

How to do it

Run a preparation course for postgraduate examinations

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Summary

This paper provides a practical guide to running preparation courses for postgraduate examinations and is based on the authors' experiences. It is intended to be useful to organisers of proposed or existing courses as well as to potential users of courses — people in every specialty preparing for a postgraduate examination. The paper covers the practical aspects of staging and financing a course and recruiting tutors and attracting candidates, in addition to covering the structure, educational content, and evaluation of the course.

Introduction

Accreditation and reaccreditation are of increasing importance in all specialties, and success in postgraduate examinations forms an important part of these processes. The number of preparation and revision courses for these exams is increasing, and they are provided through the Royal Colleges, universities, postgraduate centres, and the private sector. Such courses need to be of sufficient quality to meet the requirements of the candidates in terms of what they expect from a course and actually helping them to pass an examination as well as providing value for money. Figure 1 shows the rise in the number of candidates for the MRCGP (Membership of the Royal College of General Practitioners) examination over the past 20 years.

The purpose of our article is to show how courses may be successfully organised and run, from both a practical and an educational viewpoint, based on our experience in postgraduate medical education and in running the Yorkshire MRCGP preparation course. This article should be of benefit to educators wishing to set up an examination preparation course from scratch and those wishing to improve an existing course. While our experience is based on a local course run by doctors largely in their spare time, we recognise that increasing numbers are run by commercial organisations. We believe that our article will be equally relevant to them, and to potential users of such courses in all disciplines, who need some criteria by which to judge quality and value for money.

The Royal College of General Practitioners has been innovative in showing the educational development, openness, and reliability of its examination.^{1 2}

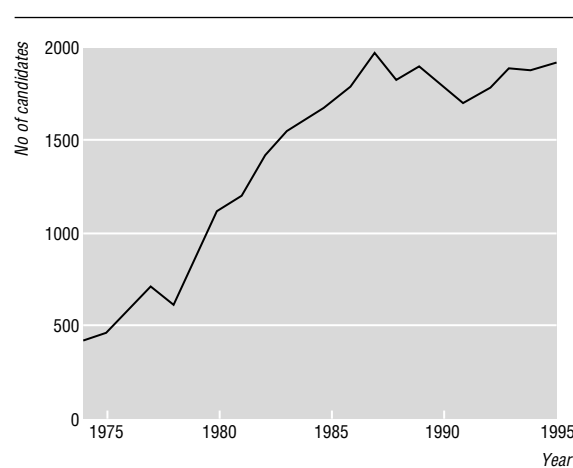


Fig 1 Number of candidates for MRCGP examination by year

Preparation courses for the MRCGP examination have mirrored these educational developments. Although the structure and content of postgraduate examinations, and the needs of candidates, vary greatly between specialties, our article should be of interest to candidates and organisers of these courses as well as those involved in postgraduate education at all levels.

Getting started

The aim of preparation courses is to improve candidates' chances of passing the examination. This may be done by achieving some or all of the objectives listed in the box.

Organisers of courses need to be familiar with fundamental information about all aspects of the examination. This needs to cover the structure, content, and format of the examination; when and where it is held; eligibility to enter and entrance procedures; purpose of and need for passing the examination; marking schemes and whether they are criterion or peer referenced; pass rates; local demand for a course and availability of other courses; and common reasons for failing. The relevant college, and current examiners, should be able to provide this information, and past papers with model answers may be available. Published textbooks and guides may already be out of date, given the pace of change in many specialties and their examinations.

Possible objectives of preparation courses

- Providing up to date factual knowledge on core subjects and from subspecialties
- Clarifying the basic level of knowledge needed to pass
- Teaching and practising examination techniques, both written and oral, by using past papers
- Providing an intensive period of revision in order to focus candidates on the examination
- Enabling candidates to find out where they are in relation to peers and to experience pressure from their peers
- Providing information about practical details, history, or background to the examination
- Providing feedback to candidates, allowing them to focus subsequent preparation on the sections of the examination where they are weakest
- Allowing candidates to make contact with others in order to form study groups
- Providing a springboard for further revision
- Enhancing confidence
- Emphasising the educational value of the examination

When, where, how often, and how big?

When to hold a course will depend on several factors:

- How far in advance of the examination should the course be held?
- How much ground needs to be covered after the course in the run up to the examination?
- When is the closing date for entrance to the examination?

Holding the course once a year may be too infrequent, whereas more than twice may be too time consuming to organise. Some courses may be suited to a modular arrangement, running a half day a week for several weeks or months, whereas other courses may be better suited to an intensive residential course during the week or at a weekend, depending on the nature of the service and family commitments of candidates and tutors.

The venue must be tailored to the requirements of the course and may be either a postgraduate centre or other hospital accommodation or a hotel or conference centre. Cooperation of the staff of the venue is essential; many hotels are used to staging courses and conferences, but in our experience quality and support can vary widely. Other factors about the venue that need to be taken into consideration are transport and access, cost (are discounts available for block bookings?), leisure facilities, and noise levels (will there be a wedding reception and disco in the hotel until the small hours when candidates start work at 9 am the next morning?).

The size of the course will be determined by the demand, the number of tutors available, and whether the course is open to candidates nationally or limited to a certain region or area. Candidates may be recruited to the course by various means — advertising in the medical press, via training schemes or postgraduate centres, through the colleges (locally or nationally), or by word of mouth.

We have found that a twice yearly weekend residential course at a hotel centrally located in our region (which we have used several times) held 8-10 weeks

before the written examination provides the right balance for the candidates, organisers, and tutors. The February course caters for about 50 candidates and the September course for about 35 (reflecting the larger number of candidates taking the examination in the summer, when most general practice registrars finish their training).

Organisation

In practice, organising both the administration and the educational content of the course may fall to one person. Delegation of some work to clerical and support staff is essential, although coordination of core tasks is important to ensure the smooth running of the course. The venue must be booked and confirmed and venue staff liaised with throughout the course, the finances must be monitored, and the course needs to be administered on an hour to hour basis. Furthermore, candidates, tutors, and examiners have to be recruited, the pre-course work and evaluation must be sent, and the timetable and educational content have to be finalised.

Funding

Funding is one of the main issues for anyone wishing to set up a course, and the box shows the main expenses and income for courses. When starting a new course, a certain amount of goodwill from various quarters will be required; any prospect of continued success will depend on adequate funding.

The question of how much to charge candidates may be difficult. While the accounts must be balanced, the fees must not be so high as to deter potential candidates. However, reasonable fees for improving candidates' chances of passing exams are acceptable when they are set against the fees for examination and re-examination. In addition, some candidates may qualify for accreditation points for postgraduate education by participating. A large profit should not be the main motive for trying to establish a course, and the course fees for candidates should reflect this. We currently charge £320 (excluding the costs of overnight accommodation) for a weekend course for general practice principals, while general practice registrars within the region receive a subsidy paid out of section 63 of the budget for the postgraduate education department.

Expenses and income for a preparation course**Expenses**

- Venue and overnight accommodation (if required)
- Fees and expenses for organisers and tutors
- Photocopying, postage, and telephoning
- Advertising
- Educational materials (for example, hiring flip charts and overhead and slide projectors and producing slides)

Income

- Royal college or its local faculty
- Regional postgraduate dean's office or specialty regional adviser
- External sponsorship (such as from drugs industry)
- Course fees paid by candidates

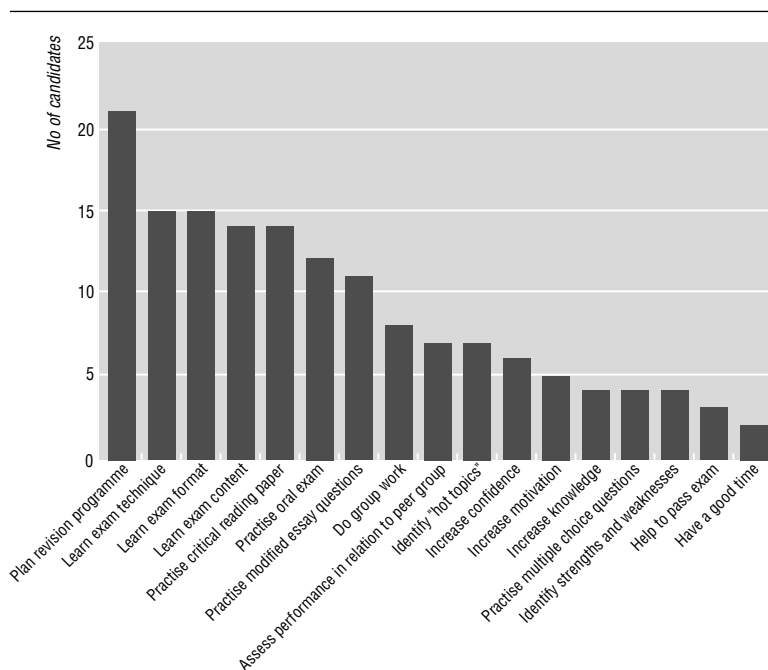


Fig 2 Pre-course objectives of 35 candidates attending preparation course for MRCGP examination

Human resources

Tutors may be needed for various tasks on courses — lecturing, running seminars, facilitating small groups, providing expert help with factual knowledge or examination technique, marking practice papers, and carrying out mock viva examinations. Courses that rely heavily on small group teaching will need more tutors, and the minimum ratio of tutors to candidates should be 1:6. The quality of tutoring can make or break a course, and tutors therefore need to be recruited and briefed with care.

The tutors must be adequately skilled and trained for their tasks and must have up to date knowledge of the examination. To be credible, they must have experience in their subject. Formal training sessions for the tutors may be necessary if the course is being started from scratch or if the organisers or tutors have little educational experience. Informal training may be more suitable for tutors already working in postgraduate education, as is often the case. Prospective tutors should have enthusiasm for the course. Other qualities needed by the tutors include experience of the examination, a willingness to listen, and an ability to bring out the best in the candidates on a group and individual basis.

We have found that using personal contacts and networking is the best way of recruiting tutors. Occasionally, outside resources may be needed — such as a particularly entertaining speaker, educationalists, or specialists in a certain subject. We have found that a diverse mix of tutors — experienced teachers, current examiners, and recent “graduates” of the course— provides the right balance. We aim to recruit one or two new tutors a year (from the candidates on the course) to provide new blood and increase the pool of available tutors. The presence of recent graduates as tutors provides reassurance to candidates. Organisers and tutors of courses need not be current examiners; indeed, current examiners may be too busy examining to provide input to

courses and may have a more appropriate role in training and providing support for the tutors.

Pre-course preparation and evaluation

The organisers must ensure well in advance that candidates know what to expect from the course, and what (if any) pre-course work is required. Candidates for courses should be sufficiently motivated towards passing their examinations that specific pre-course work should be acceptable so long as the reasons for it are explained (see box).

The disadvantages of pre-course work are that it may put people off coming on the course and that it can be disruptive if a few candidates have not done the work (some candidates may not have the time to do so). Completion of the pre-course work may be regarded as mandatory for candidates attending the course, despite the pressure of service commitments. We provide candidates with past papers to be done under examination conditions at home: this represents two hours' work, and the completed papers are brought to the course and marked, and the results fed back to the candidates.

Pre-course evaluation is an essential part of planning a successful course. What is it that candidates actually want? Why are they coming on the course? What do they expect to learn from the course? We have found that asking candidates to return a pre-course evaluation form is a successful way of eliciting this information for planning the course as a whole. The forms are passed to the group tutors to allow the specific needs of individual candidates to be addressed. Furthermore, this exercise requires candidates to focus on their needs and expectations of the course, providing an easy introduction to the course and allowing candidates to appreciate their own reasons for attending.

Figure 2 shows the results of our pre-course evaluation from a recent course: most candidates were coming on the course in order to practice and learn about specific aspects of the examination (technique, format, and content), to practice specific sections of the examination (critical reading paper, modified essay questions, orals), and to learn about planning their revision programme. The content of the course was subsequently shaped in response to these comments.

Educational content and structure of course

While traditional didactic methods of teaching may suit candidates and organisers on some courses, we

Possible reasons for pre-course work

- Focusing candidates' minds on the task in hand
- Establishing a baseline against which candidates can monitor their own performance (and that of their peers) after tuition
- Setting the agenda for an intensive course
- Ensuring that all candidates have the necessary background knowledge to participate fully in the course

have found that the incorporation of educational theory and rigorous pre-course and post-course assessment into our course provides an environment that is facilitating and is encouraging to the candidates. Candidates need to be treated as adult learners — they are attending the course because they want to learn. We have found that the content of the course mirrors postgraduate education in general practice as a whole, and we suspect that this may be the case in other specialties.

For courses with a heavy emphasis on the imparting of factual knowledge and its revision, lectures and seminars may be the most appropriate teaching methods. However, there is a major element of technique in every examination, whether it is the “stylised presentation of findings” (MRCP, FRCS) or the “stylised demonstration of problem solving behaviour or emotional interaction” (MRCGP).² Basic techniques for optimising performance in all examination disciplines—essays or short notes, multiple choice questions, long and short clinical cases, and vivas—are important and should be taught. It is easy, for example, to gloss over the techniques that can be used to improve performance in multiple choice questions, particularly as many candidates will be familiar with such questions as part of their undergraduate training. Specific techniques can be taught and practised during a course; the maxim “what we hear we forget, what we see we remember, what we do we understand” is useful. We believe that tutors and candidates ignore examination technique at their peril.

Whatever the nature of the course, we think that some teaching should occur in small groups of four to six candidates facilitated by a group tutor.³ This permits facilitated discussion of model answers, feedback on individual performance, and comparison with peers within the safety of a small group. Although the courses may be highly structured and the timetable full, time spent on the functioning and dynamics of the groups, to allow members of the group to learn from each other, is time well spent.

If time and human resources permit, we would strongly encourage courses to include mock oral examinations. With good organisation and training, these exercises can be made as close to the real thing as possible. Although often initially daunted by the prospect, most candidates find the exercise to be beneficial, not only by undergoing the vivas themselves but also by observing their peers in the group. These mock exams can be run in the previously mentioned tutor groups of six candidates or less, thus allowing constructive feedback without laying candidates open to ridicule or humiliation.

Dissemination of literature and written material may be an important part of the course. This may take the form of factual information — “how to pass” type articles, lists of past questions, and lists of current “hot topics” that are likely to come up at some stage in the examination. We also distribute copies of material used during the course (this has subsequently evolved into a workbook⁴) and a document highlighting literature of current importance to the examination.

Throughout the course, candidates should be provided with a realistic appraisal of their own performance in order to guide their preparation in the run up to the examination. By the end of our course,

Table 1 Structure of Yorkshire MRCGP preparation course and how it mirrors MRCGP examination

MRCGP examination		Preparation course	
Content	Time allowed	Content	Time allocated*
		Introduction	30 minutes
Multiple choice questions (~25% of overall mark)			
420 (maximum)	3 hours	Seminar	30 minutes
true/false questions		Practice paper 1	Pre-course work
90 (maximum) extended matching questions		Practice paper 2	45 minutes
		Marking and discussion	15 minutes
		Total	1 hour 30 minutes
Modified essay questions (~25% of overall mark)			
12 questions	3 hours	Seminar	45 minutes
		Practice paper 1	Pre-course work
		Group work paper 1	1 hour 30 minutes
		Practice paper 2	45 minutes
		Group work paper 2	1 hour
		Total	4 hours
Critical reading questions (~25% of overall mark)			
10 questions	3 hours	Seminar	30 minutes
		Practice paper	1 hour 45 minutes
		Group work	2 hours
		Total	4 hours 15 minutes
Assessment of consultation skills (Pass mandatory to pass overall)			
Videotape of 20-24 consultations	Prepared in advance	Seminar	45 minutes
		Demonstration video	30 minutes
		Plenary	45 minutes
		Total	2 hours
Oral exams (~25% of overall mark)			
Top ~80% after written paper invited for two viva voce exams	30 minutes each	Seminar	1 hour
		Mock viva exams	5 hours†
		Total	6 hours
		Plenary	15 minutes

*Excluding breaks for refreshment, food, and leisure.

†Two 20-30 minute exams per candidate plus watching others and discussion.

we hope that most candidates will be more confident and motivated and will be clearer in their thinking, revision planning, and preparation for examination. Attention must also be paid to the intensive nature of courses; appropriate and adequate breaks for food, drink, relaxation, and recreation must be provided. Table 1 shows the structure of our course and the way in which it mirrors the MRCGP examination.

Assessing and evaluating the course

The ultimate form of assessment of a course's success is the pass rate of candidates who have been on the course. In addition to scrutinising pass lists published by the college, we send a letter to candidates who do not seem to be on the list, which begins with “I would not like to intrude on personal grief, but ...” and politely asks why their name was not on the list (for example, candidate deferred sitting the examination, changed name, missed train, failed). In this way, pass rates from candidates can be continually monitored and compared with national pass rates, in addition to monitoring the reasons for failure. Over the past six years we have found that 85% of candidates who attended our course passed the exam, 5% did not subsequently sit the exam, and 10% failed. This compares with a national pass rate of 74%.

An evaluation form can be given to all candidates at the end of the course, and such evaluation provides feedback to the organisers and tutors about all aspects of the course. This can lead to improvements in subsequent courses. Examples of changes that we have made include the introduction of a three hour break for recreation on the Saturday afternoon, shortening the

introduction to the course, and changing the venue because of complaints about noise levels. The structure of courses will also change in the light of changes to the examinations. As with most of the colleges, the Royal College of General Practitioners continues to develop its examination, and preparation courses need to keep pace with such changes.

After each course, we compile a report, which has two functions. Firstly, it provides a report and evaluation of the course for its sponsors and supporters. Secondly, it provides feedback and continued motivation for the organisers, tutors, and examiners who contribute to the course.

Why bother?

Why should anyone want to get involved in running a course or tutoring on a course? We have found that it provides an important role in personal and profes-

sional development and it ensures that we keep up to date with core knowledge, current thinking and research, and changes within our college. Furthermore, we have found that if the course is organised and administered well it is not stressful to be involved but is fun.

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Socioeconomic determinants of health

Stress and the biology of inequality

Eric Brunner

Summary

It is well established that health depends on socioeconomic circumstances, but the biology of this relation is not well described. Psychosocial factors operating throughout the life course, beginning in early life, influence a variety of biological variables. Research with non-human primates shows the effects of dominance hierarchy on biology, and similar metabolic differentials are evident in a hierarchy of white collar civil servants. The neuroendocrine "fight or flight" response produces physiological and metabolic alterations which parallel those observed with lower socioeconomic status. The biological effects of the psychosocial environment could explain health inequalities between relatively affluent groups.

Impact of early experience

The quality of nurturing seems to have long term effects relevant to health inequalities. Deprivation in childhood is linked to poor educational attainment and behavioural problems such as hyperactivity and other conduct disorders,¹ which may be precursors of a lifetime of material and emotional insecurity. Studies of the attachment patterns of parents and their children suggest that early experiences of caregivers may contribute to the intergenerational transmission of physical and psychological vulnerability.² We can view childhood social disadvantage, therefore, as a first sign of an unfavourable stress history. This risk may interact with other early factors, such as low birth weight, which are associated with lower parental social class, to produce adverse effects on later health.³

Such early life influences should not be taken to imply a fixed trajectory. Studies of young rhesus mon-

keys suggest that the consequences of experimental social isolation can be modified with timely intervention, and that long term effects are most likely to be seen under stressful conditions in adulthood.⁴ Psychogenic dwarfism is an extreme but usually reversible syndrome associated with severe childhood deprivation. Psychosocial growth retardation of a less dramatic nature was unintentionally documented in Widdowson's famous study of orphaned children in postwar Germany.⁵ Under identical food rationing, those who lived in the Bienenhaus orphanage, initially under the control of the stern and forbidding Fraülein Schwarz, gained less weight and grew more slowly than children cared for at the Vogelnest orphanage by the affectionate Fraülein Grün. By chance, Schwarz replaced Grün during the study and the growth rates reversed, despite the provision of extra food at Vogelnest. The limited evidence from lifelong follow up studies that included measures of socioeconomic status suggests that risk of premature cardiovascular death is sensitive to early deprivation, while cancer and risk of death from non-cardiovascular, non-cancer causes depends more on adult circumstances.⁶

Stressors in the hierarchy

The Black report concluded that smoking, diet, and other behavioural factors with biological effects contribute to, but do not fully explain, health inequalities.⁷ Psychosocial influences, such as self esteem, relate to the social distribution of behavioural risks.⁸ Distinct from these indirect psychosocial mechanisms, there is evidence of direct connections between the psychological characteristics of social position and biological functioning.

This is the seventh in a series of eight articles edited by Richard Wilkinson

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If exposure to psychosocial as well as to physical adversity is able to explain the continuous gradient in health inequalities, which extends into the highest social strata,⁹ can we identify candidate stressors? A necessary but not sufficient condition for such factors is that their prevalence is linked with lower socioeconomic status.¹⁰ On the basis of current evidence, key contenders in adult life include perceived financial strain,¹¹ job insecurity,¹²⁻¹³ low control and monotony at work,¹⁴⁻¹⁵ stressful life events and poor social networks,¹⁶⁻¹⁷ low self esteem,¹⁸ and fatalism.¹⁹ A stepwise relation was found between civil service employment grade (1992 salary range £7387-£87 620) and the prevalence of several of these factors at the baseline of the Whitehall II study (table 1), even before the end of organisational stability in the late 1980s.²⁰

All stressed out and nowhere to go?

Chronic stresses associated with social position may be translated into modified neuroendocrine and physiological functioning, with later consequences for susceptibility to disease. Humans evolved to rise rapidly to the challenge of external, potentially lethal, but short term threats. Frequent and prolonged activation of the "fight or flight" response seems, however, to be maladaptive and may prove to be central in understanding the social distribution of cardiovascular and other diseases.

The main axes of neuroendocrine response, the sympathetic-adrenomedullary and hypothalamic-pituitary-adrenocortical systems, coordinate an array of metabolic and physiological changes. Rapid release of adrenaline from the adrenal medulla and noradrenaline from sympathetic synapses is able to produce cognitive arousal, sensory vigilance, bronchodilation, raised blood pressure, haemoconcentration, and energy mobilisation. The precise nature of the activation varies according to the stressor and its duration, but its function is essentially to prepare for or maintain physical exertion. Wide variation in the size and duration of endocrine responses is attributed to individual differences in psychological coping resources.²¹ Laboratory animals have different physiological responses to a given stressor, reflecting differences in their stress history.²² There is thus potential for immediate and chronic psychosocial adversity to interact with protective factors, each of which is influenced by social status.

The second and less rapid adrenocortical component of the stress response, which results in release of cortisol, also seems to be conditioned by psychosocial factors (see below),²³ which are unevenly distributed across social classes. A large response seems to be characteristic of actual or projected failure to cope with the apparent threat, and this corresponds to Selye's proposed general and non-specific stress mechanism.²⁴ Endogenous opioids, linked with vigorous exercise and psychological wellbeing, may be important in the counterregulatory system by inhibiting pituitary release of adrenocorticotrophic hormone (see box).

Glucocorticoids have many effects, including profound suppression of immunity. Centrally, the hippocampus is a target for glucocorticoids promoting vigilance in the short term.²¹ Prolonged high levels of cortisol, such as in Cushing's syndrome, may provoke paranoia or depression. Some depressed patients

Table 1 Psychosocial characteristics by employment grade category (adjusted for age at entry to Whitehall II study, 1985-8).²⁰ Values are percentages of sample

	Employment category						Total sample	P value (test for trend)
	Grades 1-6	Grade 7	Senior executive officer	Higher executive officer	Executive officer	Clerical and office support		
Work characteristics†								
High control:								
Men	59.3	49.7	43.1	31.6	24.7	11.8	6877	≤0.001
Women	51.2	45.4	47.1	31.2	20.1	10.2	3341	≤0.001
Varied work:								
Men	70.5	52.1	41.9	27.1	18.2	3.9	6875	≤0.001
Women	71.2	55.2	40.5	31.7	14.0	4.7	3356	≤0.001
Social network/activities								
See at least 3 relatives a month:								
Men	22.1	24.8	29.0	27.2	29.7	30.6	6426	≤0.001
Women	18.9	23.7	21.1	24.1	30.4	44.9	3187	≤0.001
See at least 3 friends a month:								
Men	65.3	61.3	58.5	58.6	56.4	50.2	5162	≤0.001
Women	71.1	62.8	67.1	63.6	52.9	49.0	2473	≤0.001
Events and difficulties								
Two or more major life events:								
Men	29.6	31.6	35.1	37.9	39.9	41.9	6758	≤0.001
Women	41.1	43.6	35.5	42.8	46.5	49.2	3247	≤0.001
Some difficulty paying bills:								
Men	11.0	16.2	22.8	24.7	29.6	29.6	5167	≤0.001
Women	15.2	13.2	11.8	15.7	18.1	26.9	2490	≤0.001
Fatalism								
Believe one can reduce risk of heart attack:								
Men	71.6	72.2	70.8	66.8	65.5	52.4	5136	≤0.001
Women	58.1	61.6	69.7	68.4	65.0	53.7	2487	≤0.001

†Upper third of distribution.

respond to metyrapone, an inhibitor of cortisol biosynthesis.²⁵ Stress from physical restraint is associated in rats with reversible loss of hippocampal neurones, probably as a result of high glucocorticoid concentrations. Aspects of aging may be connected to similar irreversible processes,²⁶ but evidence is scant in humans. Glucocorticoids have a key role in metabolic responses related to stress, as insulin antagonists acting to raise blood glucose and to promote mobilisation of fatty acids. During physical inactivity these superfluous energy substrates will lead to increased output of hepatic lipoproteins. Among captive rhesus monkeys, those with heightened stress responses tend to occupy lower positions in the dominance hierarchy.⁴

Stress mechanisms and cardiovascular disease

It is a plausible but unproved hypothesis that neuroendocrine mechanisms are involved in the production

Protective effect of wellbeing

Neuroendocrine pathways interact to pattern the stress response. In a study where the acute stress response was obtained by administration of methoxamine (an α_1 -adrenergic agonist), rising concentrations of cortisol were provoked over a period of two hours⁴⁴. This rise could be blocked by giving subjects a synthetic endorphin, which mimics the action of endogenous opioids. These findings are consistent with a protective effect of wellbeing — induced, for example, by exercise, which limits the adverse effects of stress.

of social inequalities in coronary heart disease. Reduced variability in heart rate, indicating predominance of sympathetic over parasympathetic activity, is linked with adverse work characteristics and anxiety and separately with increased risk of sudden death.²⁷ Depression, which is linked with excessive production of glucocorticoids,²⁵ predicts future coronary disease.²⁸ Cushing's syndrome is characterised by central obesity and increased risks for hypertension, diabetes, and coronary disease. Central obesity is linked with both of these degenerative diseases and is a feature of low socioeconomic status. The metabolic syndrome of central obesity, glucose intolerance, insulin resistance, lipoprotein disturbances, and reduced fibrinolysis, secondary to altered functioning of the hypothalamic-pituitary-adrenocortical axis, may mediate effects of the psychosocial environment on coronary risk.²⁹ The challenge of a car driving simulation showed that, consistent with a neuroendocrine conditioning effect, low reactivity was linked with high self esteem. Assessed by a standard psychometric method, self esteem was unrelated to cortisol concentration at baseline but was inversely related to the amount of increase during the challenge.²³

Stress, infection, and immunity

The brain is able to influence immune function. There is autonomic innervation of all relevant tissues—bone marrow, thymus, spleen and lymph nodes—and glucocorticoids have large effects on the immune system. Infectious disease contributes to the social gradient in morbidity in countries such as Britain, and though evidence is scant, immunity may be implicated in a variety of conditions such as peptic ulcer; gastric, cervical, and other cancers; and possibly coronary disease.³⁰ Recent stressful life events, which are more frequent in lower social strata (table 1), have been shown to increase susceptibility to and severity of respiratory infections.

Evidence for social stress and stress buffering effects on cell mediated immune function comes from recent animal studies.³¹ Macaque monkeys were randomised for two years either to stable social groups or groups which were changed every month. Repeated

observations established individual levels of affiliative behaviour (grooming, passive physical contact, or close proximity). As measured by mitogen stimulated proliferation of T cells, the high affiliation group seemed to be protected from the stress of social instability. Although the importance of such effects for health is not known, the same research group has shown that social status predicts susceptibility to influenza virus (SB Manuck, personal communication).

The social patterning of coronary risk

The specific nature of the links between socioeconomic status and coronary risk supplies valuable information about inequalities. Among individuals and between populations, serum cholesterol is an important predictor of coronary risk. Total cholesterol does not, however, seem to explain the inverse gradient in risk according to social position. Thirty years ago, more affluent men who had lower risk had higher cholesterol concentrations,^{32, 33} whereas mean blood cholesterol concentrations now vary by no more than 0.1 mmol/l across social classes in England.³⁴ These observations substantiate the results of dietary surveys, which have found little evidence of social class differences in total intake of fat or intake of saturated fat. A dietary contribution to health inequalities seems related to antioxidants and other micronutrients, and indirectly through the excess energy intake which leads to obesity.³⁵ More detailed blood lipid profiles from the Whitehall II study and elsewhere indicate that protective high density lipoproteins, which promote "reverse transport" of cholesterol from the arterial wall, are involved in the social distribution of coronary risk.³⁶ High density lipoprotein cholesterol concentrations rise incrementally with social status in both sexes.

Determinants of the protective lipoprotein fraction may be important in understanding socioeconomic differences in risk of coronary heart disease. The lipid and lipoprotein pattern observed in male civil servants reproduces the pattern found in the social hierarchy of male baboons.³⁷ Sapolsky, who has studied the behaviour and physiology of wild baboon troops in the Serengeti for many years, argues that the animals are ideal subjects for investigating psychosocial factors. Food is plentiful, predators are scarce, and infant mortality is low. Only some four hours a day are required for foraging, leaving the animals, who live in groups of 50-100, plenty of time to engage in social activity. Attainment and maintenance of social rank is a preoccupation which determines access to a variety of resources. On the basis of these behaviours Sapolsky classified males of the troop into dominants and subordinates. Blood samples obtained after anaesthesia under controlled conditions showed, just as in Whitehall II men, that total cholesterol and low density lipoprotein cholesterol were similar by rank position, and that high density lipoprotein concentrations were higher in the dominant than in the subordinate males, again mirroring findings in civil servants. Subordinate baboons were found to have higher resting glucocorticoid concentrations and fewer circulating lymphocytes.³⁸

Do these parallels reflect the common psychosocial effects of position within the two hierarchies of primates? Production of the more favourable physio-



Money isn't everything—but it is important

Poverty's remains

There is a historical dimension to the link between low social status and excess adrenocortical activity. Destitute people in 19th century England, who were subject to chronic malnutrition and infection—and whose cadavers made up the greater fraction of the anatomists' material—reportedly possessed adrenal glands considerably larger than those found at postmortem examination today.⁴⁵

logical profile in dominant baboons might be the direct consequence of their assertions of supremacy and consequent feelings of wellbeing, or perhaps the result of easier access to the best available food. Equally, these observational data are compatible with the view that the fittest attain the highest rank, but studies of captive macaques suggest that this is not the case.³⁹ The initial rank in small groups of female monkeys who were fed an atherogenic diet was altered experimentally by switching animals between groups. The effects of manipulating social status were dramatic. Dominants who became subordinate had a fivefold excess of coronary plaques compared with animals who remained dominant, while subordinates who became dominant had a twofold excess of atherosclerotic changes in comparison to those remaining subordinate. Other findings are compatible with an interaction between a high cholesterol diet and psychosocial adversity.

Control and adaptation

An important characteristic of position in the social hierarchy is the individual's level of control. Follow up of male and female civil servants in the Whitehall II study shows that self reports of low control at work (low autonomy and decision latitude) predict coronary heart disease.⁴⁰ These prospective findings, although observational, add important evidence for an independent effect of low control at work because the risk remains after adjustments for socioeconomic status or coronary risk factors. The dose-response gradient—reports of low control on two occasions being more strongly linked to incident disease than a single report—further supports a causal interpretation.

In the civil service, low perceived control is related to poor health and many factors relevant to it, including dietary behaviour³⁵ and sickness absence rates.⁴¹ Low control is also associated with high concentrations of the blood clotting protein fibrinogen, a marker for cardiovascular disease.⁴² This linkage may be one example of the costs of stress related biological adaptation. Physiological variables such as body temperature and blood pH are under close homeostatic control, while others such as fibrinogen concentration are less tightly constrained. Such adaptations have been defined as allostasis.⁴³ Follow up studies are testing this concept with measures of the effect of allostatic load, which include glycosylated haemoglobin, waist-hip ratio, high density lipoprotein cholesterol concentration, and output of urinary cortisol and catecholamines.

Conclusions

There is incomplete evidence, but biological plausibility, for the view that psychosocial factors may be important determinants of population health. This short review shows that the stress history—the accumulation of psychosocial experiences beginning in infancy and continuing throughout the life course—seems to have biological effects that will influence the development of degenerative disease. Neuroendocrine stress mechanisms may contribute in particular to social gradients in risk of coronary disease and morbidity associated with reduced immunity. The observed social distribution of chronic diseases presents a challenge to understanding because the underlying pathophysiological processes, which take place over many years and involve many body systems, are incompletely understood. The biological perspective does not detract from the primary importance of social organisation in generating health inequalities, but it can provide an approach to determining the specific aspects of the psychosocial environment that influence health.

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Keeping in touch A paper reunion

Medical school is a working life time away as retirement approaches. Contact with contemporaries may be tenuous and memories hazy. I went to my year's 40th reunion out of curiosity. Most there were instantly recognisable by voice, mannerism, and surprisingly by appearance too. The conversations were of illness, bereavement, and death. Surely something good must be happening to someone?

Finding out required an accurate list of names and addresses. No group's progress through medical school is tidy—1st MB exemptions, intervening BScs, illness, and examination failure disrupt it. Class lists do not tell the whole story of who did what when. The medical school's old student directory is not updated annually.

Cross referencing the school's list with the *Medical Directory* and Medical Register could produce three different addresses. The register has ceased to hold dead records earlier than the mid 1970s. A missing name could mean a death or a permanent move abroad with a lapsed British registration.

I suspected that a personal approach would bring the best response. But the information I needed had to be standardised and I wanted it to reflect personality and perceived achievement. The questionnaire devised was sent to 103 individuals identified as the 1953 1st MB intake and/or 1959 qualifiers.

The response was good; what was even better were the number of letters, full of gossip, that accompanied the returned questionnaires. These provided snippets of information about some of the inevitable non-responders. Networking from this was an effective tool and ultimately there were only nine people about whom nothing—apart from the consensus opinion that they were alive—was known.

Seventy five of 81 women and 19 of 22 men could be accounted for. Six students had not completed their training. Sixteen were dead, one a suicide and two since that 40th reunion. Fourteen were settled abroad. Seventy one had married. There were lots of children

(few doctors) and an increasing number of grandchildren.

Fellowships, MDs, master's degrees, a single DSc had been acquired, and of course BScs en route to qualification. There were memberships and diplomas galore. Several had reached the top of the profession; one had even established a new speciality. Everyone had done some medical work, despite the establishment's antipathy to women, especially if they were married and had children.

Involvement in a broad range of medical activity had created career portfolios before the concept had been defined. There had been an occasional change of speciality to match interest or need or both. A few had branched into other occupations.

The ability to combine medical and domestic commitments, with neither suffering, was a source of pride. Particular pieces of work, not necessarily of earth shattering significance, had brought satisfaction. Most would have changed little of what they had done and few regretted their medical careers.

There was anger about the way the NHS now functioned and a feeling that much of value had been lost. Retirement was a goal reached or within sight and there was pleasurable anticipation about the opportunities this offered.

Sharing what I had discovered was a paper reunion, seemingly generally enjoyed. Our medical school will shortly be merged out of existence, its task like ours completed. An era has been commemorated.

Reunion: A Directory was published by Limited Edition Press, Southport.

Helen Sapper is a retired general practitioner in London

We welcome filler articles of up to 600 words on topics such as *A memorable patient*, *A paper that changed my practice*, *My most unfortunate mistake*, or any other piece conveying instruction, pathos, or humour. If possible the article should be supplied on a disk.