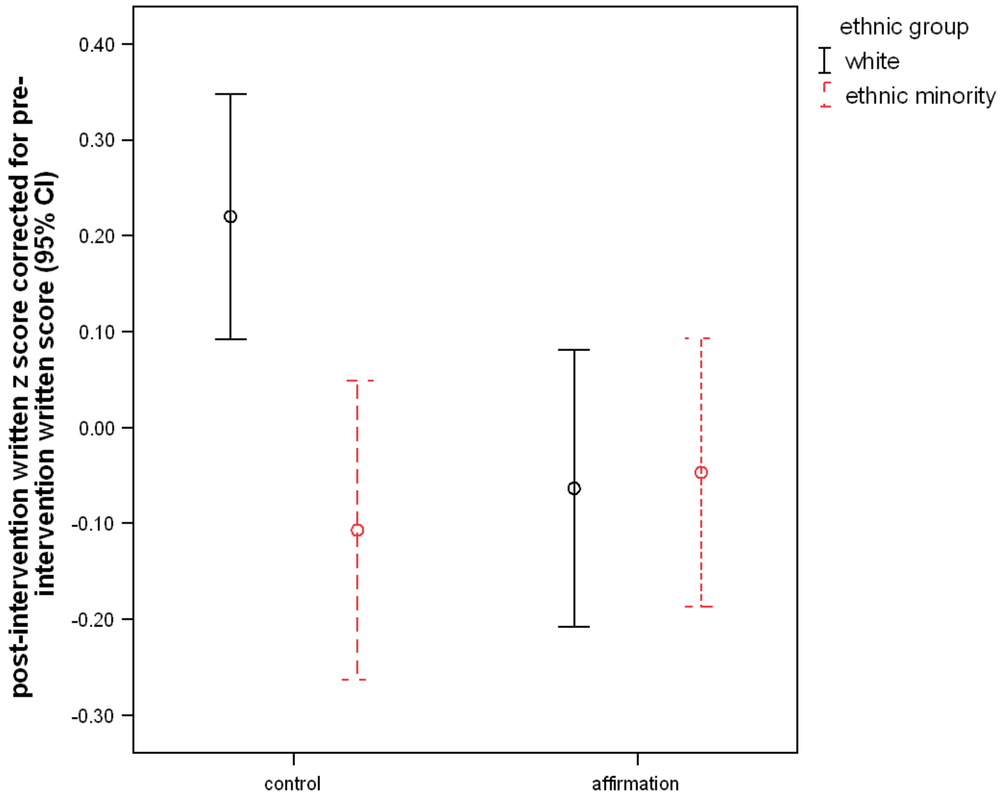


Figure 39: The significant (p<0.017) ethnic group by intervention interaction on corrected post-intervention written assessment score, which is due to the significantly higher performance of the white control group (error bars with 95% confidence intervals).

A scatterplot of post-written results corrected for pre-intervention results in Figure 40 shows that there were few outliers in the white affirmation group. This absence of significant outliers together with the overall homocedasticity within the groups, indicates that the effect of the intervention was due to an overall shift in the performance of the white affirmation group, rather than a large shift in the performance of a small number of individuals in that group.

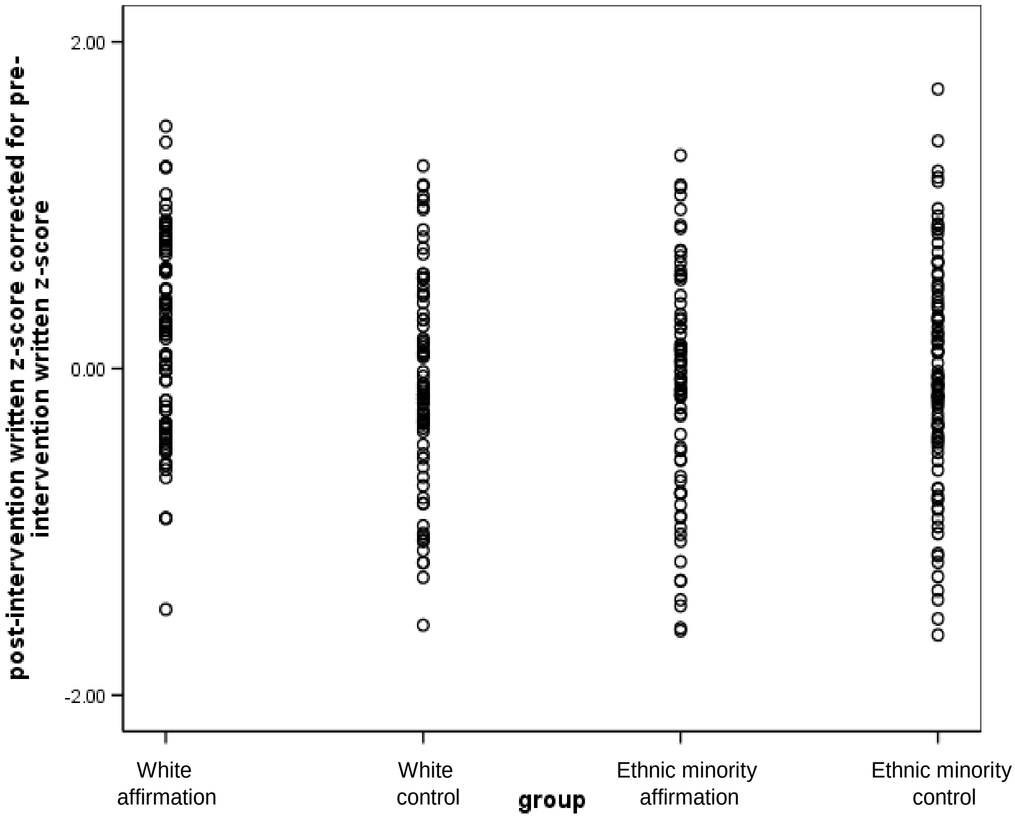


Figure 40: Scatterplot showing the spread of scores on the residual of the post-intervention written *z*-score regressed onto the pre-intervention written *z*-score for white and ethnic minority students in the affirmation and control groups

In order to explore the result further, the analyses were repeated on the common conditions written examination, and the module-specific written examination results, respectively. On the post-intervention generic clinical knowledge score with pre-intervention generic clinical knowledge score as a covariate ($p<0.001$), the main effect of ethnic group was significant [$F(1,334)=6.87$;$p=0.009$], and the ethnic group by intervention interaction did not quite reach statistical significance [$F(1,334)=2.92$;$p=0.088$]. On the post-intervention module-specific written paper with pre-intervention module-specific written paper as a covariate ($p<0.001$) there was no main effect of ethnic group [$F(1,334)=1.04$;$p=0.310$], no effect of intervention [$F(1,334)=0.60$;$p=0.440$] and the ethnic group by intervention interaction did not quite reach statistical significance [$F(1,334)=2.84$;$p=0.093$].

6.1.11.1. How do *z*-scores relate to raw scores? An explanatory note

Whilst *z*-scores are mathematically useful, it is not always immediately obvious how they translate into the raw scores obtained by students. *z*-scores have a mean of 0 and a standard deviation of 1, therefore a *z*-score of 0.23 is equivalent to a score which is approximately a quarter of a standard deviation above the mean. It was not possible to translate this directly into a post-intervention written raw score due to the *z*-score being an amalgamation of various different scores (hence the purpose of the initial transformation); however to give a general idea of what a *z*-score of 0.23 means in terms of raw written exam scores, an example is given using the mean of all the mean raw written assessment scores, which are expressed as percentages (see Table 40). The mean of the four written assessments for all participants was 68.64, with a standard deviation of 8.34. Therefore a score which is 0.23 standard deviations above that mean is equivalent to a raw score of 70.56, which is greater than the overall mean of 68.64 by 0.23*8.34=1.92 raw marks, meaning a *z*-score of 0.23 is approximately equivalent to a score 2 raw marks higher than the average. Therefore, from the figures in Table 40 it can be seen that in the control condition white students achieved approximately 3 more raw marks than ethnic minority students, whereas in the affirmation condition they only achieved 0.2 marks more.

Table 40: Means and standard deviations of raw written Year 3 assessment scores in 2006/7 (percentage)

Written assessments	N	Range	Mean	Std. Deviation[19]
Generic 1	345	40.0 to 90.7	70.98	9.09
Module-specific 1	342	31.0 to 82.8	64.28	8.45
Generic 2	342	48.0 to 86.7	72.81	7.76
Module-specific 2	345	40.0 to 85.0	66.47	8.00
Mean	344	39.8 to 86.3	68.64	8.34

6.1.12. Secondary analysis 1: the OSCE assessment

Analysis of covariance of post-intervention OSCE performance with baseline written performance as a continuous covariate ($p<0.001$), showed a main effect of intervention, with students in the affirmation condition outperforming those in the

[19] The appropriate average of standard deviations is calculated using the arithmetic mean on the variance scale

control condition [F(4,334)=6.17; p=0.013]. There was also a main effect of ethnic group, with white students (mean z=0.097; 95% CI=-0.043 to 0.237) achieving higher mean scores than ethnic minority students (mean z=-0.108; 95% CI=-0.245 to 0.030) [F(4,334)=4.18; p=0.042]. The interaction term was non-significant [F(4,334)=0.090; p=0.76] and thus there was no indication that the affirmation task had particularly improved the ethnic minority students' performance. See Figure 41 .

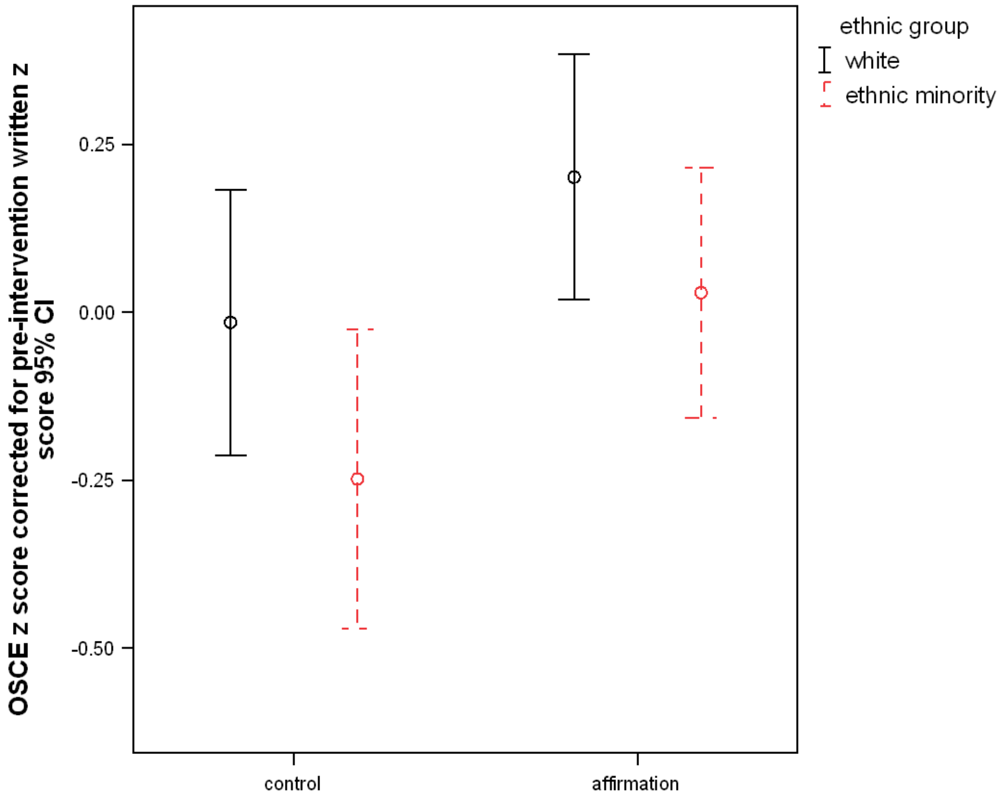


Figure 41: Affirmation significantly improved both white and ethnic minority performance on the OSCE corrected for baseline written performance (p=0.013)

6.1.13. Secondary analysis 2: the module assessment

Analysis of covariance of post-intervention module performance with baseline module performance as a continuous covariate (p<0.001), showed a main effect of intervention group [F(4,334)=7.65; p=0.006] with those in the affirmation condition outperforming those in the control condition. See Table 41. There was no significant interaction (p=0.94), nor a main effect of ethnic group (p=0.82). Including baseline written score instead of baseline module score as a covariate in the equation (F=4.3; p=0.039) did not significantly alter the findings.

Post hoc t-tests showed that there was an ethnic effect in the expected direction in the pre-intervention module results [t(338)=2.07; p=0.039], but not on the uncorrected post-intervention module results [t(334)=1.21; p=0.229]. OSCEs are typically less reliable than machine marked written examinations, and module assessments are less standardised than OSCEs so it would be expected that they are less reliable than either the OSCE or written assessments. As the ethnic differences on the module assessments were small and only marginally significant (pre-intervention t=2.09; p=0.039), the most likely reason for a lack of ethnic difference on the raw post-intervention result was that it was masked by statistical 'noise'.

Post-intervention module scores in the control students tended to be slightly lower than their pre-intervention module scores; whereas there was a non-significant trend towards ethnic minority students in the affirmation condition improving (there was no such difference in the white affirmation condition). An alternative explanation for the lack of an ethnic effect in the raw post-intervention module results then is that the improvement in the ethnic minority affirmation group tipped the previously small ethnic difference into non-significance (see Figure 42)**.**

Table 41: Mean group scores on post-intervention module *z*-score corrected for pre-intervention module *z*-score

Condition	Ethnic group	N	Mean	SD	SE	95% CI
Affirmation	white	79	0.140	0.595	0.067	0.006 to 0.273
	ethnic minority	95	0.152	0.688	0.071	0.012 to 0.292
Control	white	85	-0.145	1.275	0.138	-0.422 to 0.129
	ethnic minority	77	-0.118	0.960	0.109	-0.335 to 0.100

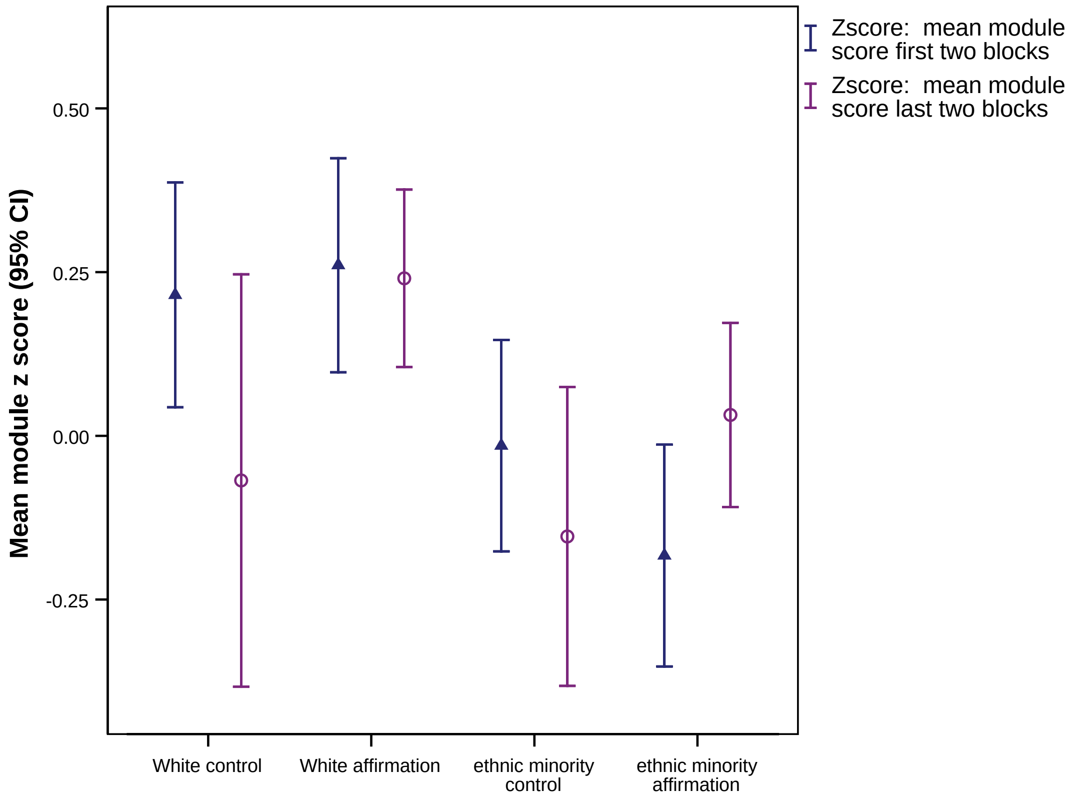


Figure 42: Mean pre-intervention (first two blocks – blue triangles) and post-intervention (last two blocks – purple circles) module *z*-scores by group

6.1.14. Validation analyses

6.1.14.1. Comparison of ratings given to values

A mean of the four ratings given to the statements by students in the affirmation condition was calculated and compared to the rating given to the statement by students in the control condition. The maximum score was 4 (e.g. “I strongly agree that this value is an important part of who I am”) and the minimum score was 1 (e.g. “I strongly disagree that this value is an important part of who I am”). Value data were missing for five students in the control condition and seven students in the affirmation condition.

The mean in the affirmation group was slightly higher than that in the control group, but overall students in the affirmation condition agreed that the value they had reflected on related to themselves, and students in the control condition agreed that the value they had reflected on related to other people. Similarly, the white and ethnic minority students similarly hardly differed in the ratings they gave the statements. The means and standard errors of the mean for the ethnic and intervention groups are shown in Table 42 .

Table 42: white and ethnic minority students' agreement (mean and standard error of the mean) with statements that the value they wrote about was important to them (affirmation condition) or was important to other people (control condition)

Condition	Ethnic group	N	Mean	SD	SE	95% CI
Affirmation	white	71	3.62	0.39	0.047	3.53 to 3.71
	ethnic minority	89	3.59	0.46	0.049	3.50 to 3.69
Control	white	74	3.35	0.78	0.091	3.17 to 3.53
	ethnic minority	67	3.22	0.65	0.079	3.07 to 3.38

6.1.14.2. Comparison of types of words used in the reflective essays

6.1.14.2.1. Affirmation and control groups

The affirmation group used significantly more 'I' and 'Self' pronouns, whereas the control group used significantly more 'Other' pronouns, providing evidence that the groups completed the task as requested, with those in the affirmation groups being more likely to write about themselves, and those in the control groups being more likely to write about others. The control groups also used significantly more negations and tentative words compared to the affirmation group, which suggests that they were writing about other people's values which were not their own, and which they were therefore less certain and more tentative about. The tentative words were perhaps used in conjunction with causation words (of which the control group used significantly more) – one way of inferring other peoples' values is by speculating on the causes of their behaviour (e.g. "….*maybe* (tentative) they did that *because* (causation)…"). The reason for the differences in the number of 'relativity' words used by each group is less clear. Frequencies and t-test results are shown in Table 43 .

6.1.14.2.2. white and ethnic minority groups

As expected, with significance set at the 99% confidence level, students in the white and ethnic minority groups differed very little in the numbers of different types of words they used in their reflective exercises, only on "hearing" words such as "heard" "listen" and "sound" did ethnic minority students score significantly higher, although why this might be is unclear (see Table 44)

Table 43: Comparison between the numbers and types of words used in the control and affirmation groups' essays. Examples of words are given in parentheses. Only differences significant at the p<.05 level are shown in the table (except word counts), and those significant at p<.0001 are highlighted

Dimensions	**Word categories**	**Type of word**	**Group with highest frequency**	**Mean use by all students**	**Mean group difference (control – affirmation)**	**P value**
Standard linguistic dimensions		*Word count*	*affirmation*	*416.7*	*-19.2*	*0.34*
		Words per sentence	*control*	*26.9*	*0.27*	*0.74*
		% dictionary words	affirmation	75.5	-1.1	0.04
		% words longer than 6 letters	control	21.2	1.7	0.001
	Pronouns	Pronoun super	affirmation	10.9	-1.1	0.001
		I (I, my, me)	affirmation	5.0	-2.7	<0.0001
		Self (I, we, me)	affirmation	5.9	-2.6	<0.0001
		Other (she, their, them)	control	3.3	1.4	<0.0001
		Negations (no, never, not)	control	1.1	0.4	<0.0001
		Prepositions	affirmation	14.4	-0.4	0.04
		Numbers	affirmation	1.12	-0.3	0.001
		Positive emotions super	affirmation	2.9	-0.3	0.02
Psychological processes	Affective or emotional processes	Optimism and energy	affirmation	0.9	-0.4	
		Cognitive processes super	control	6.9	0.1	0.045
	Cognitive processes	Causation (because, effect, hence)	control	1.1	0.4	<0.0001
		Tentative (maybe, perhaps, guess)	control	1.8	0.5	<0.0001
		Hearing	affirmation	0.9	-0.2	0.01
	Sensory or perceptual processes	Social processes super	control	9.0	1.3	0.002
	Social processes	Time super (hour, day, o'clock)	affirmation	6.2	-1.0	<0.0001
Relativity	Time	Past tense verb	affirmation	6.6	-1.1	0.001
		Present tense verb	control	0.2	0.7	0.02
		Future tense verb (will, might, shall)	control	1.0	0.3	<0.0001
		Down (down, below, under)	affirmation	0.2	-0.1	<0.0001
	Space	Exclusive (but, except, without)	control	3.7	0.6	<0.0001
		Motion (walk, move, go)	affirmation	0.9	-0.4	<0.0001
	Motion	Achieve	affirmation	1.1	-0.3	0.005
Personal concerns	Occupation	Sports	affirmation	0.4	-0.3	0.02
	Leisure activity	Music	affirmation	0.1	-0.1	0.05
		Money	control	0.2	0.1	0.04
	Money/ financial issues	Metaphysical Super	control	0.2	0.2	0.015
	Metaphysical issues	Religion	control	0.2	0.2	0.02

Table 44: Comparison between numbers and types of words used in white and ethnic minority students' essays. Examples of words are given in parentheses. Only differences significant at the p<0.05 level are shown in the table, and those significant at p<0.0001 highlighted.

Dimensions	Word categories	Type of word	Group with highest frequency	t	Mean use by all students	Mean Difference between groups	p value
Standard linguistic dimensions	%of dictionary words		ethnic minority	-2.0	75.5	-1.2	0.04
	Total pronouns	Pronoun	ethnic minority	-2.8	10.9	-0.9	0.01
Psychological processes	Affective or emotional processes	Optimism and energy (certainty, pride, win)	white	2.0	0.9	0.2	0.05
	Cognitive processes	Cognitive processes	ethnic minority	-2.2	0.1	-0.5	0.03
	Sensory and perceptual processes	Hear (heard, listen, sound)	ethnic minority	-3.5	0.9	-0.3	<0.001
	Social Processes	Communication (talk, share converse)	ethnic minority	-2.4	2.2	-0.4	0.02
Relativity	Motion	Motion (walk, move, go)	ethnic minority	-2.5	0.9	-0.2	0.01
Personal Concerns	Occupation	Job or work (employ, boss, career)	white	2.2	1.1	0.2	0.03
	Metaphysical issues	Religion (God, church, rabbi)	ethnic minority	-2.1	0.2	-0.2	0.04

6.1.15. Exploratory analyses

6.1.15.1. The effects of Oxbridge

Oxbridge students outperformed UCL medical students in the overall pre- [$t(343)=-2.58$; $p<.0001$] and post-intervention [$t(340)= -3.81$; $p<.0001$] written assessments. A two-way ANOVA showed a significant main effect of Oxbridge, a marginally significant effect of ethnic group ($p=0.05$) and no Oxbridge by ethnic group interaction. It can be seen in Table 45 that on the baseline written measure, white Oxbridge students outperformed ethnic minority Oxbridge students as well as white and ethnic minority UCL medical students, and ethnic minority Oxbridge students performed at least as well as white UCL medical students. Ethnic minority UCL medical students had the lowest mean baseline scores.

Sub-analyses on the main outcome measures were conducted including Oxbridge as an additional independent variable.

Table 45: Mean pre-intervention written *z*-scores for white and ethnic minority UCL and Oxbridge medical students

		Mean pre-intervention written *z score*	**SD**	**SE**	**95% CI**
UCL	white	0.005	0.970	0.08	-0.158 to 0.168
	ethnic minority	-0.101	1.019	0.08	-0.265 to 0.064
Oxbridge	white	0.569	0.859	0.19	0.222 to 0.916
	ethnic minority	0.082	1.071	0.20	-0.370 to 0.534

Figure 43 shows the significant interaction between ethnic group, intervention and Oxbridge on written outcome measure [F(7,334)=6.25; p=0.013]. *Post hoc* within-group tests were performed on the UCL and Oxbridge subgroups. In the Oxbridge group, there was a significant ethnic group by intervention interaction [F(3,47)=13.01; p=0.001]. Further *post hoc* testing using the Ryan-Einot-Gabriel-Welsch procedure showed a replication of Cohen *et al.*'s results. Ethnic minority affirmation students achieved scores which were significantly higher than the ethnic minority control students' scores [F(3,47)=5.06; p=0.004], whereas the white affirmation group scores did not differ significantly from the white control group scores.

In the UCL subgroup by contrast, the ethnic group x intervention interaction found in the overall cohort was no longer statistically significant (p=0.16). There were main effects of ethnic group and intervention with white students [F(3,286)=5.45; p=0.02] and those in the control condition [F(3,286)=4.31; p=0.04] outperforming ethnic minority students, and those in the affirmation condition outperforming those in the control condition.

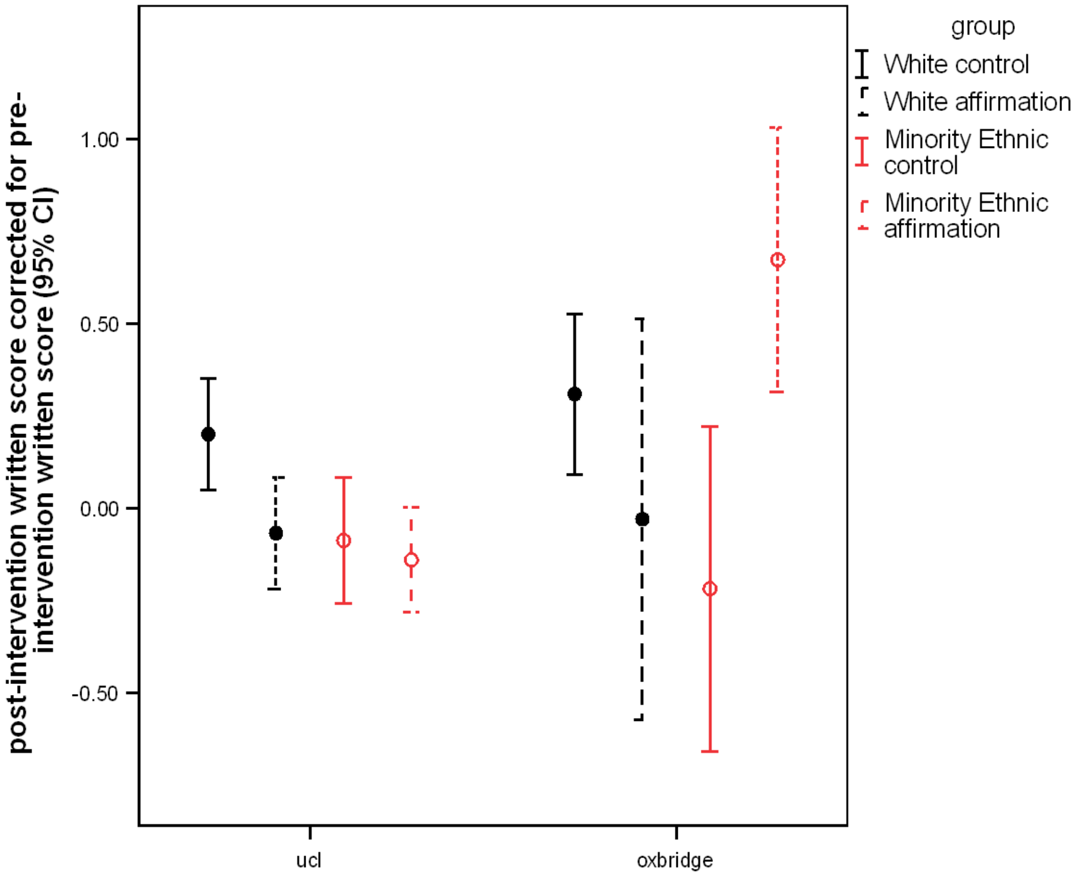


Figure 43: The significant three-way interaction between ethnic group, intervention and Oxbridge on the written exam (p=0.013). In the Oxbridge group the intervention affected only the ethnic minority Affirmation group who scored higher than their ethnic minority control counterparts (p=0.004). In the UCL group, there was no significant interaction, only main effects of ethnic group (white>ethnic minority) and intervention (control>affirmation).

On the uncorrected OSCE, Oxbridge students achieved higher scores than UCL medical students [*t*(340)=-2.34; p=0.02]. An exploratory 3-way ANOVA on OSCE corrected for pre-intervention written examination showed that the pattern of results was broadly similar for both Oxbridge and UCL groups with a main effect of intervention [F(4,334)=6.65; p=0.01] (see Figure 44)

There were no significant differences between Oxbridge and UCL students on the uncorrected module scores [pre-intervention: *t*(345)=-1.4; p=0.17; post-intervention: *t*(341)=-0.58; p=0.56] and no further tests were carried out.

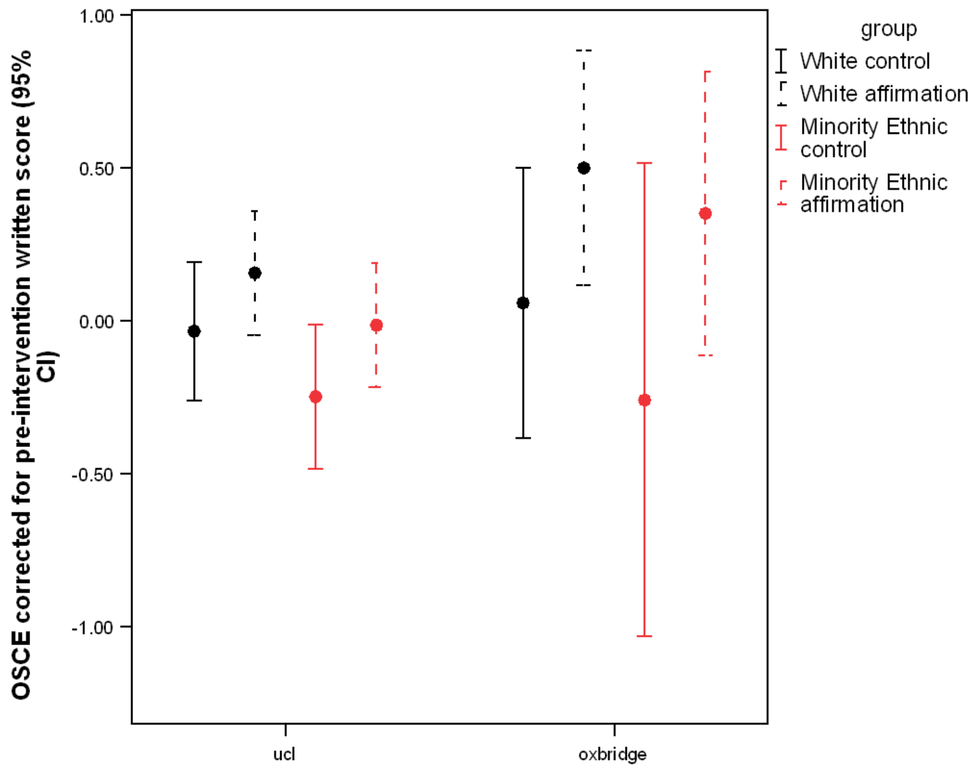


Figure 44: On the OSCE outcome measure, the intervention had similar effects on both Oxbridge and UCL students: the affirmation improved the performance of both white and ethnic minority students

6.1.15.2. The effects of sex

The means and standard deviations on the corrected post-intervention written examination for males and females in the affirmation and control conditions are given in Table 46 .

Table 46: Means and standard deviations on the main outcome measure of post-intervention written *z*-score corrected for pre-intervention written *z*-score for males and females in the affirmation and control conditions

Condition	Sex	N	Mean	SD	SE	95% CI
Affirmation	female	106	-0.105	0.685	0.067	-0.237 to 0.027
	male	69	0.010	0.642	0.077	-0.145 to 0.164
Control	female	109	0.145	0.650	0.062	0.021 to 0.268
	male	57	-0.078	0.645	0.086	-0.249 to 0.094

A three-way ANOVA on the corrected post-intervention written score showed no significant interaction between sex, ethnic group and intervention, but there was however a significant sex by intervention interaction [$F(8,333)=5.67$; $p=0.018$]. The ethnic group by intervention interaction found in the primary analysis remained significant [F(8,333)=4.52; p=0.034]. *Post hoc* analyses using the Ryan-Einot-Gabriel-Welsch procedure indicated that the effect was due a reduced performance in female students in the affirmation condition – see Figure 45.

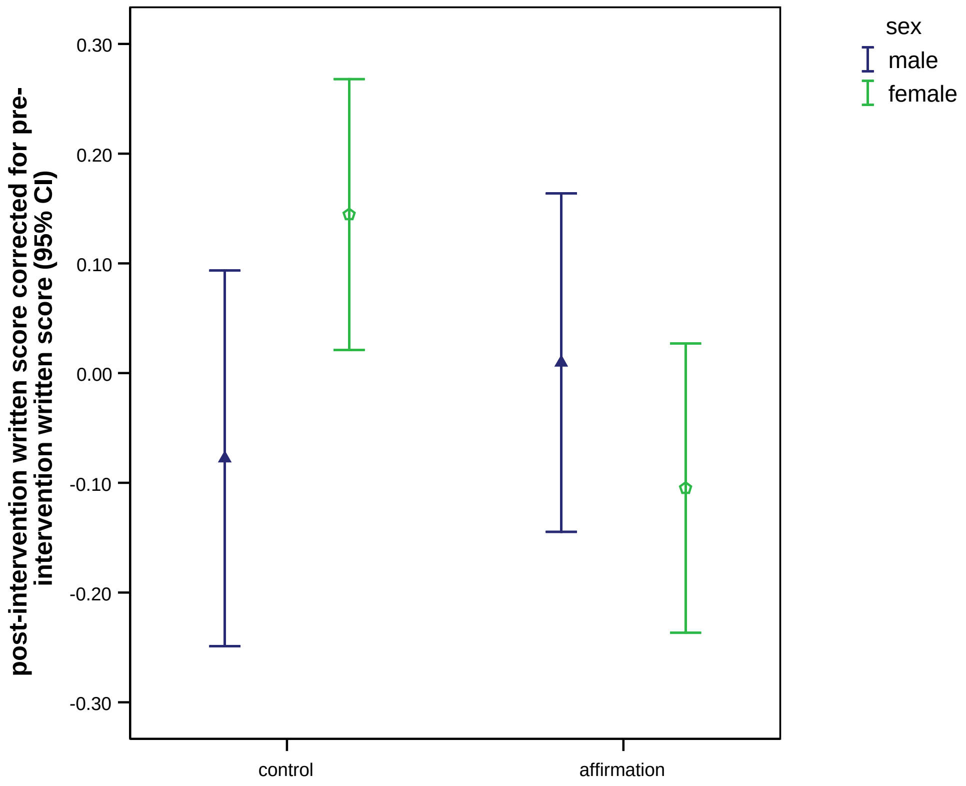


Figure 45: The significant (p<0.017) sex by intervention interaction on corrected post-intervention written assessment score, which was due to the significantly lower performance of the female affirmation group (error bars with 95% confidence intervals).

On the OSCE corrected for pre-intervention written score there was also a significant sex by intervention interaction on the [F(1,333)=4.4; p=0.036] – see Table 47 for means and standard deviations. There was no significant three-way interaction. Neither were there significant effects of sex on the corrected or uncorrected post-intervention module results.

P*ost hoc* testing showed that the effect was due to an increased performance in the male affirmation condition, whereas the intervention appeared not to affect the females significantly (see Figure 46).

Table 47: Means and standard deviations on OSCE score corrected for pre-intervention written *z*-score for males and females in the affirmation and control conditions

Condition	Sex	N	Mean	SD	SE	95% CI
Affirmation	female	106	0.054	0.884	0.086	-0.116 to 0.224
	male	69	0.177	0.846	0.102	-0.026 to 0.381
Control	female	109	-0.022	0.904	0.087	-0.194 to 0.150
	male	57	-0.295	0.989	0.131	-0.557 to -0.033

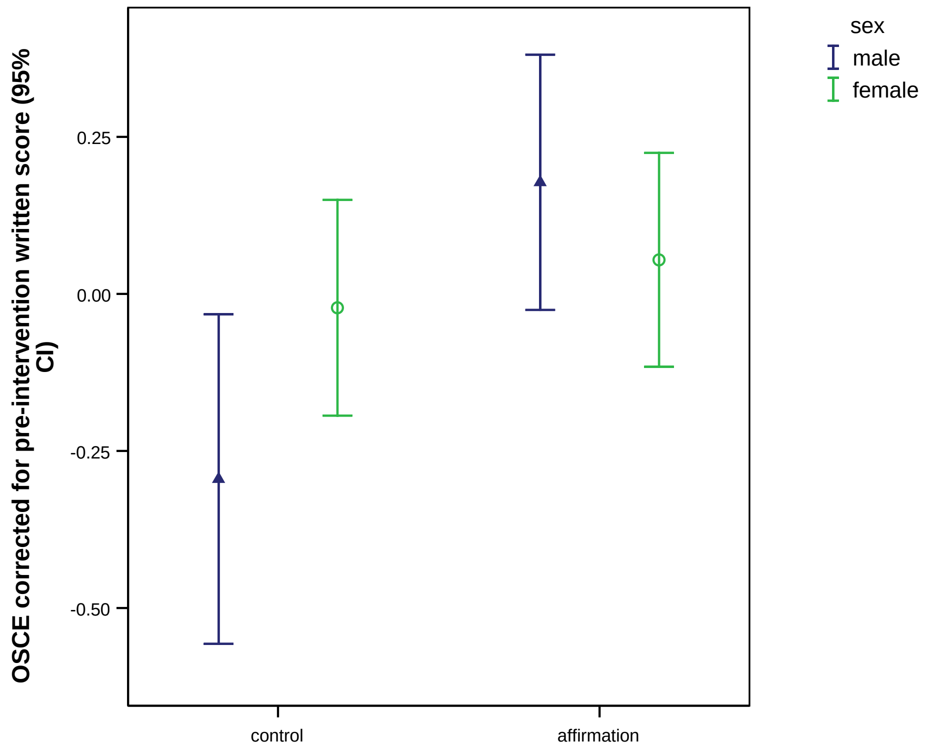


Figure 46: The significant (p<0.036) sex by intervention interaction on corrected OSCE assessment score, which was due to the significantly higher performance of the male affirmation group (error bars with 95% confidence intervals).

Discussion

6.1.16. Summary of results

A brief social intervention at the end of April 2007 had significant effects on Year 3 UCL medical students' examination performance three and a half months later in the middle of August 2007. The intervention differentially affected white students' and ethnic minority students' performance on the written examinations. Unexpectedly this was due to white students in the affirmation group achieving lower scores than whites in the control group, which refuted the experimental hypotheses. The intervention did however improve both white and ethnic minority students' scores on the OSCE and module assessments. Exploratory sub-group analyses showed that the intervention had differential effects on UCL and Oxbridge transfer students, and also on male and female students.

6.1.17. Strengths and limitations of the study

This randomised controlled experiment benefited from a strong experimental design and a theoretical underpinning – features that medical education research is sometimes attacked for lacking (e.g. Todres, Stephenson & Jones, 2007). This experimental design means it seems unlikely that the results of the study were spurious result. The random allocation of individuals to clusters and of clusters to conditions provides confidence that the results were valid and genuinely due to the intervention. That the randomisation was effective is indicated by the fact that individuals in both conditions did not differ significantly on any baseline measures and the intra-cluster correlation coefficient was of negligible magnitude.

The results were almost certainly not due to previous differences in general academic ability: groups were well matched on academic, as well as demographic and psychological factors at baseline. Moreover, baseline written performance was controlled for statistically. The written assessments were chosen *a priori* as the main outcome measure for two reasons: firstly because Cohen *et al.* used a written outcome measure and therefore it was the most appropriate for the replication; and secondly because they are less subject to bias than either the OSCE or module results, being highly reliable (typically containing over one hundred items and being machine-marked), and considered valid by the medical school which used them to determine which medical students can and cannot progress into the following academic year.

It is unlikely also that the results were due to either student or tutor expectancy effects (Orne, 1962) because the students were blinded to the existence of the study, and all but two of the tutors were blinded to the research hypothesis. The visual appearance of both exercises was also virtually identical. This blinding is important, particularly as the intervention was designed to change social perceptions. As mentioned, it was unfortunately not possible to blind all of the tutors; however the lack of significant design effect suggests that the effect of the tutors on the outcome measure was minimal. Furthermore a 3-way ANOVA of tutor knowledge (blind or not blind) by ethnic group by intervention on the main outcome measure showed no significant interaction effects of tutor knowledge with ethnic group ($p<0.16$), intervention condition ($p<0.084$) or both ($p=0.83$), and neither was there a main effect of tutor knowledge ($p<0.033$). This indicates that the intervention did not work significantly differently in the groups in which the tutor was blinded compared to those in which the tutors were not blinded. Supporting this was an anecdotal statement from one of the non-blinded tutors reported that they couldn't remember what the experiment was about – perhaps unsurprising when the briefing occurred at least four months prior to the intervention.

There were systematic differences in the essays written by students in the affirmation and control conditions. Those in the affirmation condition used more personal pronouns suggesting they wrote more about themselves, whereas those in the control condition used more pronouns which referred to others, suggesting that they wrote more about other people. Those in the control condition also used more negations suggesting they wrote about things which were not to do with their own values. By contrast, within intervention groups there appeared to be very few systematic differences between white and ethnic minority students' essays. Ethnic minority students used more "hearing" words, but it is unclear why this might be, and further qualitative analysis of the essay texts may shed further light.

It seems likely that the rating task reinforced the intervention equally in each group, as there was very little difference in the mean rating scores of the affirmation and control groups. The reinforcement task in this study differed slightly from that in Cohen *et al.*'s study: in the original study, students in both conditions rated four statements each whereas in this study students in the control condition were only asked to rate one statement compared to the four rated by students in the affirmation condition. If the imbalance in our experiment did influence the results, one can only think it would have been to reinforce the effects of the self-affirmation task slightly more than the effects of the control task, and it is difficult to envisage how this would have changed the expected direction of the experimental results.

The exercise at UCL also differed slightly from Cohen *et al.*'s in that because the UCL affirmation exercise had to be as similar as possible to the previous reflective exercises the students had completed, students had to be free to choose a value which was related to an experience they could reflect on. Unlike Cohen *et al.*, students were not asked to rank the list of values and choose their most important (affirmation) or least important (control) to write about. Students were given a list of example values, and students completed the appropriate writing task. It is uncertain what effect this had on the results. On the one hand, the participants in our experiment could have chosen to write about a value about which they did not feel particularly strongly (i.e. one which, if they had to rank it in a list of other values would not have come first or last). On the other hand, perhaps giving participants the freedom to reflect on any of their values (not just one on the list) enabled them to write about experiences which were more deeply personal than if they had been forced to reflect on a value listed by the researchers and which they may not particularly have resonated with. It would be useful to investigate whether the strength of the ratings given to values varied by whether the value reflected on was suggested by the experimenters or chosen by the participant.

Cohen *et al*. further validated their intervention by measuring the level of racial-stereotype activation in their participants approximately a year after the intervention by means of a word completion task, finding that African-American students in the affirmation condition generated fewer stereotype-relevant words compared to those in the control condition whereas the European American group showed no such effect. Having the current study's participants complete such a measure in 2008 would help to shed light on whether the effects of the current study were due to changes in racial or ethnic stereotype activation, particularly in the white affirmation group.

6.1.18. Meaning of the study

6.1.18.1. Written examination results

The experiment was designed, as far as possible given the somewhat different context of undergraduates in medical schools, as a direct replication of the study by Cohen *et al*, with a clear *a priori* expectation of an ethnic group by affirmation interaction in the same direction as that of Cohen *et al*, and indeed that is what was found on the main outcome measure. On that outcome measure, the difference between white and ethnic minority students was much reduced in the group who had carried out a self-affirmation task, but remained in the control group who had reflected on the values of other people. Detailed *post hoc* comparisons of the means of the white and ethnic minority students in the control and affirmation groups however showed that, although the ethnic difference on the written assessment was substantially reduced after the intervention, this did not seem to be due to an increased performance of the ethnic minority students (as Cohen *et al* found), but instead was entirely due to a decreased performance of the white students in the intervention group – a finding which was unexpected and for which there is no obvious theoretical explanation.

Although whites are in a majority in the UK population as a whole, within the medical school year at UCL, they are in fact in a (small) minority compared to sum of the rest of the ethnic groups. Moreover, as shown in Chapter 5, there do not appear to be any negative stereotypes of white people in academic contexts, in fact the evidence in Chapters 1 and 3 shows that white students normally do well in assessments (and indeed that is precisely what they do in the control group and on the pre-intervention written exam). As such, stereotype threat seems unlikely to be a problem for this white group, and if it were then the self-affirmation exercise would surely be expected to *improve* their performance, not reduce it.

As intended, the differences between the affirmation and control instructions were as minimal as possible, the key difference being that one asked the students, to reflect on "an incident that *made you proud of yourself and your values*", whereas the other asked them to reflect on "an incident that *helped you to recognise the value(s) of another person which were different from your own*." The differences are shown in italics, and both can be construed as positive activities of potential use to medical students (hence their inclusion in the Year 3 PDS curriculum at UCL Medical School). The key difference - and for Cohen *et al.* this was strongly theoretically motivated - is that one is about pride in self, whereas the other is about recognition in others. Why, though, reflecting on something that makes one proud of oneself and one's values should have negative and lasting effects on written exam performance is a mystery. Neither is it easy to see how the self-affirmation exercise could be seriously undermining the performance of the whites while having no impact on the ethnic minority students.

6.1.18.2. OSCE and module results

These results are complicated further by the fact that the intervention appears to have increased scores in *both* ethnic groups on the OSCE and module assessments. These results support the suggestion that affirmation can improve exam results; however they were still not predicted *a priori* by the theory, according to which the white group should have been unaffected by the affirmation exercise because they are less threatened and therefore less anxious than their ethnic minority colleagues. Previous stereotype experiments have been conducted with school children and college students (Cohen *et al.*, 2006; Wilson & Linville, 1985; Aronson, Fried & Good, 2002; Walton & Cohen, 2007). Compared to compulsory education and even compared to other undergraduate courses, being a medical student is especially stressful (Firth-Cozens, 2001). It may be that both ethnic groups of Year 3 medical students in this sample were suffering from some degree of anxiety (whatever the cause) and that self-affirmations lessened that anxiety, improved their self-efficacy and self-worth, and improved their exam results. The levels of stress for this cohort of students pre-intervention at the start of Year 3 (as measured by the GHQ-12 as part of the questionnaire study) were not particularly worrying. However, stress, anxiety, self-efficacy and self-worth levels were not measured post-intervention as would be necessary to test this hypothesis. Alternatively, it is possible that OSCE and module examinations, which are conducted face-to-face, are more influenced by the way in which a candidate comes across personally, particularly when interacting with patients, both real and simulated. There is evidence that self-affirmations can increase positive feelings towards others such as love and connection (Crocker, Niiya & Mischkowski, 2008). It could be argued that students who reaffirmed their self-worth were better at presenting themselves, and better at relating to patients in those face-to-face examinations, and this was reflected in their scores – a hypothesis that would also require objective testing.

It seems strange that a self-affirmation could have different effects on performance in different types of exam. These results contrast with Cohen *et al.*'s finding that African American students who reflected on a personal value scored higher in exams in a variety of different subjects, although whether these exams were different in format is not stated. One of the main differences between Year 3 written and clinical exams is that written exams test mainly textbook theoretical knowledge whilst the OSCE and module assessments test practical clinical knowledge and skills learned in clinical situations (Woolf et al., 2007). It may be that the reflective self-affirmation exercise improved the OSCE and module results of all groups, not by reducing threat, but by improving the ability of students from both ethnic groups to learn from their clinical experiences. Reflective practice is becoming increasingly recognised in medical education as a tool which enables doctors and students to learn from clinical experience and thus develop their professional skills and attitudes. Brockbank & McGill (2003) argue that reflection can help learners challenge the way they perceive the world, leading to a "development in conception of self and values" (p45), and subsequent changes in behaviour. It is possible therefore that asking students in the affirmation condition to reflect on their values *in the context of their clinical learning experiences* may have provoked a positive change in the way they perceived themselves, their values and how they behaved *in a clinical learning* context, which may in turn have increased their ability to learn from their clinical experiences - regardless of their ethnic group. The results then of this posited improved clinical learning would have been most evident in the OSCE and module assessments which are the most valid measures of students' clinical knowledge, skills and attitudes. Future research is needed using additional controls where students reflect on different events, or simply write non-reflective essays on particular topics related to clinical and non-clinical events.

The combination of self-affirmation reducing anxiety and therefore improving performance, and of clinical reflective practice improving performance specifically on clinical exams is one possible explanation for the pattern of results seen in the OSCE and module results, and could fruitfully be tested empirically in future studies. Should that future research show that the relationships hold then there will be important consequences for medical educator curriculum planners and teachers alike with educational self-affirmations perhaps being included as a standard part of the curriculum, or used in particular groups of students who require remedial help.

6.1.18.3. Oxbridge

The exploratory analyses yielded interesting, yet equally confusing and contradictory results. As with all results of exploratory analyses, it must be remembered that they were not predicted *ex ante*, and therefore should be treated with caution. That the

Oxbridge and UCL students differed academically was unsurprising as it replicates findings from previous Year 3 cohorts. It is not however obvious why the intervention appeared to work as predicted by Cohen *et al* in the Oxbridge group and not in the UCL group. As mentioned in the introduction to this chapter, Cohen *et al* explain the magnitude of their results by arguing that self-affirmation breaks a negative spiral of underperformance, whereby one poor performance decreases confidence and leads to further poor performances, which further decrease confidence and so on. Although the ethnic attainment gap was present in Oxbridge as well as in UCL students, ethnic minority Oxbridge students were at least as high achievers if not higher achievers compared to white UCL students. The breaking of the negative achievement spiral may have therefore already begun for ethnic minority Oxbridge students by the time of the first formative Year 3 assessments at the end of September 2006, when they may have realised that they were achieving greater academic success relative to their year group than they had at their previous institutions. The affirmation intervention may have further decreased any stereotype threat they were experiencing, increasing their positive self-image, self-esteem and subsequent exam performance. Moreover, ethnic minority students are in more of a minority at Oxford and Cambridge than they are at UCL and may therefore feel more stereotype-threatened than their UCL counterparts. As such, they may have been more affected than UCL ethnic minority students by the affirmation intervention. It is however important to remember that the intervention did not appear to differentially influence performance on the OSCE or module exams.

6.1.18.4. Sex

In terms of sex, the results are again, mixed. On the written exam, the results seem similar to those for ethnic group, with the expected highest performers (the females) appearing to be negatively affected by the affirmation exercise. As with the white students in the affirmation condition, it is difficult to conceive of a reason for those results; although the fact that the affirmation appears to have reduced the performance of two groups of students who would be expected to achieve the highest marks warrants further investigation. Once again, the OSCE appears to behave differently and this time the intervention works as might have been predicted, with the male students' scores being lifted by the affirmation exercise, although whether male students experience stereotype threat in the clinical domain is not certain (although there are stereotype of males being worse verbal communicators, which is an important clinical skill). Cohen *et al*. similarly found mixed effects of sex on performance. In their first experiment they found a significant sex by ethnic group by intervention interaction on their main outcome measure of GPA (grade point average) on the targeted course (i.e. the course during which participants completed the task), with European American girls responding negatively to the affirmation intervention with no effect on the European American boys. They also counselled caution on the interpretation of their results however, as they were not replicated in the GPA on non-targeted courses, nor were they replicated in their second experiment.

6.1.19. Conclusion

The results of this experiment provide evidence that a brief self-affirmation can affect exam results several months later. The results of the main analysis of written scores indicate that ethnic differences in performance can be mediated by self-affirmations. It is clear from these results however that whatever the mechanism by which self-affirmations affected exam results in white and ethnic minority students, it was not by altering stereotype threat in ethnic minority students. This study poses some challenges for medical education (and indeed for social psychology). It is likely that multiple factors are responsible for ethnic disparities in attainment (Wilson, 2006), however if the examination behaviour of a robust group such as medical students is so sensitive to such tiny interventions then that is something that educationalists have to understand. In a commentary published with the Cohen *et al.* study, Wilson asked:

> “Without the experimental results […] who would have thought that
> a 15-min exercise would have had such long-lasting effects”?
> (Wilson, 2006)

This statement forces the deeper question of what other seemingly trivial fifteen-minute changes, casually made by teachers as a part of their daily activity, have effects that may actually be long-lasting and substantial in their consequences, but go unrecognised because they are not formally studied. Of course, there is always the small possibility that the results of a single study are due to chance. With this in mind, a replication of the study is underway at Bart’s and the London School of Medicine and Dentistry, whose students have a slightly different ethnic profile. It is anticipated that this replication will help shed further light on the interpretation of this study’s findings.

Chapter 7. Discussion

"The truth is rarely pure and never simple. Modern life would be very tedious if it were either".
(Oscar Wilde, The Importance of Being Ernest, 1895)

"We [in academia] need to escape from the stereotypes which present our work in terms of zero-sum games. We will not succeed if we remain trapped within the stereotypes of pure versus applied, teaching versus research, research-intensive versus business-facing, esteem versus impact, excellence versus diversity, public good versus private benefit or local versus global."
(Chris Brink, The Guardian, 2008)

"Research tends to take a long time to reach a fair degree of certainty, and neither it, nor any human endeavour, can achieve complete certainty".
(The Swann Report, 1985)

"While science can develop our understanding, and can help us to predict and control the world, it cannot interpret our findings for us, or tell us how the world should be."
(John Rust & Susan Golombok, 1992)

Summary of Chapter 7

This thesis has shed light on the highly complex relationship between student ethnicity and attainment at medical school. At UCL, the small ethnic gap which was already evident in Year 1 was over twice the size in Year 3, the first clinical year. A questionnaire study failed to show that the ethnic difference was mediated by psychological or other demographic factors. However, a qualitative study suggested that ethnic minority and white students had different experiences of the clinical learning environment where Asian medical students were negatively stereotyped by other students and teachers. A randomised controlled trial showed that a short teaching intervention designed to alter students' self-perceptions and their subsequent examination performance did narrow the ethnic gap in attainment Year 3, but not in the manner predicted. This chapter discusses the thesis findings in detail, provides advice on the steps medical educators might take to address the ethnic gap in attainment, and makes recommendations for future research.

Introduction

A student's learning and attainment is determined, broadly speaking, by the factors the student brings with them to the learning environment, factors related to the learning environment itself, and the ways in which those factors interact. This thesis used quantitative and qualitative methods to investigate some of those aspects, in order to answer the research question "which factors influence the differential performance of white and ethnic minority medical students in undergraduate assessments?" The studies in Chapters 3 and 4 investigated the student-related factors influencing the attainment of white and ethnic minority students. Ethnic differences on those student-related factors were not found to explain the ethnic gap in attainment. In Chapter 5, qualitative methods were used to investigate the more subtle and complex ways in which students' ethnicity was related to their experiences of the clinical learning environment. The study revealed that students and clinical teachers alike had a negative stereotype of Asian medical students, and this was hypothesised to negatively affect Asian students' learning and attainment. Chapter 6 investigated whether it was possible to manipulate students' subjective experiences of the learning environment by implementing an in-class intervention which was designed to alter ethnic minority students' self-perceptions. The results of the study suggested that changing students' self-perceptions in the learning environment can alter their assessment performance, but the results also raised questions about how those changes were effected in students from different ethnic groups.

To summarise, there were five main findings from the thesis (all relate to UCL medical students):

1. Medical students from ethnic minority groups started underachieving in Year 1 of medical school, despite having superior school leaving examination results
2. The ethnic gap was attainment in larger in the first clinical year, Year 3, than in the first year of medical school, Year 1.
3. The ethnic gap in attainment was found not to be mediated by demographic or psychological factors measured in a questionnaire
4. Negative stereotypes of Asian students existed, which may have affected those students' experiences in the learning environment
5. Subtle changes to the learning environment can affect students' examination performance

The thesis findings shed light upon the complex problem of ethnic minority medical student underachievement at one London medical school. They also raise a number of questions. In this Chapter, the five main findings of the thesis are interpreted and examined. This is followed by a discussion of the implications of the thesis findings for medical educators. Finally, suggestions for future research into ethnicity and attainment in medical education are given.

Interpretation of thesis findings

In this section, the main results of the thesis are interpreted in turn.

7.1.1. Finding 1: Ethnic minorities underperform from Year 1 despite having good school leaving results

This thesis began by explaining how individuals from ethnic minority backgrounds have been found to underperform academically compared to whites in many areas of compulsory and post-compulsory education, including across UK higher education. Chapter 1 showed that the ethnic gap in attainment is present in medical education, despite the fact that medical students are highly selected on academic criteria. The effect size calculated from UK research studies was equivalent to approximately d=-0.30 in both undergraduate and postgraduate medical training. Chapter 3 showed that UCL Medical School is not exempt from this phenomenon. Ethnic minority students consistently underachieved in Year 1, Year 2 (effect size d=-0.17) and Year 3 (effect size d=-0.44) of the MBBS course at UCL over several years. A retrospective longitudinal path analysis showed that ethnic minority medical students' underperformance in Year 3 could not fully be accounted for by their previous underperformance in Years 1 and 2. Moreover, ethnic minority underperformance occurred in spite of the fact that ethnic minority students achieved better GCSE (d=0.22) and A Level (d=0.29) results than their white counterparts.

So why did ethnic minority medical students who performed well at A Level then perform relatively badly in Year 1 of medical school? The path models in Chapter 4 failed to show that the ethnic gap in Year 1 was due to differences in psychological factors such as study habits or motivations, or due to differences in, for example, parental language or other background demographic factors. This raised the possibility that medical students from different ethnic groups had different experiences once at medical school, and that those different experiences affected their learning and examination performance.

There is some evidence from the UK post-compulsory education sector that ethnic minority students face more difficulties than white students in their first year of study. Connor et al (2004) conducted a national survey of just over 1,300 current students in both FE and HE institutions in Spring 2002, finding that ethnic minority students were much more likely that white students to report problems or difficulties. However within the ethnic minority group, Indians, Chinese, and Asian Other students (who are the minority groups best represented at UCL Medical School) were the least likely to report such problems. The report found that Indians were most likely to say they found academic work too difficult; Chinese and Asian Other students were most likely to say they had insufficient academic staff support; and Pakistani and Bangladeshi students were most likely to feel that they did not get enough encouragement from lecturers. A lack of mixing across ethnic groups was also reported which, it was suggested, increased students' feelings of isolation. Discrimination was not reported as a major problem for students in the study, although Connor et al suggest that indirect discrimination may have occurred, and discrimination was probably under-reported.

It may be that ethnic minority medical students at UCL were more likely to experience problems in their first year of medical school, and that it affected their attainment. However, if ethnic minority medical students' experiences did negatively affect their academic performance, the results of the questionnaire showed that it was not because those experiences were making them more stressed. In-depth research is required to specifically explore the experiences of first year medical students from different ethnic groups in order to determine how their experiences might differ, and how this may affect their learning and performance.

7.1.2. Finding 2: The ethnic gap increases from Year 1 to Year 3

Chapter 3 showed that the ethnic gap in attainment increased from Years 1 and 2 to Year 3. In Years 1 and 2 the effect size was d=-0.17 and in Year 3 it was d=-0.44. The large amount of data available in Chapter 3 meant that it was possible to break down the 'ethnic minority' group into three subgroups: Asian (Indian, Pakistani, Bangladeshi, and Asian Other), Chinese, and Other (all other non-white groups) in the study in Chapter 3. Results showed that Asian students consistently underperformed compared to white students in Years 1, 2 and 3. Chinese students on the other hand, had equivalent grades to white students in Years 1 and 2 and it was only in Year 3 that their performance dropped to equal that of the Asians students'. There are several possible explanations for the increase in the magnitude of the ethnic effect in Year 3. Three are proposed below.

7.1.2.1. The spiralling effect of poor performance

The first suggestion for the increase in the ethnic gap comes from Tony D Wilson's commentary (2006) on Cohen et al's stereotype threat paper (2006), upon which the experiment in Chapter 6 was based. Wilson describes the 'spiralling' effect of poor performance, an idea which he based on the concepts of social psychologist Kurt Lewin:

> "students can be caught in a self-perpetuating 'exacerbation cycle,' whereby poor academic performance confirms their worst fears about themselves, which increases their anxiety, which hampers their subsequent performance, which further confirms their worst fears, and so on"
> (Wilson, 2006)

This implies that, because ethnic minority students achieve slightly lower levels of attainment than whites early in Year 1 (for whatever reason), this in itself causes an increase in anxiety and subsequent increase in poor performance, which grows and grows, having larger and larger effects. Students become more and more lacking in "educational capital" (Howard, McLaughlin & Vacha, 1996) as they progress throughout medical school, and this has larger and larger effects on their performance. The theory predicts that the ethnic gap should increase throughout undergraduate medical training, with the largest gap being in final year. However the data in Chapter 3 showed that the ethnic gap in Year 2 was equivalent in size to that in Year 1, whereas the gap in Year 3 was over twice the size of that found in Year 2. This jump cannot be readily understood in terms of Wilson's 'spiral' explanation.

7.1.2.2. Student factors had a greater impact in the Year 3 environment than they did in Year 1 and 2 environment

Secondly, as mentioned in Chapters 2 and 4, the environment in Year 3 at UCL Medical School is very different from the environment in Years 1 and 2. For example, in Years 1 and 2 the lecture-based format of much of the teaching means that students have relatively little personal contact with teachers and have almost no contact with patients. In Year 3 by contrast, students are often taught in small groups and are expected to spend a lot of time clerking patients. It is easy to imagine how for example, interpersonal skills might not be very important in Year 1 and 2, but suddenly become important in Year 3. Therefore a student with poorer interpersonal skills may do well in Years 1 and 2 but struggle in Year 3. The increase in the ethnic gap in attainment from Years 1 and 2 to Year 3 may be influenced by student-related factors which were relatively unimportant in the Year 1 and 2 environments, but had a much greater effect in the Year 3 environment. Evidence for this type of effect was seen to an extent in the second path model in Chapter 3. The model showed that the graduate status variable had independent positive effects on Year 1, Year 2 and Year 3 end-of-year examination performance. It appears that being a graduate confers some advantages in Year 1, additional advantages in Year 2 and even more additional advantages in Year 3, although it is not clear exactly why.

7.1.2.3. Different factors mediate the effect of ethnic group on performance Year 1 and Year 3

A third potential explanation for the increase in the ethnic gap in Year 3 is that different factors affect performance in different Years, and that those which mediate performance in Year 3 simply have a larger effect than those which mediate performance in Years 1 and 2. For example, it seems likely that the introduction of Oxbridge transfer students in Year 3 is partly responsible for the increase in the ethnic gap. It was shown in Chapter 4 that coming from Oxford or Cambridge universities was one of the only independent predictors of Year 3 performance, and it partially mediated the effect of ethnic group on end-of-year examinations. There were no Oxbridge transfer students in Years 1 and 2, so the ethnic gap seen in Years 1 and 2 must have been due to different factor(s) with smaller effects.

7.1.3. Finding 3: The ethnic gap cannot be explained by a number of psychological and demographic variables

The questionnaire study in Chapter 4 investigated student-related factors which might mediate the effect of ethnic group on performance. Results showed that Year 1 and Year 3 students from ethnic minorities differed from their white counterparts on a number of variables: they were younger, less likely to be graduate-entry, and more likely to live at home. They were more likely to have a parent who is a doctor, but less likely to have a parent who speaks English as a first language, and less likely to speak English as a first language themselves. They were also more likely to adopt surface learning study habits, and by Year 3 were less sure they wanted to practice medicine upon qualifying. However, differences on those factors hardly mediated the effect of ethnic group on end-of-year examination results. Ethnic differences in performance did not appear to be due to differences in motivation (e.g. reasons for wanting to become a doctor; factors influencing reasons for applying to medical school; desire to continue at medical school; desire to practice medicine after qualification), speaking English as a first language, whether or not students had a parent who was a doctor, or stress.

The results of Chapters 3 and 4 could be considered "negative" findings, but this does not diminish their importance. Publication bias – the tendency of academic journals to avoid publishing negative results - is often rued in the scientific community because it is just as important to know when research does not show an effect, as when it does (e.g. Thornton & Lee, 2000; Easterbrook, Gopalan, Berlin & Matthews, 1991). This is useful because it helps us to discount potential causes of observed effects, narrow down our field of enquiry, and refine our research questions. Very few studies have directly measured student psychological variables and looked at how they relate statistically to ethnic group and educational attainment, particularly at medical school. The results of the questionnaire study in Chapter 4 are therefore important, not least because they provide quantitative evidence for and against some of the ideas some of the participants in the qualitative study had about ethnic minority underperformance[20].

7.1.3.1. Evidence for and against 'lay hypotheses' for ethnic minority underachievement at UCL

This section provides evidence from the questionnaire which support and refute 'lay hypotheses' for the underperformance of medical students from ethnic minority groups at UCL.

Participants in the interview study in Chapter 5 suggested that ethnic minority, particularly Asian, medical students are not as motivated as white students to become

[20] Anecdotally, I have found that many of the 'lay hypotheses' for ethnic minority underachievement suggested by participants were also suggested by people I have spoken to who are outside of the medical school environment. Therefore they may reflect society's stereotypical views of ethnic minority groups in general.

doctors, or are motivated for the “wrong” reasons (e.g. for financial or status, or to please their parents, rather than altruistic reasons, which were perceived as the “right” reasons). In fact, the questionnaire showed that in Year 1 students, ethnic minority students were slightly *less* likely than white students to say that they were motivated to become a doctor for financial and status reasons. Motivations were found to be related to study habits, and it is true that ethnic minority students in Year 1 were slightly more likely to adopt surface study habits (which some previous research has shown to be negatively correlated with examination results: see Ferguson et al., 2002). However, there was only a weak relationship between study habits and examination performance in Year 1, and therefore differences in study habits cannot be considered a cause of ethnic minority medical student underachievement. In the 2005/6 questionnaire, both ethnic minority and white students were equally likely to say that the main factor that influenced their choice to study medicine was their father. So whilst it may be true that ethnic minority students are at least partly motivated to study medicine to please their parents, no evidence was found from the questionnaires that ethnic minority students were more motivated by this desire than white students.

This is not to diminish the fact that parental influence on student choices, attitudes and behaviours is very complex. Research has suggested that Asian and second generation immigrants are encouraged to enter Higher Education by their families, particularly to study courses which will increase the likelihood of them having a professional occupation such as medicine or law (Modood, 1993; Ball, Reay & David, 2002; Modood, 2004; Modood, 2005), but there was no evidence to suggest that those factors influenced academic performance. The issues surrounding parental involvement were not explored in depth in this PhD. Further, perhaps qualitative, research specifically exploring the influence of parents within medical student populations from different ethnic groups may shed some light on this complex and potentially important area.

Related to the idea that students from ethnic minority groups are under parental pressure, some interviewees spoke about ethnic minority students feeling stressed because of pressure from their families, and they suggested that this stress might negatively influence ethnic minority students’ examination results. In fact, no ethnic differences were found on the GHQ-12 in either Year 1 or Year 3 students.

Furthermore, GHQ-12 scores were found not to be related to examination performance.

Some interviewees suggested that ethnic minority students might be from lower socio-economic groups than white students, or that white students might have a better understanding of the way 'the system' at medical school works because they were more likely to have family who had been to medical school. In fact no significant differences in the socio-economic status of white or ethnic minority medical students were found. In fact, ethnic minority students were *more* likely than white students to have at least one parent who is a doctor and therefore from the highest social class. As it was pointed out Chapter 1, a relatively large number of Asian doctors joined the NHS in the 1960s and 1970s as a result of UK immigration policies (BMA, 2004). Many of these doctors may have had children who reached university age in recent years and because children's choice of profession is to an extent influenced by that of their parents (BMA, 2004), some of those immigrant doctors' children may well be today's medical students.

Some interviewees believed that ethnic minority students were perhaps hindered by not speaking English as a first language. However, although speaking English as a first language was positively univariately correlated with examination performance, the path analyses showed that this was simply because it was bivariately correlated with white ethnic group. Ethnic group still predicted exam results even after taking students' first language into account.

7.1.4. Finding 4: Negative stereotypes of Asian clinical medical students exist, which may affect their experiences of the leaning environment

The questionnaire study failed to show that the ethnic gap was due to a number of student-related factors. A qualitative study was therefore performed to explore other the potential reasons for ethnic minority underperformance in Year 3, including those stemming from their experiences in the clinical learning environment. It focussed on students' and teachers' perceptions of learning and teaching clinical medicine, and the ways in which participants believed student ethnicity affected clinical learning.

Analysis of those data revealed some clinical teachers and students perceived Asian clinical medical students in a stereotypical manner, i.e. as good at learning from books, poorer at communicating and less likely interact during teaching. The 'typical' Asian student was perceived as having been pushed into studying medicine by their parents, and was thus less willing and less motivated to learn to become a doctor. Students and their clinical teachers believed that the individual relationships they had with each other were a vital part of the learning process, and students who did not interact with teachers were presumed by participants to learn less in the clinical environment. Teachers described how they did not enjoy teaching students whom they felt were not 'keen' and subsequently put less effort in to teaching those students. Some teachers described how they could become aggressive or confrontational towards students. Students explained how they found it difficult to have an effective educational relationship with teachers who did not treat them with respect.

It was hypothesised from these results that Asian clinical medical students at UCL may learn less than white students in clinical situations because they are more likely than whites to be stereotyped, and the stereotypes about their group tend to be negative, both of which might hinder the establishment of those crucial student-teacher relationships.

7.1.4.1. Do stereotypical views influence teachers' behaviour towards students?

The above-mentioned hypotheses hinge on the assumption that teachers who hold negative stereotypes about Asian students behave differently towards Asian students than towards white students. What evidence is there that the assumption that stereotyping affects behaviour is valid? Most of the psychological research in this area has explored the link between stereotypes, prejudicial attitudes (disliking of particular groups) and discriminatory behaviour (acting unfairly towards people belonging to particular groups)[21] (Schutz & Six, 1996). An overview of this research is presented in order to help clarify whether teachers who view Asian students in a stereotypical way might also treat them differently to how they treat white students.

[21] The definitions of prejudice and discrimination in parentheses should not be considered definitive – they are given for ease of understanding

Fiske (2000) describes how a stereotypical view of a person is more likely to affect behaviour towards that person when the following conditions are met:

1) if the person is an isolated, few-of-a-kind individual in an otherwise homogenous environment
2) if there is a mismatch between characteristics associated with the stereotype and characteristics associated with the person's occupation
3) if the evidence upon which conclusions made about a person are based is ambiguous

In the case of the medical students in Chapter 5, the first condition was not met. Asian medical students are in a minority at UCL, but they are a large minority, making up around 30% of the UCL medical student population (see Tables 4 and 7). The second condition was met: the stereotype of Asian medical students was that they were studious, quiet in class, relatively poor communicators, and unmotivated or motivated for the "wrong" reasons. These characteristics were considered at odds with the characteristics of a "good" medical student, with the exception of "studious". The third condition was also met. Fiske describes how, when evaluating a person's performance in a work environment, evidence about their interpersonal skills is more ambiguous (i.e. it can be interpreted in a number of different ways) than say, evidence about the number of sales they made. Ambiguous data tend to be judged subjectively, which makes them vulnerable to being interpreted in a biased way based on a stereotype. In an educational setting, if a student behaves in a particular way in class - e.g. sits at the back quietly - it is possible to interpret that behaviour as having a number of causes (e.g. the student is hungover, or bored, or shy, or are trying to avoid showing their lack of knowledge *etc.*). In other words, the behaviour is ambiguous. According to Fiske's rationale, in the case of Asian students, ambiguous behaviour in class was vulnerable to being interpreted subjectively through the 'lens' of the stereotype about their group, therefore an Asian student who sits quietly at the back of the class may be more likely to be considered shy, whereas it might be assumed that a white student who behaves similarly is hungover. The perceived causal factors influence teachers' attitudes and behaviour towards that student. Two out of three of Fiske's conditions applied according to the findings in Chapter 5. This makes it possible that teachers' or students' negative stereotyping of Asian clinical medical students will result in unhelpful behaviour towards individual Asian students.

Further evidence that stereotyping affects behaviour comes from Sekaquaptewa, Espinoza, Thompson et al. (2001). Those authors showed that white male participants who had a tendency to describe hypothetical people's behaviours in terms of racial stereotypes subsequently asked a black person more stereotypical questions in an interview, who also rated those participants more negatively. The authors concluded that stereotyping may predict behaviour in what they called 'interracial interactions'. Negative behaviour resulting from stereotyping can include evaluating individuals based on their category membership rather than their individual merit, exaggerating a person's negative attributes, and discounting their positive attributes (Fiske, 2000).

There is also evidence that people's attitudes (i.e. their likes and dislikes) about a particular group can influence their behaviour towards members of that group. For example Green et al (2007) showed that white physicians who showed implicit (subconscious) preference for whites were more likely to give treatment (in this case, thrombolysis) to white patients than black patients. Schutz & Six's (1996) meta-analysis of 60 studies showed that the link between verbalised, i.e. conscious, prejudicial attitudes and behaviour is in the small to moderate range at r=0.36 (although the authors acknowledged that the strength of the correlation depended heavily on various factors including the groups targeted, e.g. patients with AIDS or ethnic minorities, and the ways in which prejudice and discrimination were measured). Teachers in the study in Chapter 5 tended to have negative stereotypical views about Asian clinical medical students, which the literature suggests may prompt them to behave in a more negative fashion towards Asian students.

Overall, there is some evidence from the literature to support the hypothesis that teachers who have negative stereotypical views about ethnic minority students may be less likely to form constructive educational relationships with those students. Further research is required to prove or disprove this hypothesis.

7.1.4.2. The link between teacher behaviour, student perceptions, and student attainment

The evidence above supports the proposal that negative stereotyping may influence teacher's behaviour and therefore student-teacher educational relationships. But can negative stereotyping by teachers and students also induce stereotype threat as suggested in the third hypothesis in Chapter 5?

Steele (1997) believes that merely being in a situation where the stereotype is salient - what he described as “a threat in the air” – will engender stereotype threat in some students. In Chapter 5, the fact that both teachers and students were aware of negative stereotypes of Asian students suggests that stereotype threat may well have been “in the air” in the clinical learning environment. Stereotyping is a necessary, but not sufficient factor to induce stereotype threat in an individual. According to research, the *perceptions* of the person being stereotyped have an important influence in determining whether stereotype threat occurs. People who belong to the same stereotyped group may be more or less affected by stereotype threat, depending on how they perceive themselves and their environment (Steele, 1997; Cohen et al., 2006; Crisp, 2008)[22]. Teachers’ behaviour is still important in this context because research suggests that the ways in which teachers behave towards students can influence students’ self perceptions and their subsequent attainment. For example, Steele (1997) suggests that helping students perceive themselves positively by having high expectations of them can help counter the negative effects of stereotype threat. Similarly, the Swann Report (1985) highlights school teachers’ low expectations of black pupil as part of the cause of those students’ academic underachievement. Moreover, Stern, Williams, Gill et al. (1997) showed a small but statistically significant positive relationship between teaching ratings and students’ examination results.

Students’ self-perceptions are also influenced by other factors, aside from teacher behaviours. For example, the behaviour of other students, students’ previous experiences, and individual differences on psychological factors such as self-efficacy (Bandura, 1977) may all affect how a student views themselves and their abilities. Believing that one is a victim of unfair treatment or discrimination may affect a student’s perception of their ability to achieve, and therefore their likelihood of being stereotype threatened.

[22] Steele (1997) suggests that commitment to the subject being tested is one such student-determined factors which can affect the outcome of stereotype threat. Only students who want to achieve in the field being tested will be affected by stereotype threat.

In this context it is interesting that the results from the questionnaire study in Chapter 4 showed that Year 3 students who perceived that they were discriminated against had lower scores in their examinations nearly a year later. Saliently, those students also scored higher on the personality trait Neuroticism. At the higher end of the scale Neuroticism is associated with anxiety, anger, hostility, vulnerability and depression (Matthews & Deary, 1998). Those are not characteristics which are conducive to learning, particularly in the intense and competitive world of medical education. But they might be important in the development of stereotype threat for members of negatively stereotyped groups.

7.1.5. Finding 5: Changing the learning environment can affect students' examination performance

The experiment described in Chapter 6 used an in-class teaching intervention to investigate the relationships between ethnicity, students' self-perceptions and performance. A randomised controlled trial was performed with the aim of testing whether an intervention based on stereotype threat theory could improve the academic performance of Year 3 ethnic minority medical students. The hypothesis was that ethnic minority students, who, as part of a new teaching initiative, completed a brief written self-affirmation essay to reaffirm their own values and help them perceived themselves positively, would be less vulnerable to stereotype threat than their peers who had completed a control task. They would therefore achieve higher end-of-year examination scores. The results showed that completing the essay did indeed affect students' examination results. However it did not affect white and ethnic minority students' examination results in the way predicted. According to the hypothesis, the intervention should not have affected the white students' performance. But on the written examination, it was only the white students who showed an effect of the intervention; and on the OSCE and module assessments, the intervention group showed improved results regardless of ethnic group. The results of Chapter 6 showed that, if Year 3 students from ethnic minorities were suffering from stereotype threat, it was not relieved by the self-affirmation exercise. Importantly however the results of the study did confirm that relatively minimal psychological interventions conducted in class can have substantial educational outcomes several months later, and also that those outcomes vary by ethnic group.

7.1.6. Overall interpretation of the thesis findings

Taken together, the results of the thesis showed that students from ethnic minorities underachieved compared to white students from their first summative assessments in Year 1. This was not due simply to the effects of student-related factors, as measured in a questionnaire. Instead, ethnic minority underperformance was probably influenced at least in part, by factors relating to the medical school environment and their interaction with student-related factors. Supporting that, the ethnic gap increased when the learning environment changed in Year 3. In clinical learning environments, negative stereotypical perceptions of ethnic minority, in particular Asian, clinical medical students existed. This may have had a number of effects. It may have created an atmosphere in which the negative stereotype was salient, thus increasing the likelihood of stereotype threat in some Asian individuals, and decreasing their attainment. Stereotyping may also had led teachers to behave in subtly negative ways towards some ethnic minority students, affecting their individual relationships with students from ethnic minorities, and those students' learning and performance. Subtle changes in teaching we found to have unexpectedly large effects on examination performance. It is therefore plausible that features of the clinical learning environment, such as stereotyping, may have affected students' perceptions of their abilities and their subsequent examination performance. The extent to which those factors influenced students' performance may have depended partly on the students' overall self-view, and partly on the ways in which they interpreted others' behaviour towards them.

Context for change

This thesis has shown that ethnic differences in attainment exist across a number of different medical schools in England, and has shed some light on the reasons that ethnic minority, in particular Asian students underperformed at UCL Medical School. Before outlining some recommendations for interventions to effect change in this area, a brief synopsis of the UK law and professional guidelines regarding equality, diversity and the delivery of medical education are provided to show the context in which any changes would need to be made.

The Race Relations Act 1976 (Statutory Duties) Order 2001 http://www.opsi.gov.uk/si/si2001/20013458.htm required all Higher Education institutions to publish a Race Equality Policy by 2002. Amongst other things the policy should explain how the institution would:

> "prevent racial discrimination, promote equality of opportunity, and promote good race relations across all areas of activity"
> (Commission for Racial Equality, 2002)

The legislation required HE institutions to monitor ethnicity and assess the impact of their organisational policies on admissions and student progress. UCL of course has such a policy, which is published on its website (http://www.ucl.ac.uk/hr/docs/race_equality.php). The following extract explains what is expected of UCL as an institution in terms of equality and diversity:

> "[UCL is] expected to create effective learning environments where racial differences are seen positively, where negative stereotypes and harassment are challenged and teaching materials are free from discrimination and stereotyping. […] The purpose of the policy is to promote diversity, fairness, justice and equality of access and opportunity, identify any barriers to progress, expose inequalities and their underlying causes and take remedial and preventative action."
> (UCL Race Equality Policy, accessed June 2008)

Since the research in this thesis took place, The Higher Education Academy has published a report exploring possible causes of and practical responses to the ethnic gap in degree attainment across Higher Education Institutions in the UK (Ethnicity, Gender and Degree Attainment Project: Final Report, HEA, 2008). The document suggests several ways in which institutions can address the problem of ethnic differences in attainment, spanning the areas of data collection, teaching and learning, policies, governance and management.

Medical Schools need to take account of the legislation and recommendations above concerning ethnicity and higher education, as well as GMC guidance for undergraduate education (Tomorrow's Doctors, 2003), the reforms laid out in the Bologna Declaration (1999 http://ec.europa.eu/education/policies/educ/bologna/bologna_en.html), and NHS requirements, when organinsing their selection processes, designing their curricula and training their teachers.

What can medical educators do about the ethnic gap in attainment?

The recommendations outlined in this section are intended to point medical educators to actions which in the author's opinion might be useful in addressing the problem of ethnic minority underperformance in undergraduate medical education. They are aimed at those who organise undergraduate medical education. They are written to be applicable to any Medical School but should, of course, be tailored to the specifics of the institutions in which they are implemented. The list of recommendations is not intended to be exhaustive. A vast number of different factors are involved in producing a newly-qualified doctor, and the complexities of the problem of ethnic minority underachievement. This can make it difficult to know which factors have the largest impact on the problem, and which can be changed to useful effect. However, making practical, pragmatic changes and monitoring their effects will help improve understanding of this multifaceted problem and how it can be ameliorated.

7.1.7. Improving clinical teaching

Clinical teachers can improve their students' experiences of medical school by getting to know them as individuals, being committed to their growth as learners and supporting them pastorally as well as educationally (Seabrook, 2004; Kilminster & Jolly, 2000; Knight & Bligh, 2006; Yeates, Stewart & Barton, 2008; Calman, 2008). The findings of this thesis suggest that students from ethnic minorities are more likely than white students to believe that they are perceived as slightly inferior or undeserving by those around them. Therefore those students may particularly benefit from the personal encouragement afforded by constructive relationships with their clinical teachers. Ashley (2000) has suggested a new 'apprenticeship' model of medical education which emphasises the importance of feeling safe and valued whilst learning in clinical environments. In this model, students would spend long attachments with doctor-mentors, observing, helping and finally becoming part of a 'two-person team'.

Ashley points out that implementing this model would require a completely novel approach to teacher selection and training. Whilst it may not be entirely desirable to implement Ashley's model, the anticipated difficulties in its realisation highlight the barriers to close student-teacher relationships that exist in the current structure of undergraduate medical education. They include:

- A lack of institutional rewards for teaching
- A lack of teacher training for doctors
- Large student numbers

7.1.7.1. Lack of teacher training for doctors

All doctors in the UK are required by the GMC to undertake a teaching role (Doctor as Teacher, GMC, 1999). It is now recognised that effective teaching behaviours can be taught, that attitudes conducive to effective teaching can be fostered (Benor, 2000), and that doctors responsible for teaching should be given some training to this end (Parsell & Bligh, 2001). There is also evidence that teacher training improves student academic outcomes (Stern, Williams, Gill et al., 2000). However much clinical teacher training is done in short courses and it is still the situation that many teachers remain untrained. This is a legacy of the belief widely held until the 1970s and 1980s that simply knowing a lot about medicine is the same as being a good medical teacher (Benor, 2000).

At UCL Medical School, initiatives have been put in place to improve the educational effectiveness of current and future clinical teachers. All new consultants are now required to undergo a two-day teacher training course, and senior medical students are given the opportunity to choose Student Selected Components in which they are trained to deliver teaching to more junior students. Increasing the emphasis on teacher training throughout undergraduate and postgraduate medical education will improve the quality of teaching and the educational experience of medical students.

7.1.7.2. Lack of institutional rewards for teaching

Doctors involved in medical education are often expected to be three winged angels who conduct world-class clinical research whilst caring for their patients and excelling at teaching (Banatvala 2001). In reality this triad can be very difficult to achieve and is an extension of a problem faced by many non-clinical academics, described below by the anthropologist Nigel Barley:

> "It is assumed that if you are a good student you will be good at research. If you are good at research, you will be good at teaching. If you are good at teaching you will wish to go on fieldwork. None of these connections holds. Excellent students do appalling research. Superb academic performers […] provide lectures of such stultifying tedium that students vote with their feet and disappear like dew in the African sun. The profession is full of devoted fieldworkers […] who have little or nothing of interest to say in an academic discipline"
> (Nigel Barley, The Innocent Anthropologist, 1983)

As noted by Sir William Osler in 1892 (in Calman, 2008), teaching is too often left by the wayside as doctors spend long hours caring for their patients and conducting research. Doctors only have a finite amount of time to work in any given week, and the external drivers to encourage excellence in clinical matters and research are strong. The GMC tells doctors to "make the care of your patient your first concern" (GMC, 2006) and the Research Assessment Exercise - which determines the amount of money given to universities by the Higher Education Funding Councils - ensures pressure is put on clinical academics to deliver high quality research output. However, relatively few organisational incentives push doctors to put effort and energy into their teaching. Furthermore, poor links with universities can make doctors feel undervalued in their capacities as teachers (Seabrook, 2003).

One of the ways in which this situation can be improved is by Universities and Medical Schools increasing their efforts to reward teaching excellence. For example, at UCL, clinical teachers can now apply for academic promotion on the basis of their teaching rather than on the basis of their research. The Medical School also has annual Excellence in Medical Education Awards, which recognise exceptional contribution to education at any stage of the MBBS programme (http://www.ucl.ac.uk/medicalschool/quality/Medical%20Education%20Awards/index.htm). Changes at the institutional level need to be supported by changes at the macro-level, where

Medical Schools need to work together with the NHS, the Postgraduate Medical Education Training Board (PMETB), the GMC and the Government to increase the value associated with teaching in medicine.

7.1.7.3. Large student numbers

As a result of the merging of medical schools described in Chapter 2, section 2.1.3 , many London medical schools now have very large numbers of students. In Year 3 at UCL, there are typically 360 students per year. In order to accommodate these large numbers, students rotate quickly around different specialities, and group numbers are large. This can make it difficult for teachers to get to know their students on an individual basis. Students and clinical teachers would benefit from smaller groups and longer rotations.

In summary, the high quality of much medical education is testament to the internal drive of many clinical teachers, many of whom want more time to teach and training in how to teach (Busari, Prince, Scherpbier, et al., 2002). Teaching should not be the poor relation in the medical profession. Changes to the infrastructure and organisational reward systems in medical education need to be made in order to provide doctors with effective, evidence-based training, which will help teachers to facilitate all students achieving their potential.

7.1.8. Diversity training for medical educators

In addition to general teacher training, diversity training may help teachers adopt appropriate attitudes and skills for facilitating learning in medical students with diverse needs. Many medical students and Foundation Year doctors are now given courses on treating patients from diverse backgrounds (Dogra, Connin, Gill et al., 2005) but it is much rarer to find courses run for medical educators which focus on valuing diversity within medical student populations. This is partly a reflection of general lack of medical teacher training mentioned in section 7.1.7.1 above, but also reflects the unpopular association between diversity training and excessive political correctness (Kai, Bridgewater & Spencer 2001; Dogra & Karim, 2005), and the perception that ethnicity is not an issue in medicine (Esmail, 2004). Much diversity training is delivered simply in order to ‘tick a box’ (Beagan, 2003; Dogra & Karim, 2005).

These problems are compounded by the poor quality of much diversity training, which focuses on different beliefs associated with various cultural groups but ignores the more important individual differences within cultural groups. Furthermore, while there is a small amount of evidence that cultural diversity training may have some effect on attitudes (Dogra, 2001) there is little evidence so far to suggest the diversity training currently on offer has much effect on practice. Training can be vital to changing practice, but poor training may be worse than useless if it causes resentment and is perceived as a waste of participants' time and faculty resources. In order to be beneficial, diversity training should be evidence-based and properly evaluated with clearly measurable outcomes (Dogra and Karim, 2005).

The psychological literature provides some evidence to support best practice in diversity training. Greenwald and Banaji (1995) reviewed the literature on implicit attitutdes, self-esteem and stereotypes and showed that descreased attention (i.e. distraction) increases the likelihood of implicit stereotyping, and that when attention is focussed on the source of the implicit effect, the effect is lessened. On this basis, the authors suggested that the most likely successful strategy for avoiding unintended discrimination is to make people consciously aware of the likely sources of bias in the judgements they make. Dogra and Karim (2005) agreed with this idea, focusing on the importance of reflective practice in helping doctors care for patients with diverse needs. The authors provided a list (replicated below) which they suggested doctors could use to help them reflect on their practice in the context of diversity:

- "Think about how you view culture and sense of indentity given the frameworks presented
- Justify your position in the context of your professional role
- Reflect on your own practice and evaluate how your own views influence the choices you offer your patients
- How often you are genuinely interested in asking individual patients what they might need?
- How often do you assume that the needs of patients are already known on the basis of their diagnosis, ethnicity, gender or any other factor?
- What three things could you do to change your practice?"

(Dogra & Karim, 2005 p. 165)

Reading through the list, it is easy to see how, by replacing the word ‘patient’ with ‘student’, Dogra and Karim’s items could be refocussed on the delivery of teaching to medical students rather than the delivery of healthcare to patients. Diversity training programmes should emphasise this type of reflective practice, drawing awareness to the problems associated with stereotyping and inadvertent prejudicial attitudes. It should focus less on the differences between different cultural groups.

7.1.9. Increasing cohesiveness of the medical student population

Within large medical schools such as UCL, the medical student body can be fragmented. Segregation along ethnic lines has been noted in some studies of medical students (e.g. Beagan, 2003; Lempp & Seale, 2004) and elsewhere in Higher Education (e.g. Clack et al., 2005). It was also noted by students in the focus groups in Chapter 5 who talked about there being a “brown” (Asian) and a “white” side of the large lecture theatre students regularly attended during Years 1 and 2.

It is known that students can influence each others’ experiences of the learning environment (Lempp & Seale, 2004; Sinclair, 1997) but the effect of such self-imposed segregation along ethnic lines upon learning is unknown. The finding from Chapter 4 that the most common perpetrators of discrimination in the preclinical years were other students, together with the surprise many students in Chapter 5 reported feeling on their first day when they saw the number of ethnic minority medical students suggests that students may need help in dealing with ethnic diversity. Training medical teachers in diversity as mentioned above is important, but encouraging medical students to appreciate diversity in their colleagues might also have a positive impact.

One of the problems with implementing any such intervention is students’ perception that the ethnic heterogeneity of the medical student population makes them implicitly culturally aware, and therefore that they do not need training in this area (Beagan, 2003; Shapiro, Lie, Gutierrez, Zhuang, 2006). This idea that discrimination and prejudice are not an immediate problem in HE is reflected the HEA’s findings that faculty members understand that discrimination affects ethnic minority students’ performance in general, but that discrimination tends to be a problem at other institutions rather than theirs (HEA, 2008). Furthermore, some students may require more training than others to reach a particular level of cultural awareness and sensitivity (Lee & Coulehan, 2006).

If interventions to improve cultural awareness and sensitivity among medical students are to be effective, students first of all need to be made aware that cultural insensitivity is a problem, and secondly that it is one the intervention can address. Furthermore, there is some concern about whether specific interventions for ethnic minority students might make students perceive that they are being selected for, or excluded from 'special treatment'. Other, less explicit ways of encouraging mixing across ethnic groups, such as the small-group PDS teaching already in place at UCL Medical School, may be beneficial to counter any such perceptions.

7.1.10. Data monitoring, evaluation and research

Keeping data on students' attainment, ethnic group, and other demographic and socioeconomic factors was recommended by the HEA to be important in reducing the ethnic gap in attainment (HEA, 2008). It was also recommended that institutions keep records of reported complaints and discrimination and their outcomes in order to inform research and audit processes. Qualitative research with particular student groups was also suggested as a way of gaining insight into the more complex aspects of students' experiences at individual institutions. These matters are considered in greater depth below.

Conducting further research into ethnicity and medical education

7.1.11. Ethnicity as a variable in research

Research designed to explore ethnic differences in health, education and economics is needed by policymakers to enable them to create interventions to redress imbalances. The effects of those interventions also need to be measured and evaluated by researchers. It is therefore essential to have a valid and useful way of categorising "ethnicity" in research.

The issues surrounding ethnic categorisation in research are the subject of debate. A 1994 editorial in the BMJ by McKenzie & Crowcroft, published on the advent on of the NHS starting patient ethnic monitoring, explored the conceptualisations of race, ethnicity, and culture in the context of scientific enquiry in a healthcare setting, warning that ethnic categorisations often ignore the diversity within groups. For example, within a black African group, Somalians and Kenyans can be culturally and physically different, and within a white European group, Swedes can be culturally and physically different from Italians. The editorial argued that in order to understand why different groups have different experiences of health, it is necessary to distinguish between the confounded influences of racism, education, employment and social deprivation. The same could be said of understanding why different groups have different experiences of education.

In this thesis, the way in which “ethnicity” and “ethnic group” were conceptualised and measured was explained in Chapter 2, section 2.1.1 . The measurement or categorisation used was the same as that used by universities and the government in the UK. In many of the studies in this thesis it was decided to further condense ethnic group into a dichotomous variable: ethnic minority and white. There were two main reasons for this. Firstly, the number of medical students in some ethnic minority groups is very small, so for statistical and ethical reasons it is difficult to analyse data from those students. Secondly there is evidence that whites are more likely to pass the MRCP(UK) than any other ethnic group, and the minority groups did not differ from each other in terms of performance (Dewhurst et al., 2007). Thus it could be argued that the white/ethnic minority distinction is the important in terms of inequality in medical education attainment. This is not to underestimate the differences between ethnic groups, including within the “white” groups, but the importance of research into inequalities means it is sometimes necessary to use imperfect measures of ethnicity and ethnic group. The best should not be the enemy of the good. That being said, we should of course strive to make ethnicity a variable that is acceptable to stakeholders as well as being fit for purpose in research terms.

Senior and Bhopal (1994) made nine recommendations for improving the validity of ethnicity as an epidemiological variable, many of which surround the importance of making clear and justifying choices made. McKenzie & Crowcoft (1996) highlight the importance of having appropriate terminology for the hypotheses being tested. Future research into ethnic differences in medical education would benefit from careful consideration of the research question, and therefore on the precise nature of the ethnic variables being used. To give one example, religion is often considered a part of many definitions of ethnicity (see Chapter 2, section 2.1.1). Religion can influence cultural attitudes and behaviours, and can also affect interaction across cultures by influencing people's opinions and attitudes about people from different religious groups. Therefore, as well as recording ethnic group, it may be useful for research into ethnicity to consider asking questions about religion as well.

7.1.12. Keeping accurate and complete records

The idea that it is necessary to record people's ethnic origins is relatively new. The predecessors to UCAS [the Universities Central Council on Admissions (UCCA) and the Polytechnics Central Admissions System (PCAS)] only started asking candidates to declare their ethnic origin in 1990 (Modood, 1993). This came about partly because of the controversy surrounding the discriminatory admissions process at St George's Medical School in the 1980s (Modood, 1993). The Census started recording ethnic data in 1991. The NHS started recording patients' ethnic origins in 1994, using a variation on the Census question. As mentioned above, The Race Relations Act 1976 (Statutory Duties) Order 2001 required public authorities to monitor ethnicity by 2002, which is when UCL Medical School started routinely collecting ethnic data on students.

One of the reasons that it is important to collect student ethnic data is to enable researchers and educators to see where ethnic differences are present, where they are not, and where they are growing or shrinking (HEA, 2008). At UCL, the MSSR electronic student record was invaluable in conducting this PhD. Having demographic and academic information on vast numbers of students, all on one database, in searchable and statistically analysable form, increased the number of research questions it was possible to investigate, as well as the ease with which those questions were explored.

Other educational research has also benefited from large amounts of data being collected and stored. For example, in the Youth Cohort Study (YCS) spreadsheets contain all the data from a series of longitudinal surveys conducted on behalf of the Government to explore 16 to 18 year olds' experiences of education and the labour market in England and Wales. Those databases contain detailed information about examination grades, subjects studied, employment, types of educational establishments attended, socio-economic and other demographic variables. They are comprehensive, well designed and best of all, freely available online http://www.dfes.gov.uk/rsgateway/DB/SFR/s000382/index.shtml, which means that they can be used for secondary analysis, as was done by McManus et al. (2008) who looked at the educational qualifications of medical students from ethnic minorities (see section 1.1.8.2). In clinical research, data from the General Practice Research Database (http://www.gprd.com/_docs/Database-4.pdf) have been used in hundred of studies. In the United States, Maxine Papadakis has analysed data from medical school records and State Medical Board records, finding a link between reported unprofessional behaviour at medical school and disciplinary action years later (Papadakis et al., 2004, Papadakis et al., 2005). She has now extended her research to national databases (Papadakis et al., 2008). At an Association for the Study of Medical Education (ASME) meeting on medical student professionalism in June 2008, she explained how some of the student records would have been disposed of were it not for one administrator who decided, off her own bat, to keep them. Papadakis strongly stressed the need to keep student data in order that research on such important topics can be conducted.

Measures need to be put into place to ensure the security of databases which contain sensitive information; however this should not prevent institutions such as medical schools keeping secure electronic records. These records have the benefit of being used to answer current research, but can also be used in the future answer questions which have yet to be conceptualised.

7.1.13. Choosing malleable variables

The relationship between ethnicity and attainment is complex, and choosing which variables to examine is potentially problematic. Medical education research should be conducted with the ultimate aim of improving the experiences, knowledge, skills and attitudes of medical students and doctors, and this can only be achieved by concentrating on factors which it is possible to change. As mentioned in Chapter 6, many of the problems often blamed for ethnic minority underperformance are intractable: e.g. social deprivation (Aronson et al., 1999). It is not possible for medical schools to improve the childhood experiences of their entrants, and selecting students who do not come from deprived backgrounds is socially unacceptable and unfair (and of course there are Widening Participation programmes which aim to do the exact opposite, *Cf.* Garlick & Brown, 2008). Whilst it is important to understand the needs of disadvantaged groups in order to ensure fairness, in terms of research, it is important that malleable variables are chosen to investigate because they are more amenable both to experimental research and to intervention.

7.1.14. Conducting theory-driven as well as applied research

Medical educational research tends to take an applied approach, which is sensible considering the vast number of different influences on educational outcomes, and the difficulties in controlling variables in an experimental fashion. However, for the last 150 years psychologists have increased our understanding of the workings of the human mind using scientific methods. It is therefore also sensible to use some of the knowledge psychologists have about the ways in which our minds work in order to better understand the behaviour of doctors and medical students. Geoff Norman had long advocated using experimental methods to test the “building blocks” of learning and knowledge acquisition in medical education using theories and methods developed in experimental psychology (e.g. Norman, 2000; Norman, 2002); and he gives the examples of medical expertise and clinical reasoning as specific areas of progress in medical education which have arisen out of just such an approach.

In terms of ethnicity, cognitive and social psychology can inform medical educational research. Stereotype threat (Steele & Aronson, 1995; Steele, 1997) was a psychological theory explored in this thesis. Other theories abound about the psychological process which underlie behaviours relating to for example, stigma consciousness (Pinel, 1999), self-efficacy (Bandura, 1977) and working memory (Baddeley, 2001) to name but a few. Medical education researchers could benefit from conducting research deriving from psychological theories.

Qualitative research should also be theory-driven where possible, although the theories may be somewhat different from experimental psychological theories and are likely to be based in sociology or anthropology. The aim should be to provide deep insights into the differences experienced by students from different ethnic and social groups. When possible, quantitative and qualitative research could be used in parallel to shed light on the problem from different, yet complementary angles (HEA, 2008).

7.1.15. Investigating environmental factors and their interaction with student-related factors

The results of this thesis have emphasised the importance of environmental factors as well as student-factors in exploring the problem of ethnic minority underachievement. Naturally, there is a huge number of possible subjects for future research. Three specific suggestions are outlined in this section.

Firstly, a large scale quantitative study of all medical schools in the UK could be performed. Demographic and academic data on students could be gathered, together with descriptive statistics about environmental factors relating to the medical school, for example teacher and patient demographics, type of curriculum, staff to student ratio, amount of early patient contact, presences of diversity training, and so on. The datasets resulting from such research would show where ethnic differences exist, and also importantly, where they do not exist. They would also be large enough to investigate in more detail differences between different ethnic minority, and even between different white groups. Large scale projects of that type do exist (e.g. the Youth Cohort Study), but they require significant funding and multi-centre collaborations.

A second potentially useful way of examining the influences of the environment of ethnic differences would be to explore the relationships between students and teachers, and between students and their peers, and the effects of those relationships on performance. Qualitative methods, such as interview and ethnographic observations, could give detailed insights into what participants from different ethnic groups believe to be the most important aspects of the relationships they have with teachers, and the relationships they have with other students. The perceived important aspects of the relationships could then be examined in detail using quantitative methods, such as self-report or observer-completed questionnaires, or self-report diaries. The quantitative findings could be examined for differences by ethnic group, and statistically correlated with measures of performance, measures of satisfaction and other student, and teacher outcome measures.

Thirdly, smaller-scale projects could investigate the impact on students of, for example, diversity teacher training. This research could be small-scale, single-institution, and experimental to begin with, and could measure attitudes and behaviours in controlled situations. Interesting results could lead to larger-scale projects in real-life teaching and learning situations which would have more ecological validity.

7.1.16. Investigating sex differences in performance: a parallel to ethnic differences?

The majority of this PhD has focussed on ethnic differences in performance. However another demographic variable, sex, was also found to influence examination performance. The sex differences to an extent mirror the ethnic differences: at UCL Medical School the sex gap was small (indeed statistically non-significant) in Years 1 and 2, but then increased in Year 3. The sex gap is however relatively robust across Higher Education (Richardson, 2008), including in undergraduate medical education (Ferguson et al., 2002), and it continues into postgraduate medical training (Dewhurst et al., 2007).

There are two key differences between the issues surrounding sex and performance and those surrounding ethnicity and performance. Firstly in the case of sex, it is the traditionally disadvantaged group – women – who achieve the higher marks in examinations. Secondly, although women perform well in examinations, once in the labour market, female medics underperform on a number of other different markers of success (Kilminster, Downes, Gough et al., 2006): they earn less than men, they are less likely to be promoted to consultant level, and if they enter academia, they are less likely to become professors (Medical Schools Council, 2007). Ethnic minority students and graduates not only achieve lower marks in examinations, but are also faced with other barriers to career advancement (BMA, 2004). It is conceivable that similar mechanisms influence the academic underperformance of male and ethnic minority students, and that the barriers faced by female and ethnic minority students in their careers are also similar in some ways. As such, further examination of the factors influencing female medical student and graduate performance may shed light on the ethnic minority medical student and graduate underperformance.

Conclusion

This thesis has shown that the relationship between ethnicity and attainment in medical school examinations is not straightforward. Ethnic differences are not due to simple differences in learning styles, motivations or English language proficiency. Neither are they due to differences in socio-economic background, schooling or A Level grades. It does however seem likely that many ethnic minority medical students have qualitatively different experiences of medial school compared to white students. In the clinical years, ethnic minority students are more likely to be negatively stereotyped by clinical teachers, and this may affect their learning and their performance, although the relationship between stereotyping and attainment is not straightforward either. Using evidence-based methods to help teachers value diversity, and increasing the cohesiveness of medical student population, may both improve ethnic minority medical students' experiences of the clinical learning environment. Future research into ethnicity and medical education would benefit from accurate and complete data on students and institutions. Medical education research could draw inspiration from psychological and social science theory, and would benefit from employing clearer conceptualisations of ethnicity that are fit for purpose.

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Appendix

This appendix includes the ethical approval for the PhD, the interview and focus group questions used with medical students and clinical teachers in the study in Chapter 5, and the tutor briefing information from the study in Chapter 6. The questionnaires used in the study in Chapter 4 are included in the pocket on the inside cover of the thesis.

Ethical approval for the study

FINAL
30 June 2005

For office use only

Ref. No: .... Date rec'd: ....

UCL Committee on the Ethics of Non-NHS Human Research
APPLICATION FORM

SECTION A: IDENTIFYING INFORMATION

A1. Project Title: Factors affecting medical students' exam performance

Date of Submission: 24 June 2005 — UCL Ethics Project ID Number: 0511/001
Proposed Start Date: July 2005 — Proposed End Date: July 2008

If this is an application for classroom research as distinct from independent study courses, please provide the following additional details:

Course Title: — Course Number:

A2. Principal Researcher
(Please note that a student – undergraduate, postgraduate or research postgraduate cannot be the Principal Researcher for Ethics purposes).

Full Name: Jane Dacre — Position Held: Professor

Address: Academic Centre for Medical Education, Royal Free and University College Medical School 4th Floor Holborn Union Building, Highgate Hill, London N19 3LW

Email: j.dacre@medsch.ucl.ac.uk — Telephone: 020 7288 5209 — Fax: 020 7288 3322

Declaration To be Signed by the Applicant or by the Principal Researcher if different from the Applicant

- **I undertake to complete and submit the 'Continuing Review Approval Form' on an annual basis to the UCL Ethics Committee.**
- **I will ensure that changes in approved research protocols are reported promptly and are not initiated without approval by the UCL Ethics Committee, except when necessary to eliminate apparent immediate hazards to the participant.**
- **I have obtained approval from the UCL Data Protection Officer stating that the research project is compliant with the Data Protection Act 1998. My Data Protection Registration Number is: Z6364106/2005/6/41 Section: 19 research: social research**
- **I will ensure that all adverse or unforeseen problems arising from the research project are reported in a timely fashion to the UCL Ethics Committee.**
- **I will undertake to provide notification when the study is complete and if it fails to start or is abandoned.**
- **I have met with and advised the student on the ethical aspects of this project design and am satisfied that it complies with current professional, departmental and university guidelin**[redacted]***Principal Researcher is not also the applicant).***

Signature: .[redacted]............... **Date:**...30/6/05...........

A3. **Applicant(s) Details** (if Applicant is not the Principal Researcher e.g. student details):

Full Name: Katherine Woolf

Position Held: PhD student and non-clinical research assistant

Address: ACME, as above

Email: k.woolf@medsch.ucl.ac.uk

Telephone: 020 7288 3546
Fax: 020 7288 3322

A4. **Has or will this project be submitted for funding?** No

A5. **Signature of Head of Department or Chair of the Departmental Ethics Committee**
(This must not be the same signature as the Principal Researcher)

I have discussed this project with the principal researcher who is suitably qualified to carry out this research and I approve it. The project is registered with the UCL Data Protection Officer and a formal signed risk assessment form has been completed.

In line with UCL's policy on criminal record checks which can be found at: (http://www.ucl.ac.uk/hr/docs/criminal_record.php), checks for the staff working on this project:
(1) ~~have been satisfactorily completed~~,
(2) ~~have been initiated with the HR Division~~,
(3) are not required (Head of Department to delete as applicable).

Print Name: D. P. GILL

Signa[redacted]

Date: 30/6/05

Chair's Action Recommended: YES
(A recommendation for Chair's action can be based only on the criteria of minimal risk as defined in the Terms of Reference of the UCL Committee on the Ethics of Non-NHS Human Research).

SECTION B: DETAILS OF THE PROJECT

B1. Please provide a brief summary of the project in lay terms (if a Class Research Project as defined on page 1, please include aims and objectives of the course) **including the hypothesis to be tested if relevant** (max 200 words).

Our previous research has shown that non-white and male students perform differently to white and female students in 3rd year written and clinical examinations at Royal Free & University College Medical School. This may be due to differences in clinical learning. Our aims are to discover whether this phenomenon occurs throughout medical school, and to explore the possible reasons for this. We will first obtain demographic and academic student data. We wish then to follow the 2005/6 1st and 3rd year students through medical school until 2007/8. We will design a questionnaire to measure their psychological attributes, administering it at the start of each academic year. We will also look for sex and ethnicity differences in clinical learning by analysing 3rd year student logbooks (self-reported records of clinical experience). We have already received UCL ethical approval to interview clinical students and their teachers about their views on the factors that affect students' clinical learning. All these data will be analysed to discover which factors affect students' examination performance, and in particular which factors may be influencing underperformance.

B2. Briefly characterise in lay terms the research protocol, type of procedure and/or research methodology (e.g. observational, survey research, experimental). Give details of any samples or measurements to be taken (max 1500 words).

All students in years 1 and 3 in academic year 2005/6, and 25 Year 3 medical students' clinical teachers will be asked to take part in the project from 2005/6 until 2007/8.

- Student sex, ethnicity data and A level and medical examination results will be obtained from the medical student records database.
- These data will be analysed to see whether previous findings of sex and ethnicity differences in examination performance are replicated in these cohorts of students.
- Previous research has found that learning style, personality, mood and stressful experiences can influence academic performance. We will ask students to fill in a questionnaire to measure these factors. We will also explore students' motivation for doing medicine, extracurricular activities and socioeconomic background. We will analyse the results in terms of students' sex, ethnicity and examination results.
- Students will be asked to give their name on a sheet attached to the questionnaire, upon which there will also be a statement regarding confidentiality. Each student's name sheet and their questionnaire will be given a number. Thus, each student will allocate themselves with an identifying (ID) number for the purpose of this project. Students will be asked to detach the sheet from the questionnaire and hand both in together. The students' name sheets will enable us to correlate students' questionnaire responses with their examination scores.
- The first page of the questionnaire will contain a covering letter to explain the purpose and voluntary nature of the study. Students will be asked to read this letter before completing the questionnaire. On the last page of the questionnaire, students will be asked to initial a statement of informed consent, which will be numbered and detached.
- On the last page of the questionnaire, students will be given the UCL student counselling service's contact details and will be informed that they can contact them if required.
- The same students will be asked to complete the questionnaire at the start of academic years 2005/6, 2006/7 and 2007/8. This prospective design will help enable us to establish the causal relationship between the demographic, psychological and academic factors studied.
- Our previous research suggests that sex and ethnicity differences in 3rd year examination scores may be due to differences in clinical learning. To investigate this, we propose to photocopy and analyse the 2004/5 and 2005/6 3rd year students' logbooks of their clinical experience. Logbooks are collected from the students by medical school administration throughout the 3rd year.
- We have already obtained UCL ethical approval to interview 3rd year students and their clinical teachers to explore factors affecting students' clinical learning. We will analyse the results of these interviews qualitatively.
- All the data collected will be analysed to investigate the interactions between sex, ethnicity, clinical experience, psychological factors, and performance in medical school examinations.

Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)

From: Spenser Crouch
Sent: 23 June 2005 15:43
To: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)
Subject: RE: data protection form K Woolf

Dear Katherine,

Thank you for your request for Data Protection Registration for your project, "Factors affecting medical students' exam performance".

I am pleased to confirm that your project is covered by the UCL Data Protection Registration, reference No Z6364106/2005/6/41, Section 19, Research: Social Research.

Kind regards,

Spenser

Spenser Crouch
Data Protection & FOI Assistant
Records Office
University College London
Gower Street
London WC1E 6BT

Tel: 020-7679-0166 Ex 30166
Email: s.crouch@ucl.ac.uk

-----Original Message-----
From: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)
Posted At: 23 June 2005 15:27
Posted To: EFD_Data-Protection
Conversation: data protection form K Woolf
Subject: data protection form K Woolf

Dear Spencer
Further to our telephone conversation this afternoon, please find attached the data protection form 2 for our study "Factors affecting medical students' exam performance".
I look forward to hearing from you.
Best wishes
Katherine Woolf

Katherine Woolf
Non-Clinical Research Assistant

Academic Centre for Medical Education
Royal Free & University College Medical School
4th Floor Holborn Union Building
Archway Campus
Highgate Hill
London N19 5LW

UCL GRADUATE SCHOOL

The Graduate School
University College London
Gower Street London WC1E 6BT

Professor David Bogle
Head of the Graduate School

Tel: 020 7679 7844
Fax: 020 7679 7043
Email: gradschoolhead@ucl.ac.uk

26 July 2005

Professor Jane Dacre
Academic Centre for Medical Education
Royal Free and University College Medical School
4th Floor
Holborn Union Building
Highgate Hill
London
N19 3LW

Dear Professor Dacre

Re: Notification of Ethical Approval

Project ID: 0511/001: Factors affecting medical students' exam performance

The above research has been given ethical approval following review by the UCL Committee for the Ethics of non-NHS Human Research for a period of 12 months from the commencement of the project (26 July 2005).

Approval is subject to the following conditions:

1. It is a requirement of the Committee that research projects which have received ethical approval are monitored annually. Therefore, you must complete and return our 'Annual Continuing Review Approval Form' PRIOR to the **26 July 2006**. If your project has ceased or was never initiated, it is still important that you complete the form so that we can ensure that our records are updated accordingly.

2. You must seek Chair's approval for proposed amendments to the research for which this approval has been given. Ethical approval is specific to this project and must not be treated as applicable to research of a similar nature. Each research project is reviewed separately and if there are significant changes to the research protocol you should seek confirmation of continued ethical approval by completing the 'Amendment Approval Request Form'.

The forms identified above can be accessed by logging on to the ethics website homepage: http://zzz.grad.ucl.ac.uk/ethics/ and clicking on the button marked 'Key Responsibilities of the Researcher Following Approval'.

3. It is your responsibility to report to the Committee any unanticipated problems or adverse events involving risks to participants or others. Both non-serious and serious adverse events must be reported.

Reporting Non-Serious Adverse Events.
For non-serious adverse events you will need to inform Ms Helen Dougal, Ethics Committee Administrator (h.dougal@ucl.ac.uk), within ten days of an adverse incident occurring and provide a full written report that should include any amendments to the participant information sheet and study protocol. The Chair or Vice-Chair of the Ethics Committee will confirm that the incident is non-serious and report to the Committee at the next meeting. The final view of the Committee will be communicated to you.

Reporting Serious Adverse Events
The Ethics Committee should be notified of all serious adverse events via the Ethics Committee Administrator immediately the incident occurs. Where the adverse incident is unexpected and serious, the Chair or Vice-Chair will decide whether the study should be terminated pending the opinion of an independent expert. The adverse event will be considered at the next Committee meeting and a decision will be made on the need to change the information leaflet and/or study protocol.

4. On completion of the research you must submit a brief report (a maximum of two sides of A4) of your findings/concluding comments to the Committee, which includes in particular issues relating to the ethical implications of the research.

[redacted]

Sir John Birch
Chair of the UCL Committee for the Ethics of Non-NHS Human Research

Cc: Katherine Woolf, ACME

Dr Charles Mackworth-Young.
Charing Cross Research Ethics Committee.
Room 3E/03A,
3rd Floor East,
Charing Cross Hospital,
Fulham Palace Road,
London,
W6 8RF.

27th April 2005

Dear Dr Mackworth-Young,

My name is Katherine Woolf and I am a non-clinical research assistant at the Academic Centre for Medical Education, Royal Free & University College Medical School.

I am working on a non-clinical research project supervised by Professor Jane Dacre (Royal Free & University College Medical School), Professor Chris McManus (UCL Psychology) and in collaboration with Miss Jenny Higham (Imperial College School of Medicine). The project is looking at the effects of ethnicity and gender on performance in medical school examinations. The project was conceived by Dr Inam Haq (MD student and Arthritis Research Campaign Research Fellow) who has already obtained ethical approval from UCL for the concept of the overall project.

As an additional part of this research project I plan to conduct some interviews with medical students and their clinical teachers. The interviews will be conducted, taped and transcribed by myself. The transcripts will be anonymised by assigning them a code which is unrelated to the interviewees' names. The interviewees' full names will not be mentioned on the tape recording. All potential participants will be informed before the interviews that their participation in the study is entirely voluntary and nothing they say will be attributable to them by name.

I already have UCL ethical approval to interview the medical students and those clinicians who have contracts with UCL. I also wish to interview other clinicians who, although they regularly teach Royal Free & University College Medical School students, do not have formal contracts with UCL.

I should be very grateful if my application for ethical approval for the interviews with those clinical teachers who do not have UCL contracts could be considered and if possible, passed by Chair's action.

I look forward to hearing from you.

Yours sincerely,

Katherine Woolf

UCL Committee for the Ethics of Non-NHS Human Research

Amendment Approval Request Form

1. ID Number: 0088/001	**Name and Address of Principal Investigator:** Professor Jane Dacre

2. Title of Project:
The effect of gender and ethnicity on medical student performance in written and clinical examinations

3. Information about the amendment:

(a) Is the amendment purely administrative? NO

(b) Has the Participant Information Sheet/Consent Form been changed as a result of the amendment? **YES** **NO** **N/A** **If yes, please enclose a copy.**

A further participant information sheet has been designed (see attached).

4. Summarise the issues contained in the amendment.
We wish to extend the current project by conducting a further study which follows on results of data already collected and analysed during the course of this project.

This further study will involve interviewing medical students and their clinical teachers about the clinical teaching they either receive or give.
The interviews will be conducted, taped and transcribed by Katherine Woolf (research assistant). The transcripts will be anonymised and assigned a code which is unrelated to the interviewees' names. The interviewees' full names will not be mentioned on the tape recording. Other potentially identifying information (e.g. names of Hospitals the students are being taught at or the teachers are teaching at; and any other names mentioned on the recording) will also be anonymised.

All potential participants will have the nature of the study explained to them before the interview and will be reassured that nothing they say will be attributable to them by name (see information sheet attached). Participants' verbal consent will be gained before starting the interview.

The results will be analysed qualitatively.

UCL Committee for the Ethics of Non-NHS Human Research

Amendment Approval Request Form

1. ID Number: 0088/001	Name and Address of Principal Investigator: Professor Jane Dacre

2. Title of Project:
The effect of gender and ethnicity on medical student performance in written and clinical examinations

3. Information about the amendment:

(a) Is the amendment purely administrative? NO

(b) Has the Participant Information Sheet/Consent Form been changed as a result of the amendment? YES NO N/A **If yes, please enclose a copy.**

Participants will be informed of the nature of the study by email, and verbally before the start of the focus group (see attached documents).

4. Summarise the issues contained in the amendment.
We currently have ethical approval to interview students on a one-to-one basis about the clinical teaching they receive. However, during the course of conducting and analysing these interviews, it has become apparent that the research topic would be better investigated by using group interviews, rather than one-to-one interviews. This change in methodology has been recommended to us by two experienced researchers in the field of qualitative research.

We intend to conduct a maximum of 8 focus groups, each with 5-15 year 3 students. The study will therefore involve a maximum of 120 students.
Focus groups will be stratified by ethnicity and ability to facilitate the discussion. Students will be selected and invited to take part on the basis of their self-declared ethnicity (from their student record, or from a previous study), and also on the basis of their year 3 firm examination results. Selection will be done by a researcher independent of the research project to improve the validity of the study.
There will be 2 groups of White students, 2 groups of Indian students, 2 groups of Pakistani or Bangladeshi students. Students will be invited to attend focus groups by email, with the possibility of telephone or letter reminders.
The focus groups will last about 1-2 hours and the students will be given food and non-alcoholic drink. The focus groups will be moderated, taped and transcribed by Katherine Woolf (PhD student and research assistant). They will be co-moderated by Sara Bell (an undergraduate psychology

student). The transcripts will be anonymised and all potentially identifying information will also be anonymised. All potential participants will have the nature of the study explained to them before the focus groups and will be reassured of the anonymity of the results. They will also be reminded of the voluntary nature of their participation in the research, and that they are free to withdraw their participation at any time. Attached is a list of the questions to be asked during the focus group, together with the study information to be given to students. The results will be analysed qualitatively.
5. Please give any other information you feel may be necessary:
Signature of Principal Investigator: **Date of Submission: 26th April 2006** [redacted]
FOR OFFICE USE ONLY: **Amendments to the proposed protocol have been** ..approved...... **by the Committee for the Ethics of Non-NHS Human Research.** **Chair's Signature:** [redacted] **Date:** 27/4/06.

Please return completed form to:

Ms Helen Dougal, Secretary of the Committee for the Ethics of Non-NHS Human Research
Graduate School, North Cloisters, Wilkins Building
Gower Street, London WC!E 6BT

Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)

From: Helen Dougal [h.dougal@ucl.ac.uk]
Sent: 21 August 2006 14:37
To: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)
Subject: RE: minor alteration to questionnaire used in research project 0511/001

Dear Katherine

Your proposed questionnaire has been reviewed and approved by the Chair of the UCL Research Ethics Committee.

With best wishes, Helen

Helen Dougal
Ethics Committee Administrator & PA to Professor David Bogle
Head of the Graduate School
University College London
Gower Street
London
WC1E 6BT

Tel: +44 (0)20 7679 7844 (ext 37844)
Fax: +44 (0)20 7679 7043
Email: h.dougal@ucl.ac.uk

Please note that my new working hours are: Monday-Friday: 8am-3.30pm

-----Original Message-----
From: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education) [mailto:k.woolf@medsch.ucl.ac.uk]
Sent: 11 August 2006 11:30
To: h.dougal@ucl.ac.uk
Subject: minor alteration to questionnaire used in research project 0511/001

Dear Helen
I have made some minor alterations to a questionnaire I'm giving out to the Year 1, 3, 4 and iBSc students as part of my PhD (ID number: 0511/001).
I've attached a copy of the new year 3 questionnaire (the questionnaire is virtually identical for all the years).
Best wishes
Katherine Woolf

Katherine Woolf
PhD student
Academic Centre for Medical Education
Royal Free & University College Medical School
4th Floor Holborn Union Building
Archway Campus
Highgate Hill
London N19 5LW
Mobile: 07899 895 543
Tel: 020 7288 3546
www.ucl.ac.uk/acme

06/06/2007

Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)

From: Helen Dougal [h.dougal@ucl.ac.uk]

Sent: 02 November 2006 14:30

To: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)

Subject: RE: ethics for medical student research projects

Dear Katherine

The Chair of the UCL Research Ethics Committee, Sir John Birch, has approved the sending of your attached letter to all UCL medical students.

With best wishes, Helen

Helen Dougal
Ethics Committee Administrator & PA to Professor David Bogle
Head of the Graduate School
University College London
Gower Street
London
WC1E 6BT

Tel: +44 (0)20 7679 7844 (ext 37844)
Fax: +44 (0)20 7679 7043
Email: h.dougal@ucl.ac.uk

Please note that my new working hours are: Monday-Friday: 8am-3.30pm

-----Original Message-----
From: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education) [mailto:k.woolf@medsch.ucl.ac.uk]
Sent: 26 October 2006 12:22
To: h.dougal@ucl.ac.uk
Subject: ethics for medical student research projects

Dear Helen

The Vice Dean of the Royal Free & UCL Medical School and Director of UCL's Academic Centre for Medical Education, Prof Jane Dacre, would like to undertake a number of educational research projects using the medical students' assessment data. This research would go towards improving the learning experience and teaching at the medical school, and also to investigate specific questions, for example, about the reasons for ethnic differences in performance in medical school examinations.

Although I believe this type of research is covered under the Graduate School Ethics Exemptions, it would be useful to obtain ethical approval (by Chair's action if possible) to send the attached letter to all UCL medical students, to inform them of this research, and give them the chance to opt-out.

I would be grateful if you could let me know whether this would be possible.

Many thanks

Best wishes

Katherine Woolf

Letter sent electronically to all Year 3 medical students (as per email from Helen Dougal on p.318)

Dear Medical Student

As part of its continuing efforts to improve the standard of teaching and learning, the Royal Free & University College Medical School may use student assessment information for research purposes.

All information relating to individuals will be kept confidential and any data published will be anonymised, published in aggregate form or other form which will not enable individuals to be identified. All data will be stored according to the Data Protection Act 1998.

If you do not agree to your assessment information being used for these purposes, please contact Sabine Morris on s.morris@medsch.ucl.ac.uk. Refusal will not affect your current or future studies.

Thank you.

Yours faithfully,

Professor Jane Dacre
Vice-Dean
Director of Education
Royal Free & University College Medical School

Email from Year 3 administrator showing the number of students who declined to have their data used for research purposes

From: Morris, Sabine (Medsch Hampstead/Medical Student Administration)
Sent: 07 June 2007 14:51
To: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)
Subject: RE: Consent for Medical Student Research Projects

Hi Kath,

None of the students ever wrote back to say they did not want to be included!

From: Woolf, Katherine (Medsch Archway/Academic Centre for Medical Education)
Sent: 06 June 2007 15:26
To: Morris, Sabine (Medsch Hampstead/Medical Student Administration)
Subject: Re: Consent for Medical Student Research Projects

Hi Sabine

I hope things are good with you.

Please could you let me know which – if any - students wrote back and said they didn’t want their data to be used for the below please?

Many thanks

All the best

Katherine

UCL RESEARCH ETHICS COMMITTEE 9 JUL 2007

to Kath

UCL

Annual Continuing Review Approval Form

It is a requirement of the UCL Research Ethics Committee that research projects which have received ethical approval by the Committee are monitored annually. Therefore, this form must be completed and returned **PRIOR** to the date that the current approval expires. If your project has ceased or was never initiated, it is still important that you complete this form so that we can ensure that our records are updated accordingly.

1	**ID Number:** 0511/001	**Principal Investigator:** Professor Jane Dacre
2	**Project Title:** Factors affecting medical students' exam performance	
3	**Current Approval Expires:** July 2008	
4	**Project Status:** (please tick relevant box)	[x] Active [ ] Terminated
5	**Current Status of Human Participant Use:** Number being used: 984 Number will be used: 1500 Total Number enrolled to date: 984 Beginning date: July 2005	Participant use completed? [ ] Yes [x] No Date completed: Total number enrolled:
6	**Human participants will no longer be used. Please explain:** n/a	
7	If funded study, please indicate: n/a	Agency: Project Period: Agency Award Number:
8	Number of participants who withdrew from the project: 0 Please provide reasons for withdrawal:	

		Yes	No
9	**Have you modified your research since your last review?**	x	

If so, you are required to submit a revised application form to the Committee for review.

We have already obtained UCL Ethics Committee consent for our changes (please see attached paperwork)

10	**Please provide with this form a brief report describing the progress of your study thus far.**

Include a description of any **adverse or unforeseen circumstances** arising out of the research project (e.g. a complaint by a participant, an incident endangering a research worker taking a questionnaire out to a population study, etc) together with a summary of any recent literature, findings, or other relevant information associated with your study.

- All students in years 1, 3 and 4 in academic year 2006/7 were asked to complete a questionnaire to measure their learning style, personality, mood and stressful experiences, motivation for doing medicine, demographics, extracurricular activities and socioeconomic background. Response rates were 90.3% for Year 1, 78.7% for Year 3 and 57.9% for Year 4.
- The data from these paper questionnaires has been entered electronically. The paper questionnaires have been anonymised by removing the "name" section of the questionnaire from the rest of the questionnaire and storing these separately.
- Exam data will be obtained at the end of the academic year for these students and analysed statistically together with the questionnaire data obtained.
- All year 3 students have, as part of a new teaching initiative which is completely separate from this research, written reflective essays on their experiences. Students are required to write these essays four times in Year 3. The third time they wrote these essays, half of the students were asked to reflect on one particular broad topic, and the rest on another broad topic. The essays were submitted by students as part of a formative assessment and was part of their standard teaching that all year 3 students received in 2006/7.
- When we analyse the year 3 students' examination results by ethnicity (as described above) we will also investigate whether the effects of ethnicity on exam results are the same in the group of students who wrote an essay on the first topic as those who wrote their essay on the second topic. We have obtained consent from the UCL ethics committee to analyse the students' assessment data, including this formative assessment data (see attached paperwork).

2

Print Name:	**Signature:**	**Date:**
Professor Jane Dacre		28/6/7

FOR OFFICE USE ONLY:

Approval

The continuing monitoring of this protocol has been reviewed and approved by the Committee. The re-approval date is ...1 July 2007.......... and is valid for 1 year from this date.

Chair [redacted] Date: 8/7/07.

Please return completed form to:

Ms Helen Dougal
Secretary of the UCL Research Ethics Committee
Graduate School
North Cloisters, Wilkins Building
Gower Street
London
WC1E 6BT

My records show that your project is due to end on 1st July 2008. Please submit a final report of findings on completion of the research, including in your report any particular ethical issues which you would like to bring to the attention of Committee members.

Year 3 questionnaire 2005 (Chapter 4)

Consent

As described in the covering letter, this questionnaire is entirely for the purposes of research. It is part of a longitudinal study, and the results may be linked with other data. Information you provide is entirely confidential and will be stored safely in an anonymised form. Information on individuals will not be given to those examining or teaching students. Results of this questionnaire will be published in aggregate or other form in which individuals cannot be identified. Both for your own reassurance and as part of research ethics, **we would be grateful if you could consent to the information being used for these purposes by completing this form.**

No:

This section will be detached from your completed questionnaire

Surname (block capitals please):

____

Name (block capitals please):

____

Signature:

____

Date (dd/mm/yyyy):

_____/_____/________

No:

The information you provide is confidential. Please answer as honestly as you can

Royal Free and University College Medical School
University College London

Academic Centre for Medical Education

4th Floor Holborn Union Building
Archway Campus
Highgate Hill
London N19 5LW

Telephone: 020 7288 5209
Facsimile: 020 7288 3322

http://www.ucl.ac.uk/acme

Dear Third Year Student,

This questionnaire will look at factors which may affect how students perform at medical school. The results will be used for research in general and specifically for answering questions such as why individuals decide to become doctors. This questionnaire is part of a longitudinal study and the results may be linked with other data.

Your name is essential in allowing us to analyse the questionnaire, but it is confidential and your questionnaire will be stored in a secure and anonymised form. Information about individuals will not be passed on to those examining or teaching students. Results of this questionnaire will be published in aggregate or other form in which individuals cannot be identified.

This project is covered by the Data Protection Act 1998: the personal information that you give will be used only for this project and will not be divulged to third parties. It will be stored and disposed of in a secure manner. If at any time you do not wish to continue to take part in this project please inform us in writing and we will remove your details from the database.

The questionnaire is entirely voluntary. If you do not wish to take part this will not affect your current or future studies.

Thank you for your time.

Yours sincerely,

Professor Jane Dacre
Professor of Medical Education

The information you provide is confidential. Please answer as honestly as you can

1. What is today's date (dd/mm/yyyy)? ___/_____/______

2. What is your date of birth (dd/mm/yyyy)?___/_____/______ **3. What is your sex?** *Male / Female*

4. In which country did you complete your secondary education? *UK* *Other* ______________________________

5. Please indicate in which of the following types of school you received your secondary education. If you have been to more than one type, please indicate the number of years in each

1. Comprehensive		4. Public School	
2. State Grammar School		5. Private School	
3. Private Grammar School		6. Sixth Form College	

6. Where did you complete your preclinical training? *RFUCMS / Oxford / Cambridge / Other*______________________

7. Do you have a degree? *No / Yes intercalated / Yes prior to medical school*

8. What is (or was) your father's occupation? (Describe what he does or did as fully as you can)

____

9. What is (or was) your mother's occupation? (Describe what she does or did as fully as you can)

____

10. Below is the Registrar General's employment classification. Please put ticks next to the categories that best describe your *father*'s occupation and your *mother*'s occupation.

		Father	Mother
I	Professional - includes doctor, lawyer, architect		
II	Managerial - includes shopkeeper, teacher, farmer		
IIINM	Non-manual - includes shop assistant, clerical worker		
IIIM	Skilled Manual - includes electrician, miner		
IV	Partly skilled - includes bus conductors, farm workers		
V	Cannot classify		

11. Are your parents medical doctors? *Father / Mother / Both parents / Neither parent*

12. Are your parents university graduates? *Father / Mother / Both parents / Neither parent*

13. What are your parents' first languages? *Father:*______________________ *Mother:* ______________________

14. What is your first language?____

15. If English is not your first language, at what age did you first start to speak English? _________*years*

It would be helpful to us if you could answer the following question, which is taken from the **2001 UK Census**.

16. What is your ethnic group? Tick one box to indicate your cultural background.

White	Asian or Asian British	Black or Black British	Mixed	Chinese or Other ethnic group
British □	*Indian* □	*Caribbean* □	*White & Black Caribbean* □	*Chinese* □
Irish □	*Pakistani* □	*African* □	*White & Black African* □	*Other (please specify)* □
Other (please specify) □	*Bangladeshi* □	*Other (please specify)* □	*White and Asian* □	
	Other (please specify) □		*Other (please specify)* □	

The information you provide is confidential. Please answer as honestly as you can

17. Please estimate how many hours *per week* you devote to the following

	0	1-2	3-4	5-8	9-15	16+
Watching TV						
Watching sport						
Playing sport						
In a pub						
On hobbies						
Playing musical instruments						
Talking to friends						

	0	1-2	3-4	5-8	9-15	16+
Reading newspapers						
Earning money						
Reading books						
Working and studying						
Social activities						
Theatre/Drama						
Political activities						

18. Please estimate your consumption of alcohol *per week*: *Beer* ___*(half pints) Wine* ___*(glasses) Spirits*___*(singles)*

19. Do you currently live at home (with parents or other family)? *No / Yes*

20. If No, when did you first leave home?____*(month)*________*(year)*

21. Do you intend to live at home during this academic year (2005-2006)? *No / Yes*

22. Do you agree with the way these statements describe you as a person?

	Strongly disagree	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
I try to be courteous to everyone I meet					
I'm pretty good about pacing myself so as to get things done on time					
When I'm under a great deal of stress, sometimes I feel like I'm going to pieces					
I am intrigued by the patterns I find in art and nature					
I really enjoy talking to people					
I often feel tense and jittery					
I like to be where the action is					
I often feel as if I'm bursting with energy					
I often get angry at the way people treat me					
Some people think of me as cold and calculating					
I have little interest in speculating on the nature of the universe or the human condition					
I generally try to be thoughtful and considerate					
I never seem to be able to get organized					
I often enjoy playing with theories or abstract ideas					
I strive for excellence in everything that I do					

23. Please read each item and indicate the reply which comes closest to how you have been feeling *in the past week*.

I feel tense or 'wound up'	*Most of the time*	*A lot of the time*	*Occasionally*	*Not at all*
I still enjoy the things I used to enjoy	*Definitely as much*	*Not quite so much*	*Only a little*	*Not at all*
I get a sort of frightened feeling like something awful is about to happen	*Definitely and badly*	*Not too badly*	*A little*	*Not at all*
I can laugh and see the funny side of things	*As much as before*	*Not quite as much now*	*Definitely not so much now*	*Not at all*
Worrying thoughts go through my mind	*A great deal of the time*	*A lot of the time*	*From time to time*	*Only occasionally*
I feel cheerful	*Not at all*	*Not often*	*Sometimes*	*Most of the time*
I can sit at ease and feel relaxed	*Definitely*	*Usually*	*Not often*	*Not at all*
I feel as if I am slowed down	*Nearly all of the time*	*Very often*	*Sometimes*	*Not at all*
I get a sort of frightened feeling like 'butterflies in the stomach'	*Not at all*	*Occasionally*	*Quite often*	*Very often*
I have lost interest in my appearance	*Definitely and badly*	*Not too badly*	*A little*	*Not at all*
I feel restless as if I have to be on the move	*Very much indeed*	*Quite a lot*	*Not very much*	*Not at all*
I look forward with enjoyment to things	*A much as before*	*Rather less than before*	*Definitely less than before*	*Hardly at all*
I get sudden feelings of panic	*Very often indeed*	*Quite often*	*Not very often*	*Not at all*
I can enjoy a good book or radio or TV programme	*Often*	*Sometimes*	*Not often*	*Very seldom*

The information you provide is confidential. Please answer as honestly as you can

24. Please indicate how far each of the following statements applies to the way in which you approach studying:

	Rarely true	*Sometimes true*	*True half the time*	*Frequently true*	*Always true*
While I am studying, I often think of real life situations to which the material that I am learning would be useful.					
I chose my present courses largely with a view to the job situation when I graduate rather than their intrinsic interest to me.					
I find that at times studying gives me a feeling of deep personal satisfaction.					
I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.					
I think browsing around is a waste of time, so I only study seriously what's given out in class or in course outlines.					
I try to work consistently throughout the term and review regularly when the exams are close.					
I would see myself basically as an ambitious person and want to get to the top, whatever I do.					
I find that I have to do enough work on a topic so that I form my own point of view before I am satisfied.					
I try to do all of my assignments as soon as possible after they have been set.					
I find that studying academic topics can at times be as exciting as a good novel or film.					
I usually become increasingly absorbed in my work the more I do.					
I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.					
I almost resent having to do further years studying after leaving school, but feel that the end results make it all worthwhile.					
I see getting high marks as a kind of competitive game, and I play it to win.					
I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.					
Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.					
I try to relate new material, as I am reading it, to what I already know on the topic.					
I keep neat, well organised notes for most subjects.					

25. Please indicate whether you have experienced any of the following:

	In the last 3 months	*4-12 months ago*	*13-24 months ago*	*25-36 months ago*	*N/A*
Personal serious illness, injury, or assault					
Serious illness, injury, or assault happened to a close relative					
Death of a partner, parent, or child					
Death of close friend or relative					
Breaking off a steady relationship					
A serious problem with a close friend, neighbour, or relative					
Major financial crisis					
Unable to afford essential items e.g. food and travel					
Legal problem					
Something valuable was lost or stolen					
Unwanted pregnancy for self or partner					

26. How has your health been in general *over the past few weeks.* Have you recently:

Been able to concentrate on whatever you're doing?	*Better than usual*	*Same as usual*	*Less than usual*	*Much less than usual*
Lost much sleep over worry?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Felt that you were playing a useful part in things?	*More so than usual*	*Same as usual*	*Less useful than usual*	*Much less useful*
Felt capable of making decisions about things?	*More so than usual*	*Same as usual*	*Less so than usual*	*Much less capable*
Felt constantly under strain?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Felt that you couldn't overcome your difficulties?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been able to enjoy your normal day-to-day activities?	*More so than usual*	*Same as usual*	*Less so than usual*	*Much less than usual*
Been able to face up to your problems?	*More so than usual*	*Same as usual*	*Less able than usual*	*Much less able*
Been feeling unhappy and depressed?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been losing confidence in yourself?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been thinking of yourself as a worthless person?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been feeling reasonably happy, all things considered?	*More so than usual*	*About same as usual*	*Less so than usual*	*Much less than usual*

The information you provide is confidential. Please answer as honestly as you can

27. **How old were you when you first had the idea that you wanted to be a doctor?** _______ *years*

28. **Do you want to practice as a doctor when you leave medical school?** *No / Possibly / Probably / Definitely*

29. **How old were you when you definitely decided you would like to be a doctor (if applicable)?** _________ *years*

30. **In the past year, how often you have considered leaving medical school?** *Never/ Once or twice / Monthly / Weekly /Daily*

31. **Please indicate which of the following you had done before you applied to study medicine:**

Talked to family members who are doctor(s)/health worker(s)		Paid work in hospital(s)/nursing home(s)	
Talked to other doctor(s)/ medical student(s)/health worker(s)		Read books about medicine/doctors and their work	
Visited medical school(s)		Went to a Sixth Form conference	
Voluntary work in hospital(s)/nursing home(s)		Attended a medical summer school	

32. **How much did the following encourage or discourage you in applying to study medicine?**

	Strongly discouraged	*Moderately discouraged*	*No influence*	*Moderately encouraged*	*Strongly encouraged*
Your father					
Your mother					
Other family					
Your school teachers					
Television/Films/Radio/Newspapers					
Your own GP/other doctor(s) or health worker(s)					
Medical student(s)					
School friends/close colleagues					
Experience of illness/disability yourself					
Experience of illness in a close friend or relative					
Voluntary work in hospitals/the community					
Reading about medical research/science					

33. **Students differ in the factors that help them to perform well at medical school. Below are 22 factors which may influence how students perform. Put a tick (√) next to the *seven* you think *most* affect *your* performance at medical school (either positively or negatively). Put a cross (x) next to the *seven* you think *least* affect *your* performance at medical school (either positively or negatively).**

I find it easy to remember lots of facts		I have good relationships with my teachers	
I know I want a career in medicine		I'm emotionally supported by my peers/friends	
I'm good with my hands		I'm emotionally supported by my family/partner	
I'm financially secure		I'm good with people	
I'm good at studying hard on my own		I make sure I'm in the right place at the right time	
I have the right family background		I worked in a medical environment before medical school	
I benefit from having role models		I worked outside a medical environment before medical school	
I'm a lucky sort of person		I'm good at thinking on my feet	
I have good exam technique		I manage my time well	
I'm virtually always punctual		I've got the confidence to approach patients	
I believe Fate is on my side		I'm well-organised	

34. **The following list shows a number of reasons why a person might wish to become a doctor. Indicate for each one how important it is *to you***

	Not important	*Slightly important*	*Fairly important*	*Very important*
Ability to exercise leadership				
Opportunity to be original and creative				
Freedom from supervision at work				
Achieving high social status				
Desire to work under pressure				
Being helpful to others and useful to society				
Advancing medical knowledge through research				
Financial rewards				
Working with people rather than things				
Living and working in the world of ideas				
Wanting an economically secure occupation				
Wishing to express own values and interests				
Involvement in a really challenging occupation				
Helping towards improving society				
A job with steady progress and promotion				
Flexible working patterns				

The information you provide is confidential. Please answer as honestly as you can

If you have any comments about the questionnaire please write them here:

If completing this questionnaire has raised any issues you would like to talk about with somebody, you can contact the UCL Student Counselling Service: Tel: 020 7679 1487; E-mail j.etienne@ucl.ac.uk ;Address: 3 Taviton Street, London, WC1E 6BT; Website: http://www.ucl.ac.uk/student-counselling/

Thank you very much for completing this long questionnaire

Year 3 questionnaire 2006 (Chapter 4)

Consent

As described in the covering letter, this questionnaire is entirely for the purposes of research. It is part of a longitudinal study, and the results may be linked with other data. Information you provide is **entirely confidential** and will be stored safely in an **anonymised** form. Information on individuals will not be given to those not involved in the research project. Results of this questionnaire will be published in aggregate or other form in which individuals cannot be identified. Both for your own reassurance and as part of research ethics, **we would be grateful if you could consent to the information being used for these purposes by completing this form.**

No:

This section will be detached from your completed questionnaire

Surname (block capitals please):

____

Name (block capitals please):

____

Signature:

____

Date (dd/mm/yyyy):

____/____/______

No:

The information you provide is confidential. Please answer as honestly as you can

ROYAL FREE AND UNIVERSITY COLLEGE MEDICAL SCHOOL
UCL DEPARTMENT OF MEDICAL SCHOOL ADMINISTRATION

Academic Centre for Medical Education, 4th Floor, Holborn Union Building, Archway Campus, Highgate Hill, London. N19 5LW Tel: 020 7288 5209 Fax 020 7288 3322 www.ucl.ac.uk/acme

Director : Professor Jane Dacre

Dear Third Year Student,

This questionnaire will look at factors which may affect how students perform at medical school. The results will be used for research in general and specifically for answering questions such as why individuals decide to become doctors. This questionnaire is part of a longitudinal study and the results may be linked with other data.

Your name is essential in allowing us to analyse the questionnaire, but it is confidential and your questionnaire will be stored in a secure and anonymised form. Information about individuals will not be passed on to those examining or teaching students. Results of this questionnaire will be published in aggregate or other form in which individuals cannot be identified.

This project is covered by the Data Protection Act 1998: the personal information that you give will be used only for this project and will not be divulged to third parties. It will be stored and disposed of in a secure manner. If at any time you do not wish to continue to take part in this project please inform us in writing and we will remove your details from the database.

The questionnaire is entirely voluntary. If you do not wish to take part this will not affect your current or future studies.

Thank you for your time.

Yours sincerely,

[redacted]

Professor Jane Dacre
Professor of Medical Education

The information you provide is confidential. Please answer as honestly as you can

1. **What is today's date (dd/mm/yyyy)?** ____/_____/______

2. **What is your date of birth (dd/mm/yyyy)?**____/_____/______

3. **What is your sex?** *Male / Female*

It would be helpful to us if you could answer the following question, which is taken from the **2001 UK Census**:

4. **What is your ethnic group?** Please tick one box to indicate your cultural background.

White	Asian or Asian British	Black or Black British	Mixed	Other ethnic group
British ☐	*Indian* ☐	*Caribbean* ☐	*White & Black Caribbean* ☐	*Please specify* ☐
Irish ☐	*Pakistani* ☐	*African* ☐	*White & Black African* ☐	
Other (please specify) ☐	*Bangladeshi* ☐	*Other (please specify)* ☐	*White and Asian* ☐	
	Chinese ☐		*Other (please specify)* ☐	
	Other (please specify) ☐			

The Office of National Statistics provides the following questions for its socio-economic classifications. We realise they are a little tedious, but it would be helpful to us if you could try and answer them as fully as possible.

5. **Please tick one box to show which category best describes your *father's* current (or last) occupation and your *mother's* current (or last) occupation.**

	Father	*Mother*
Modern professional occupations e.g. teacher, nurse, physiotherapist, social worker, artist, police officer (sergeant or above), software designer		
Clerical and intermediate occupations e.g. secretary, personal assistant, clerical worker, office clerk, call centre agent, nursing auxiliary, nursery nurse		
Senior managers or administrators e.g. finance manager, chief executive		
Technical and craft occupations e.g.: motor mechanic, fitter, inspector, plumber, printer, tool maker, electrician, gardener, train driver		
Semi-routine manual and service occupations e.g. postal worker, machine operative, security guard, caretaker, farm worker, receptionist, sales assistant		
Routine manual and service occupations e.g. HGV driver, van driver, cleaner, porter, packer, sewing machinist, messenger, labourer, waiter / waitress		
Middle or junior managers e.g. office manager, retail manager, bank manager, restaurant manager, warehouse manager, publican		
Traditional professional occupations e.g. accountant, solicitor, medical practitioner, scientist, civil/mechanical engineer		

5a. Please indicate *how many people* your father and mother works or worked with:

	Father	*Mother*
1. Employee:		
With 1 to 24 other employees		
With 25 or more other employees		
2. Self-employed with employees:		
Employing 1 to 24 people		
Employing 25 or more people		
3. Self-employed / freelance without employees:		

5b. Do (did) your father or mother *supervise* any other employees?
Father supervises / Mother supervises / Neither parent supervises

6. **Are your parents medical doctors?** *Father / Mother / Neither parent*

7. **Are your parents university graduates?** *Father / Mother / Neither parent*

8. **What are your parents' first languages?** *Father:*______________________ *Mother*: ______________________

The information you provide is confidential. Please answer as honestly as you can

9. **What is your first language?**______________________________

10. **If English is not your first language, at what age did you first start to speak English?** ________*years*

11. **In which country did you complete your secondary education?** *UK* *Other* ____________________

12. **Please indicate in which of the following types of school you received your secondary education.**

1. Comprehensive	☐	4. Public (fee paying) School	☐
2. State Grammar School	☐	5. Private School	☐
3. Private Grammar School	☐	6. Sixth Form College	☐

13. **Where did you complete your preclinical training?** *RFUCMS / Oxford / Cambridge /Other*____________________

14. **Do you have a degree?** *No / Yes intercalated / Yes prior to medical school*

14a. If *Yes*, please indicate which type: *BSc/ BA/ MSc/ MA/ PhD/ Other*____________________

14b. What subject was it in? ______________________________

15. **Do you currently live at home (with parents or other family)?** *No / Yes*

15a. If *No*, when did you first leave home?___*(month)*______*(year)*

15b. If *Yes*, which of the following describe your reason(s) for living at home?

For my own personal financial reasons	☐	I want to stay near my friends	☐
For family financial reasons	☐	My family/community expect me to live at home	☐
To care for my relatives	☐	I'm not ready to leave home yet	☐
My family home is better located for my extra curricular activities	☐	My family help me with day-to-day practicalities	☐
My family home is better located for my work	☐	For my own health reasons	☐
My family home is better located for University	☐	Other reason (please specify) ____________	

16. **Do you intend to live at home during this academic year (2006-2007)?** *No / Yes*

17. **During your time in medical school, how involved have you been in student activities?**

	Not involved	*Not very active*	*Fairly active*	*Very active*
Sport				
Rag week				
Drama				
Music				

	Not involved	*Not very active*	*Fairly active*	*Very active*
Education				
Politics				
Voluntary service				
Other (please specify)				

18. **Which medical school clubs and/or societies are you, do you plan to be, or have you previously been a member of?**

	Previously a member	*Currently a member*	*Plan to be a member*	*N/a*
1. ________________				
2. ________________				
3. ________________				
4. ________________				

19. **Are you, or have you previously been on the Board or Committee of a medical school club/society?**
Never/ Previously / Currently

20. **How old were you when you first had the idea that you wanted to be a doctor?** ______*years*

21. **Do you want to practice as a doctor when you leave medical school?** *No/ Possibly/ Probably / Definitely*

22. **How old were you when you definitely decided you would like to be a doctor (if applicable)?** ________*years*

23. **In the past year, how often you have considered leaving medical school?** *Never/ Once or twice/ Monthly/ Weekly/ Daily*

The information you provide is confidential. Please answer as honestly as you can

24. The following list shows a number of reasons why a person might wish to become a doctor. Please indicate for each one how important it is *to you*

	Not important	*Slightly important*	*Fairly important*	*Very important*
Ability to exercise leadership				
Opportunity to be original and creative				
Freedom from supervision at work				
Achieving high social status				
Desire to work under pressure				
Being helpful to others and useful to society				
Advancing medical knowledge through research				
Financial rewards				
Working with people rather than things				
Living and working in the world of ideas				
Wanting an economically secure occupation				
Wishing to express own values and interests				
Involvement in a really challenging occupation				
Helping towards improving society				
A job with steady progress and promotion				
Flexible working patterns				

25. Do you agree with the way these statements describe you as a person?

	Strongly disagree	*Disagree*	*Neutral*	*Agree*	*Strongly Agree*
I try to be courteous to everyone I meet					
I'm pretty good about pacing myself so as to get things done on time					
When I'm under a great deal of stress, sometimes I feel like I'm going to pieces					
I am intrigued by the patterns I find in art and nature					
I really enjoy talking to people					
I often feel tense and jittery					
I like to be where the action is					
I often feel as if I'm bursting with energy					
I often get angry at the way people treat me					
Some people think of me as cold and calculating					
I have little interest in speculating on the nature of the universe or the human condition					
I generally try to be thoughtful and considerate					
I never seem to be able to get organized					
I often enjoy playing with theories or abstract ideas					
I strive for excellence in everything that I do					

26. Please indicate whether you have experienced any of the following:

	In the last 3 months	*4-12 months ago*	*13-24 months ago*	*25-36 months ago*	*Not at all*
Relationship difficulties					
Something stolen					
Personal serious illness, injury, or assault					
Serious illness, injury, or assault happened to a close relative					
Death of a partner, parent, or child					
Death of close friend or relative (not parent or child)					

27. How has your health been in general *over the past few weeks*. Have you recently:

Been able to concentrate on whatever you're doing?	*Better than usual*	*Same as usual*	*Less than usual*	*Much less than usual*
Lost much sleep over worry?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Felt that you were playing a useful part in things?	*More so than usual*	*Same as usual*	*Less useful than usual*	*Much less useful*
Felt capable of making decisions about things?	*More so than usual*	*Same as usual*	*Less so than usual*	*Much less capable*
Felt constantly under strain?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Felt that you couldn't overcome your difficulties?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been able to enjoy your normal day-to-day activities?	*More so than usual*	*Same as usual*	*Less so than usual*	*Much less than usual*
Been able to face up to your problems?	*More so than usual*	*Same as usual*	*Less able than usual*	*Much less able*
Been feeling unhappy and depressed?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been losing confidence in yourself?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been thinking of yourself as a worthless person?	*Not at all*	*No more than usual*	*Rather more than usual*	*Much more than usual*
Been feeling reasonably happy, all things considered?	*More so than usual*	*About same as usual*	*Less so than usual*	*Much less than usual*

The information you provide is confidential. Please answer as honestly as you can

28. Please indicate how far each of the following statements applies to the way in which you approach studying:

	Rarely true	*Sometimes true*	*True half the time*	*Frequently true*	*Always true*
i. While I am studying, I often think of real life situations to which the material that I am learning would be useful.					
ii. I chose my present courses largely with a view to the job situation when I graduate rather than their intrinsic interest to me.					
iii. I find that at times studying gives me a feeling of deep personal satisfaction.					
iv. I want top grades in most or all of my courses so that I will be able to select from among the best positions available when I graduate.					
v. I think browsing around is a waste of time, so I only study seriously what's given out in class or in course outlines.					
vi. I try to work consistently throughout the term and review regularly when the exams are close.					
vii. I would see myself basically as an ambitious person and want to get to the top, whatever I do.					
viii. I find that I have to do enough work on a topic so that I form my own point of view before I am satisfied.					
ix. I try to do all of my assignments as soon as possible after they have been set.					
x. I find that studying academic topics can at times be as exciting as a good novel or film.					
xi. I usually become increasingly absorbed in my work the more I do.					
xii. I generally restrict my study to what is specifically set as I think it is unnecessary to do anything extra.					
xiii. I almost resent having to do further years studying after leaving school, but feel that the end results make it all worthwhile.					
xiv. I see getting high marks as a kind of competitive game, and I play it to win.					
xv. I find it best to accept the statements and ideas of my lecturers and question them only under special circumstances.					
xvi. Whether I like it or not, I can see that further education is for me a good way to get a well-paid or secure job.					
xvii. I try to relate new material, as I am reading it, to what I already know on the topic.					
xviii. I keep neat, well organised notes for most subjects.					

29. Have you experienced anything *at medical school* which you could describe as 'discrimination' of any sort?
Never / Once / Several times / Many times

29a. If you have experienced discrimination, do you think the *worst* event was related to your:
*Gender / Race or ethnic group / Religion / Sexuality / Social background / Other*____________________

29b. How *severe* was the *worst event*?
Trivial / Mild / Moderate / Severe / Extremely Severe

29c. How *stressful* did you find the *worst event*?
Very stressful / Quite stressful / Mildly stressful / Not very stressful / Not at all stressful

29d. Who was *responsible* for the *worst* event?
*Non-clinical teacher or lecturer / Clinical teacher (e.g. Consultant) / Other hospital staff / Patient / Student / Medical school staff / Other*________________

If you have any comments about the questionnaire please write them here:

If completing this questionnaire has raised any issues you would like to talk about with somebody, you can contact the UCL Student Counselling Service: Tel: 020 7679 1487; E-mail j.etienne@ucl.ac.uk ;Address: 3 Taviton Street, London, WC1E 6BT; Website: http://www.ucl.ac.uk/student-counselling/

Thank you very much for completing this long questionnaire

The information you provide is confidential. Please answer as honestly as you can

Interview schedule for clinical teachers (Chapter 5)

Thank you for agreeing to be interviewed. The reason for this interview is to try and find out what you feel influences how students learn in clinical situations. There are many, many factors which could affect this, and I am interested in all of them. However I am particularly interested in your thoughts about how students' gender and ethnicity may or may not influence their learning in clinical situations.

I'm going to ask you a few questions about the clinical teaching you do, and your thoughts about what influences how students learn in those types of teaching settings.

I'm not medically trained so I'm just trying to gain an insight. So I'd be really grateful for any ideas you might have. I really don't know the answers to this one, so I'm interested in any of your thoughts and opinions.

Everything you say in this interview is strictly confidential and will not be attributable to you by name. I'm going to tape the interview, because this will help me to remember what you have said accurately, rather than relying on my own memory, which is probably not very accurate. The transcript of the interview will not have your name on it. Is that OK?

1. Where does most of your clinical teaching take place? (prompt: outpatients/theatre/bedside(ward)/seminars/clinical skills centres)

2. How well do you feel clinical teaching sessions are attended by students?

3. Think of a clinical session you taught or witnessed that you feel the students **learned a lot from**. What **helped** them learn well in that situation?

4. Think of a clinical session you taught or witnessed that you feel the students **didn't learn a lot from**. What **hindered** their learning in that situation?

5. Thinking about students, what do you think might make some students learn **more or less than others** in a clinical setting? (prompt: why do students differ in the amount they lean?)

6. Some studies show that female students and white students get more from clinical teaching compared to male and non-white students. I wondered what you thought of these results?

Interview schedule for students (Chapter 5)

Thank you for agreeing to be interviewed. The reason for this interview is to try and find out what you feel influences how students learn in clinical situations. There are many, many factors which could be involved, and I am interested in all of them. However I am particularly interested in your thoughts about how students' gender and ethnicity may or may not influence their learning in clinical situations.

I'm going to ask you a few questions about the clinical teaching you get, and your thoughts about what influences how students learn in those types of teaching settings. There are no right or wrong answers; I am just interested in your thoughts and opinions.

Everything you say in this interview is strictly confidential in that your comments will not be attributable to you by name. I'm going to tape the interview, because this will help me to remember what you have said accurately, rather than relying on my own memory, which is probably not very accurate. The transcript of the interview will not have your name on it. Is that OK?

1. The first think I would like you to do is to tell me a bit about your clinical teaching sessions. Where do they take place? (prompt: outpatients/theatre/bedside(ward)/seminars/clinical skills centres/PALS)
2. How many clinical teaching sessions do you go to per week?

3. How well do you feel clinical teaching sessions are attended by students?"

4. Think of a clinical situation you feel you **learned a lot from**. What **helped** you learn well in that situation?

5. Think of a clinical situation you feel you **didn't learn a lot from**. What **hindered** your learning in that situation?

6. What do you think might make some students learn **more or less than others** in a clinical setting? (prompt:why do students differ in the amount they lean?)

7. Some studies show that male students and students from ethnic minorities might be learning less from clinical situations. Does that sound possible? If so, why?

Focus group questions (Chapter 5)

Thanks for coming [Introduce ourselves]. The background to my research is that there are some studies that suggest that students' ethnicity might affect their experiences of medical school. One of the things I'm doing to try and investigate this is holding these group discussions with medical students from different ethnic groups.

I've asked you to come today because you have all identified yourselves as being of Indian/Pakistani or Bangladeshi/white origin. I'm going to ask you to think and talk about a number of topics. I'm interested in hearing all of your views, and on hearing a range of opinions. So if you agree or disagree with something that's said, please speak up.

I'm going to record all the sessions with all the groups, and then analyse all the findings together systematically to look for the common themes that arise from all the discussions. I'll pull out the main themes transcripts (i.e. the things that lots of people talk about) and discuss them. I'm also doing some questionnaires. From my point of view, I will only use what goes on in this room for research purposes. Everything will be totally anonymised so nobody will be able to read it and identify anyone by what they have said. Your name will not appear on any of the results. The results of this study will hopefully be used to improve the experience of medical school for future medical students. Can we agree as a group that everything that goes on in this room is confidential between us as a group, and we will not discuss it out of this context?

1. Go around the group: **tell us what name you would like to be called by, and what firm you're on at the moment** (5 minutes) – opening question

2. **To give me an idea of what it's like being a clinical medical student, can you tell me, what do you like about being a clinical medical student?** (5 minutes) – introductory question

3. **How about what you don't like?** (5 minutes) – introductory question

4. We've asked you here today because you've all identified yourselves as being Indian/white/Pakistani or Bangladeshi. **What does it mean to be of x ethnicity?** (colour of skin/physical, that's what it means physically, what does it mean culturally?) (10 minutes) – transition question

5. **In the last three years, white students have scored higher on average compared to non-white students. We're trying to find out why this might be – what do you think**? (15-20 minutes) – key question

6. **Sara's going to summarise what we've all said, and can you let us know if it sounds correct**?

7. **Is there anything we've left out**? – closing question

Encourage them to explain, and to comment on each other's views. Explain again that we welcome different points of view. Does anyone have a different view? What do you think about this? Does anyone have any alternative views?

Tutor Information Sheet (Chapter 6)

Research Project with First year Clinical Medical Students
Portfolio Reflection Exercise – Module 3

Jane Dacre, Deborah Gill, Paul Dilworth, Judith Locke, Katherine Woolf

We are running a randomised field experiment with 1st year clinical students to investigate how reflecting on different subjects affects students. The research has ethical approval and will take place in Module 3 (April & May 2007).

The reflective exercise in Block 3 will be very similar to the standard long reflection exercises in Blocks 1,2 and 4, and will involve **NO EXTRA WORK FOR TUTORS.** The students will be emailed an instruction sheet (please see attached).

As with previous reflection exercises, the students will return their reflective writing exercises to Judith Locke via email, who will pass them on to you. You can then choose a few to discuss with the rest of the group (as before).

All students in your group will have the same exercise.

All we ask is that you do not discuss the other Condition with your group (e.g. if your group is asked to do the task in Condition 1, please do not discuss the Condition 2 task with them).

For further information please contact:
Katherine Woolf; [redacted]