

Estimating implied rates of discount in healthcare decision-making

RR West

R McNabb

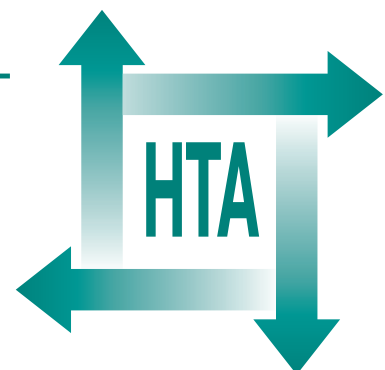
AGH Thompson

TA Sheldon

J Grimley Evans



Health Technology Assessment
NHS R&D HTA Programme





INAHTA

How to obtain copies of this and other HTA Programme reports.

An electronic version of this publication, in Adobe Acrobat format, is available for downloading free of charge for personal use from the HTA website (<http://www.hta.ac.uk>). A fully searchable CD-ROM is also available (see below).

Printed copies of HTA monographs cost £20 each (post and packing free in the UK) to both public **and** private sector purchasers from our Despatch Agents.

Non-UK purchasers will have to pay a small fee for post and packing. For European countries the cost is £2 per monograph and for the rest of the world £3 per monograph.

You can order HTA monographs from our Despatch Agents:

- fax (with **credit card** or **official purchase order**)
- post (with **credit card** or **official purchase order** or **cheque**)
- phone during office hours (**credit card** only).

Additionally the HTA website allows you **either** to pay securely by credit card **or** to print out your order and then post or fax it.

Contact details are as follows:

HTA Despatch
c/o Direct Mail Works Ltd
4 Oakwood Business Centre
Downley, HAVANT PO9 2NP, UK

Email: orders@hta.ac.uk
Tel: 02392 492 000
Fax: 02392 478 555
Fax from outside the UK: +44 2392 478 555

NHS libraries can subscribe free of charge. Public libraries can subscribe at a very reduced cost of £100 for each volume (normally comprising 30–40 titles). The commercial subscription rate is £300 per volume. Please see our website for details. Subscriptions can only be purchased for the current or forthcoming volume.

Payment methods

Paying by cheque

If you pay by cheque, the cheque must be in **pounds sterling**, made payable to *Direct Mail Works Ltd* and drawn on a bank with a UK address.

Paying by credit card

The following cards are accepted by phone, fax, post or via the website ordering pages: Delta, Eurocard, Mastercard, Solo, Switch and Visa. We advise against sending credit card details in a plain email.

Paying by official purchase order

You can post or fax these, but they must be from public bodies (i.e. NHS or universities) within the UK. We cannot at present accept purchase orders from commercial companies or from outside the UK.

How do I get a copy of HTA on CD?

Please use the form on the HTA website (www.hta.ac.uk/htacd.htm). Or contact Direct Mail Works (see contact details above) by email, post, fax or phone. *HTA on CD* is currently free of charge worldwide.

The website also provides information about the HTA Programme and lists the membership of the various committees.

Estimating implied rates of discount in healthcare decision-making

RR West^{1*}

R McNabb²

AGH Thompson³

TA Sheldon⁴

J Grimley Evans⁵

¹ University of Wales College of Medicine, Cardiff, UK

² Economics Section, Cardiff University, UK

³ Department of Politics and the Graduate School in Social and Political Studies, University of Edinburgh, UK

⁴ Department of Health Studies, University of York, UK

⁵ Green College, University of Oxford, UK

* Corresponding author

Declared competing interests of authors: none

Published November 2003

This report should be referenced as follows:

West RR, McNabb R, Thompson AGH, Sheldon TA, Grimley Evans J. Estimating implied rates of discount in healthcare decision-making. *Health Technol Assess* 2003;**7**(38).

Health Technology Assessment is indexed in *Index Medicus/MEDLINE* and *Excerpta Medica/EMBASE*.

NHS R&D HTA Programme

The NHS R&D Health Technology Assessment (HTA) Programme was set up in 1993 to ensure that high-quality research information on the costs, effectiveness and broader impact of health technologies is produced in the most efficient way for those who use, manage and provide care in the NHS.

Initially, six HTA panels (pharmaceuticals, acute sector, primary and community care, diagnostics and imaging, population screening, methodology) helped to set the research priorities for the HTA Programme. However, during the past few years there have been a number of changes in and around NHS R&D, such as the establishment of the National Institute for Clinical Excellence (NICE) and the creation of three new research programmes: Service Delivery and Organisation (SDO); New and Emerging Applications of Technology (NEAT); and the Methodology Programme.

The research reported in this monograph was identified as a priority by the HTA Programme's Methodology Panel and was funded as project number 94/35/09.

The views expressed in this publication are those of the authors and not necessarily those of the Methodology Programme, HTA Programme or the Department of Health. The editors wish to emphasise that funding and publication of this research by the NHS should not be taken as implicit support for any recommendations made by the authors.

Criteria for inclusion in the HTA monograph series

Reports are published in the HTA monograph series if (1) they have resulted from work commissioned for the HTA Programme, and (2) they are of a sufficiently high scientific quality as assessed by the referees and editors.

Reviews in *Health Technology Assessment* are termed 'systematic' when the account of the search, appraisal and synthesis methods (to minimise biases and random errors) would, in theory, permit the replication of the review by others.

Methodology Programme Director: Professor Richard Lilford

HTA Programme Director: Professor Kent Woods

Series Editors: Professor Andrew Stevens, Dr Ken Stein, Professor John Gabbay,
Dr Ruairidh Milne and Dr Rob Riemsma

Managing Editors: Sally Bailey and Sarah Llewellyn Lloyd

The editors and publisher have tried to ensure the accuracy of this report but do not accept liability for damages or losses arising from material published in this report. They would like to thank the referees for their constructive comments on the draft document.

ISSN 1366-5278

© Queen's Printer and Controller of HMSO 2003

This monograph may be freely reproduced for the purposes of private research and study and may be included in professional journals provided that suitable acknowledgement is made and the reproduction is not associated with any form of advertising.

Applications for commercial reproduction should be addressed to HMSO, The Copyright Unit, St Clements House, 2-16 Colegate, Norwich, NR3 1BQ.

Published by Gray Publishing, Tunbridge Wells, Kent, on behalf of NCCHTA.

Printed on acid-free paper in the UK by St Edmundsbury Press Ltd, Bury St Edmunds, Suffolk.



Abstract

Estimating implied rates of discount in healthcare decision-making

RR West,^{1*} R McNabb² AGH Thompson³ TA Sheldon⁴ and J Grimley Evans⁵

¹ University of Wales College of Medicine, Cardiff, UK

² Economics Section, Cardiff University, UK

³ Department of Politics and the Graduate School in Social and Political Studies, University of Edinburgh, UK

⁴ Department of Health Studies, University of York, UK

⁵ Green College, University of Oxford, UK

* Corresponding author

Objectives: To consider whether implied rates of discounting from the perspectives of individual and society differ, and whether implied rates of discounting in health differ from those implied in choices involving finance or 'goods'.

Design: The study comprised first a review of economics, health economics and social science literature and then an empirical estimate of implied rates of discounting in four fields: personal financial, personal health, public financial and public health, in representative samples of the public and of healthcare professionals.

Setting and participants: Samples were drawn in the former county and health authority district of South Glamorgan, Wales. The public sample was a representative random sample of men and women, aged over 18 years and drawn from electoral registers. The health professional sample was drawn at random with the cooperation of professional leads to include doctors, nurses, professions allied to medicine, public health, planners and administrators.

Results: The literature review revealed few empirical studies in representative samples of the population, few direct comparisons of public with private decision-making and few direct comparisons of health with financial discounting. Implied rates of discounting varied widely and studies suggested that discount rates are higher the smaller the value of the outcome and the shorter the period considered. The relationship between implied discount rates and personal attributes was mixed, possibly reflecting the limited nature of the

samples. Although there were few direct comparisons, some studies found that individuals apply different rates of discount to social compared with private comparisons and health compared with financial. The present study also found a wide range of implied discount rates, with little systematic effect of age, gender, educational level or long-term illness. There was evidence, in both samples, that people chose a lower rate of discount in comparisons made on behalf of society than in comparisons made for themselves. Both public and health professional samples tended to choose lower discount rates in health-related comparisons than in finance-related comparisons. It was also suggested that implied rates of discount, derived from responses to hypothetical questions, can be influenced by detail of question framing.

Conclusions: The study suggested that both the lay public and healthcare professionals consider that the discount rate appropriate for public decisions is lower than that for private decisions. This finding suggests that lay people as well as healthcare professionals, used to making decisions on behalf of others, recognise that society is not simply an aggregate of individuals. It also implies a general appreciation that society is more stable and has a more predictable future than does the individual. There is fairly general support for this view in the theoretical literature and limited support in the few previous direct comparisons. Further research is indicated, possibly involving more in-depth interviewing and drawing inference on real, rather than hypothetical choices.





Contents

List of abbreviations	vii	Factors influencing discount rates:	
Executive summary	ix	personal characteristics	28
1 Background	1	Interpretations	29
2 Structure and methods	3	Limitations of the method	30
3 Literature review	5	Advances made by this study	30
Discounting on behalf of society	5	5 Conclusions, recommendations for	
Discounting health	6	further research, and implications	33
Empirical measurements of discount rates	7	Consistency within variation	33
Findings in studies of discount rates	12	Health and financial comparisons	33
Limitations of previous studies	17	Individual and societal comparisons	33
4 Empirical estimate of implied rates of		Determinants of discount rates	33
discounting	21	Recommendations for further	
Study objectives	21	research	33
Design	21	Implications	34
Sample	21	Acknowledgements	35
Questionnaire development and piloting ..	22	References	37
Study management	23	Appendix Interview schedule for	
Results: characteristics of samples	24	estimating implied rates of	
Imputed discount rates: overall statistics ...	24	discounting	39
Private and public discount rates	26	Health Technology Assessment reports	
Health compared with financial discount		published to date	49
rates	26	Health Technology Assessment	
Factors influencing discount rates:		Programme	57
question form	27		



List of abbreviations

CD	compact disc	PAM	professions allied to medicine
CIE	chief income earner	RNLI	Royal National Lifeboat Institution
ED	enumeration districts	SD	standard deviation
FE	further education	SPSS	Statistical Package for the Social Sciences
H of H	head of household	VAS	visual analogue scales
OPCS	Office of Population, Censuses and Surveys		

All abbreviations that have been used in this report are listed here unless the abbreviation is well known (e.g. NHS), or it has been used only once, or it is a non-standard abbreviation used only in figures/tables/appendices in which case the abbreviation is defined in the figure legend or at the end of the table.



Executive summary

Objectives

The main objectives of the study were to consider whether implied rates of discounting from the perspectives of individual and society differ, and whether implied rates of discounting in health differ from those implied in choices involving finance or 'goods'. The study thus sought empirical estimates of discount rates implied by choices made by individuals for themselves compared with those made on behalf of society, and those involving 'health' compared with those involving 'wealth'. The study sought also to ascertain whether implied discount rates used by healthcare professionals compared with those used by the general public to see whether people making decisions about healthcare provision concur with those of the other main stakeholders, namely patients and potential patients. The study was in two parts: a review of the literature; and an empirical study in representative random samples of the general public and of healthcare professionals.

Methods

Literature review

The economics, health economics and social science literature was reviewed for previous comparisons of discounting on behalf of society and by individuals for themselves, and for comparisons of discounting in health and wealth. The literature was also searched for methodologies of eliciting choice, value judgements, ordering or ranking, appropriate for the estimation of equivalence at two points in time and hence of implied rates of discounting.

Empirical study

The second part of the study was an empirical estimate of implied rates of discounting in four fields: personal financial; personal health, public financial and public health, in representative samples of the public and of healthcare professionals.

Geographical setting

The samples were drawn in the former county and health authority district of South Glamorgan, Wales, covering the city of Cardiff and some surrounding towns and rural areas.

Samples studied

The public sample was a representative random sample of men and women, aged over 18 years and drawn from electoral registers. The health professional sample was drawn at random with the cooperation of professional leads to include doctors, nurses, professions allied to medicine, public health, planners and administrators.

Interviews

Subjects were interviewed at home or, for health professionals, if more convenient, at work by a trained lay interviewer using a structured interview schedule. The interviews sought four comparisons in each of the four fields. Subjects were also asked for limited demographic information, so that they could be classified by age, gender, educational level, social class and long-term illness or disability, if present.

Measurements

The nature and form of the questions posed were developed on the basis of previous work in this area and three stages of piloting. The basic approach adopted was to elicit responses to choice of an amount at some variable time in the future, that in the subject's perception equates with some given amount in the present. This allowed estimation of implied rates of discount in each of the fields (personal financial, personal health, public financial and public health). Questions were all of the type: "how much £X in t years time would you consider equivalent to £1000 now?".

Findings and results

The literature on discounting, time preference and eliciting preferences is extensive, too extensive to review systematically with available resources. The review focused, therefore, on papers that compared and contrasted social and private discounting, health and wealth discounting and empirical measurement. The review revealed few empirical studies in representative samples of the population (more were classroom exercises with students), few direct comparisons of public with private decision-making and few direct comparisons of health with financial discounting. The review identified almost as many methods of

eliciting time preference as empirical studies of time preference: these included equipoise, standard gamble, time trade-off and person trade-off, and administration by questionnaire, postal survey, telephone interview and personal interview. Implied rates of discounting varied widely between studies depending on context, comparisons sought and mode of enquiry; for example, whether payment or receipt is to be expedited or postponed. Studies suggest that discount rates are higher the smaller the value of the outcome and the shorter the period considered. The relationship between implied discount rates and personal attributes was mixed, possibly reflecting the limited nature of the samples (mostly students) studied. Although there were few direct comparisons, some studies found that individuals apply different rates of discount to social compared with private comparisons and health compared with financial.

The present study, in a random sample of 385 (lay) people and 180 health professionals, also found a wide range of implied discount rates, with little systematic effect of age, gender, educational level or long-term illness.

There was evidence, in both the general public and health professional samples, that people chose a lower rate of discount in comparisons made on behalf of society than in comparisons made for themselves: medians of four financial questions in two samples were 0–9.5% and 5.0–12.5%, respectively, and of four health questions were 0–2.4% and 0–7.7%, respectively. The differences were statistically significant.

Both public and health professional samples tended to choose lower discount rates in health-related comparisons than in finance-related comparisons: medians of four individual questions were 0–7.7% and 5–12.5% and of four societal comparisons were 0–2.4% and 0–9.5%, respectively. The differences were statistically significant.

On a technical note, both the present study and the literature review suggest that implied rates of discount, derived from responses to hypothetical questions, can be influenced by detail of question framing. Further research is indicated, possibly involving more in-depth interviewing and drawing inference on real, rather than hypothetical choices.

Conclusions

The present study suggests that both the lay public and healthcare professionals consider that the discount rate appropriate for public decisions is lower than that for private decisions. This finding suggests that lay people as well as healthcare professionals, used to making decisions on behalf of others, recognise that society is not simply an aggregate of individuals. It also implies a general appreciation that society is more stable and has a more predictable future than does the individual. There is fairly general support for this view in the theoretical literature and limited support in the few previous direct comparisons. The findings of the present study have implications for all public decision-making and particularly for healthcare planning.

Chapter I

Background

Economics is the study of the creation, availability and distribution of wealth and resources. Resources are limited, which means that not all needs and wants can be met. This raises the issue of choice and priority, which in turn inevitably entails sacrifice or opportunity cost both for the individual and for society.^{1,2} The individual may wish to spend his/her time or earnings purchasing an (economic) good or investing (saving to purchase at a later date) or, if he/she is unwell, purchasing some form of healthcare. Similarly, society has to make choices and prioritise how to spend its time or resources on purchases, including healthcare programmes, on behalf of its members. In a planned health-delivery system such as the NHS in the UK, it is necessary to make decisions as to how resources are allocated.

Many resource allocation decisions involve costs, payments or investments and benefits or gains at different points in time. Investing now for benefits or gain in the future means that those resources are not available for an alternative present consumption. Allowances are often made to adjust for future costs and benefits over time, because it is widely held that there is a preference to consume in the present and to defer payment. This preference for the present leads to any general (economic) good being accorded higher value in the present than at some time in the future, or alternatively a lower or discounted value in the future than if it were available in the present.

There are three main assumptions or principles that underlie discounting. First, time preference, whereby it is held that there is a natural human preference to bring forward benefits and to delay costs, or to enjoy good things now and to postpone bad things. Second, future uncertainty, that possible changes in the state of the world create uncertainty about the future value of a good or return on an investment. Third, economic growth, that individuals on average or society in general, will acquire more wealth and become healthier with the passage of time, so that the marginal utilities of wealth and health decrease. The extent to which the future is discounted by comparison with the present is reflected in the

rate of discounting or the discount rate. Thus, if a person considers two units of a good next year the equivalent of one unit now, he/she is discounting at a higher rate than if he/she considers one and a quarter units next year the equivalent of one unit now.

One important consideration in health economics and in its application in planning and managing the health services and public health is whether the same discount rates or rates of time preference do or should apply to public and private resource allocation decisions. If the same economic principles, derived for individual choice, apply for society, then society would choose to spend or invest in much the same way and on the same criteria as individuals. However, some have questioned whether individual rates of discounting should form the basis of public policy. For example, it has been argued that society's needs and wants are more constant over time than those of individuals.^{3,4} Conventional economic approaches have been criticised for taking a snapshot view of society so that costs and benefits are only taken into account in as much as they concern individuals now.⁴ Olsen⁵ and Sheldon⁴ argue for a distinction between 'selfish' time preference and 'policy' time preference, so that a distinction is clear between the relative values that individuals and public policy makers place on the future. Furthermore, public policy decisions are relevant over longer-time spans and therefore long-term societal discount rates also involve consideration of intergenerational equity.⁶

The second fundamental issue in health economics is consideration of discounting of health per se. This is important for public health policy and for the equitable planning and management of the NHS. It is possible that there is the same basic human wish to consume now and pay later in health as there is in decisions involving finance and material goods. The rate at which individuals discount their future health (or illness) has implications for the treatment of many chronic conditions, immunisation and health education; for example, there really is very little point in berating a teenager for indulging a health behaviour that leads to 5 years' loss of life in retirement, if it is accepted that most people

discount health in the same way as they discount in choices that they make concerning money and material goods.

Similarly, society may discount future health (or illness). Many health planning and health management decisions involve differential timing of health gains, as for example the short-term benefits of treating one condition compared with the long-term benefits (to different patients) of treating another condition. The ranking of many treatment regimens or healthcare programmes can be quite sensitive to the choice of rates of discount for both health (benefit) and healthcare costs, if the timing of benefits or costs differs. The same considerations as above are relevant in relation to discounting the health of society compared with the health of individuals. The choice of rates of discount in healthcare spending and of rates of discount in health itself, the objective of healthcare, has important consequences for equity, a founding principle of the NHS.⁷

The specific issues addressed in the report are: whether

- the future is discounted at different rates, depending upon whether the decision is made on behalf of society or for the individual. In other words, whether individuals recognise, when making decisions on behalf of society, that society's view of the future is not necessarily the same as an individual's
- individuals' implied discount rates differ between appraisals of health and financial or wealth outcomes
- society's implied discount rates differ between appraisals of future health or wealth of society
- health professionals, with more knowledge of healthcare and of making choices on behalf of others, respond differently from members of the general public in discounting future health and wealth outcomes and in distinguishing private and social appraisal.

Chapter 2

Structure and methods

The research comprised two parts: a review of the literature and an estimate of implied rates of discounting in representative random samples of health services' users and providers.

The literature review pursued two principal lines of enquiry:

- theoretical discussions of the issues of discounting on behalf of society and of discounting in health
- empirical measurements of implied rates of discounting, particularly in health and healthcare.

The literature review attempted, within the time and resource constraints of the study, a wide-ranging search of the economics, health economics and social science literature for papers addressing these two specific issues, discounting on behalf of society compared with discounting by individuals for themselves, and discounting of health compared with discounting of traditional economic goods, and a synthesis of this search. The literature review also sought empirical studies of estimations of discount rates to identify the methods used and limitations of these methods, and to provide an overview of previous estimates of discount rates, particularly those relating to public/private and health/wealth comparisons. The literature search took the form of a semi-systematic review of the theory of discounting and empirical estimation of discounting rates pertaining to health economics. The search was semi-systematic in that the literature of discounting is very wide and permeates the literature of economics, and that the 'in-out' criteria for selection of relevant papers could not be set tightly, as in systematic reviews of specific healthcare interventions, for example 'trials of aspirin in myocardial infarction'. Tight in-out criteria, for example, 'empirical estimation of discount rates in public compared with private decision-making', would have been overly

restrictive. Searches were undertaken by keywords in relevant indexing systems, for example 'discount(ing)', 'time preference' and 'rate', using EconLit. The search was not systematic, in that keywords were searched for only in titles or listed keywords and not in abstracts. Abstracts of more than 100 titles were read for selection of the papers, addressing the issues of public/private and health/wealth comparisons and empirical estimation. References cited within selected papers and in previous reviews were followed up and included, where relevant. Selected papers were read by two reviewers, principal points or findings summarised and summaries compared. Principal papers were summarised again by a third reader.

The review, limited somewhat by the time and resources available, provides an overview of previous debate in this field and, together with the empirical study described in Chapters 4 and 5, provides an overview of estimates of discount rates in the different contexts. We would anticipate that a wider and more systematic search, using paper-based as well as electronic indexing systems, going further back in time and searching abstracts as well as titles and keywords, would identify and select more past work relevant to the principal aims of this research.

The second part of the research was an estimate of implied rates of discounting, based on samples of 400 health service users and 200 healthcare professionals, and undertaken in the former county of South Glamorgan (Cardiff and the Vale of Glamorgan). The study involved individual interviews using structured interview schedules. The basic approach adopted throughout was that each person was asked to estimate equivalence at two points in time in four questions in each of four fields: personal finance, personal health, public finance and public health. The structure of the questions and the development, piloting and administration of the questionnaire are described more fully in Chapter 4.

Chapter 3

Literature review

Decisions about the allocation of resources to meet present and future needs involve consideration of the weights that should be applied to future outcomes. In this respect, decisions in healthcare are no exception. Some healthcare programmes confer future health benefit, while others provide only present benefit; for example, renal transplantation compared with maintenance haemodialysis.^{8,9} Consideration of the timing of health effects therefore raises the question of discounting of health and what the appropriate discount rates, if any, should be.

There is a substantial literature on discounting, but it was not the purpose of this review to provide a comprehensive evaluation of the theoretical basis of discounting, which has been reviewed well by others.^{1,10,11} Rather, the focus was on specific issues relevant to the health economics of a public health service, namely comparisons of the rate of discount in public compared with private decision-making and consideration of the rate of discount of health per se, and to summarise previous estimates of discount rates. In this summary of the literature the specific issues addressed are as follows. (1) Is the discount rate for society the same as the discount rate for individuals? (2) Do individuals discount health in the same way as they discount future outcomes, when making financial or other expenditure decisions? (3) Should future public health effects be discounted in healthcare planning? (4) What are the discount rates imputed in previous estimation studies?

Discounting on behalf of society

Early in the development of health economics in the UK, discounting in healthcare planning became normal practice. Guidelines suggested a discount rate similar to those of previous studies in the same field, with exploration of sensitivity by varying the rate about that chosen value.¹² It is interesting to note, however, that rates used in forward planning of service programmes tend to follow the guide from the Department of Health, which follows a rate set by the Treasury, which in turn follows the rate of return in financial markets and the bank rate.¹³ Whereas current advised rates may be relatively low (less than 5%), a decade or

so ago, when interest rates were high, discount rates in healthcare planning were also high.¹⁴

However, several authors have presented arguments questioning this widespread practice of discounting the future on behalf of society^{4,15-18} and more recent health economics guidelines acknowledge debate over discounting.¹⁹ The present review considers principally those papers that discuss the issues from a health and healthcare planning perspective. Citations are necessarily brief and the authors of this review do not necessarily agree wholly with the views expressed or with their understanding of these views.

Goodin suggested that there is nothing natural or normal about the discounting process and that attaching less importance to future payoffs is an irrational element of human psychology, which should not be used in public policy making.¹⁵ He suggested that interest should be in “tomorrow’s satisfaction and not today’s assessment of tomorrow’s satisfaction”. However, it should be appreciated that tomorrow’s satisfaction is very difficult to estimate without reference to the needs and preferences of today.

Sheldon has presented several arguments against discounting in healthcare planning.⁴ First, he suggested that spending on healthcare increases the opportunity for benefit from individual investment, so that spending on health becomes complementary to investment, rather than competition for investment. Second, he suggested that time preference by individuals is indicative of myopia that should not necessarily be embodied in societal decision-making. To use time preference derived from individuals in policy would mean that too few resources are set aside for the future. Third, he suggested that uncertainty is very different on a societal level and that what may be uncertain for the individual may be less so for society as individual variation is averaged. For example, in the relationship between smoking and lung cancer an individual giving up may not be guaranteed avoidance of lung cancer, but for society as a whole giving up would guarantee a marked overall reduction in lung cancer. Fourth, he questioned the assumption

of growth, that society will become healthier and wealthier and the marginal utility of health and wealth in the future will hold less worth.

Similarly, West contrasted the stability or constancy of society over time with the transiency of an individual.^{16,18} He observed that, while individuals pass through the seven ages of mankind, a society (the UK) continues to comprise in round figures approximately 57 million persons with little change from one decade to the next, with 11 million children, 22 million people in paid employment and 12 million in retirement. He also observed that many accepted healthcare practices contradict the theory of discounting. For example, many paediatric treatments incur present costs with implied future benefits, even though health economics calculations have found that in some treatments the future benefits, even modestly discounted, do not approach present costs. Similarly, immunisation and screening programmes, which in cost–benefit terms may be considered inefficient, at least if the condition is rare, and health education all incur present costs with delayed (and not necessarily guaranteed) benefits. Discounting a (possible) future benefit can significantly reduce its perceived present value, yet all of these healthcare activities are high priorities in public health.²⁰

Long time spans involve the issue of intergenerational justice. In theory, equity may be established between generations by an application of Rawls' theory of justice,²¹ which postulates that individuals should be placed behind a “veil of ignorance”, when formulating rules for the distribution of welfare, such that they do not know their place in society, when the rules take effect.⁶ While such depersonalised distribution may be conceivable between groups, countries or races at one point in time, it would demand great detachment to distribute resources in time, because all decision-makers and planners are here now in the current generation, with current concerns and values. It is argued that the society that emerges would be one that “maximised the minimum position” or did the most for those who were least well-off. However, Arrow suggests that applied to healthcare this could end up bankrupting society.²² Although the idea of the most seriously ill getting priority may appeal to a sense of justice, the most seriously ill may be suffering from conditions that a health service or society can do little or nothing for. It would follow that to allocate resources in a futile attempt to save lives at such a stage would do little to help society.

Discounting health

Observations of individual behaviour would suggest that individuals discount their future health in much the same way as they discount future goods: ‘a fit healthy day today is worth two next year’. Furthermore, it can be inferred that there are wide interpersonal variations in this, just as there are for other (economic) choices. In other words, some individuals employ high rates of discount and others low rates of discount. Some health behaviours, such as cigarette smoking, imply that individuals may discount future health at quite high rates, possibly at higher rates than they do wealth.

Some authors have perceived a problem in applying neoclassical economics to health, as health is not a marketable good.^{23,24} Drummond²⁵ presented three arguments against discounting in health: first, that unlike wealth it was difficult to conceive of individuals investing in health or trading flows of healthy years through time; second, that it did not make sense to assume that in the future people would be healthier as well as wealthier; and third, that individuals discount health at a different rate from monetary benefits. However, he considered that to trade healthcare projects differently from those in other sectors of the economy could lead to inconsistencies in the overall allocation of resources.

Another relevant issue is the applicability of the concept of consumer sovereignty in healthcare. It can be questioned whether an individual is able to judge his/her welfare and if so whether he/she is willing to accept this ability. In making decisions about healthcare the consumer is often disadvantaged with respect to information. Economic theory holds that good information is needed for a market to work efficiently, but it has been questioned whether patients have sufficient information about health states, treatments, effectiveness and cost to make sensible decisions. It has also been suggested that values expressed by patients are not necessarily stable and representative of their true preferences. In anticipation of an event, values may differ from values during the event itself, as for example the value prospective mothers place on delivery without anaesthesia.²⁶ Whether the average individual is capable of making health decisions concerning outcomes of which he/she has little or no experience is questionable, especially when patients can choose to delegate responsibility to the appropriate informed healthcare professional. This might suggest that healthcare decisions should be wholly the responsibility of the experts.²

Many arguments have been aired over the rationale of discounting of health and whether health should be discounted at the same rate as wealth. Keeler and Cretin²⁷ and Drummond and co-workers²⁵ suggest that, if the health discount rate is lower than the rate applied to wealth, it will always be more cost-effective to postpone a programme. However, Parsonage and Neuburger³ and Ganiats²⁸ argue against this proposition with three main points. First, there are significant differences between wealth and health: wealth can be invested to grow in value and can be spent to obtain another commodity. Second, the fear of continual postponement is not relevant as resources are not limited to only the most cost-efficient programme. If a programme is worth implementing now it should be implemented now, whether or not it may be worth more at some time in the future. Postponement would only be preferable if the choices were mutually exclusive. Third, society's health and wealth are dynamic, which may modify the relative values of health and wealth. In response to Parsonage,³ Cairns²⁹ defended the traditional arguments for discounting health in healthcare planning at the same rate as other goods, although his questionnaire-based study of a small sample of economic students suggested a lower rate.

In considering time preference for health improvement and life saving, Olsen³⁰ discusses whether and to what extent intertemporal choices from our own consumption behaviour should govern social intertemporal choices. Several different factors are influential when considering choices at an individual or a societal level. Olsen⁵ suggested that there should be a lower discount rate for health than elsewhere in the economy as health is a non-tradable good and all age groups should be given equal weight in determining provision. Ganiats²⁸ and others¹⁸ mention the prevention paradox that while most prevention programmes are intuitively cost-effective, many do not fare well in traditional cost-effectiveness analysis, because discounting does not favour preventive measures. Gyrd-Hansen and Sogaard³¹ suggest that it would not be inconsistent to use different rates: private time preference rates for private discounting and social time preference rates for societal discounting of health benefits.

Although the debate is likely to continue, it is now more widely accepted that health should not be discounted automatically like other economic goods. Many now consider that the appropriate discount rate for health at the societal level is less than that applied by individuals. Contributions to

the debate from within (or close to) the government 'machine'³ may have led to downward revisions of the social rate of discount for health. The UK Department of Health's currently recommended rate for health is 1.5–2%,³² which is lower than the recommended monetary rate.

Empirical measurements of discount rates

The second line of enquiry in the literature review was to consider those studies that have attempted to measure implied rates of discounting, with an emphasis on discounting health effects. The main studies that have attempted to estimate discount rates are summarised in *Table 1*. In general, the majority were classroom exercises with students, and mostly economics, accountancy or finance students. While this provides a more homogeneous sample, it severely limits the inferences that may be drawn from the findings. Several authors explicitly stated that the students concerned had been taught about discounting before the study. Four studies sampled more generally, Cropper and co-workers,³³ Olsen³⁰ and Cairns and van der Pol,^{34,35} in the USA, Norway and the UK, respectively. All of the student-based studies used self-administered questionnaires of one sort or another, while the population-based studies used telephone interviews, hand-delivered questionnaires or postal questionnaires. Question types, structures or formats and methods of delivery are described for each study in the following paragraphs.

The simplest type of question used to estimate an implied rate of discount is to ask respondents to choose a value (X) at some specified point in the future to balance a given starting value now. Cairns⁴⁰ investigated implied rates of discount for both health and wealth outcomes, with hypothetical scenarios that presented health questions as similarly as possible to wealth questions, as in the following examples.

Time preference over wealth states:

Suppose you must pay £1000 in 2 years' time or £ X in 5 years' time.

What value of X would make you indifferent between paying in 2 years' time or 5 years' time?

Time preference over health states:

Scenario A

You will experience 20 years of excellent health then spend X days in the health state described (a severe mental health state is described), followed by 22 years of excellent health, followed by death.

TABLE 1 Studies of implied rates of discounting

Study	Study sample	Size	Objective	Format
Rose and Weeks (1998) ³⁶	Patients, doctors, health workers	154	Compare time preference rates for health and wealth (gain)	
Loewenstein (1988) ³⁷	Undergraduates, introductory economics	66	Reference point in intertemporal choice	Questionnaire, classroom
Benzion <i>et al.</i> (1989) ³⁸	Students, economics and finance	204	Postpone or expedite financial commitment	Questionnaire, classroom
Pope and Perry (1989) ³⁹	High-school students, business natural science	304	Individual variation, 'public' vs 'private'	Questionnaire, classroom
Cairns (1992) ⁴⁰	Economics undergraduates	29	Compare time preference rates for health and wealth (loss)	Questionnaire, classroom
Cropper <i>et al.</i> (1992) ⁴¹	US population samples	3200	Discounting lives saved (environmental programmes)	Telephone interviews
Redelmeier and Heller (1993) ⁴²	Doctors and medical students	121	Personal time preference for disease	Structured interview
Olsen (1993) ³⁰	Norwegian population; health planners	250 + 77	Population vs health planners for lives saved and health improvement	Delivered, postal
Shelley (1993) ⁴³	Undergraduates or masters, accountancy	74	Influence of outcome sign and question frame	Questionnaire, classroom
Chapman and Elstein (1995) ⁴⁴ (Chapman, 1996) ⁴⁵	Undergraduates, psychology	70 + 34	Discounting of health vs money (health money equivalence)	Questionnaire, classroom
Cairns and van der Pol (1997) ³⁴	Aberdeen population	473	Private vs public financial	Postal
Cairns and van der Pol (2000) ³⁵	Six UK towns or counties	1095	Private vs public health	Postal

Scenario B

You will experience 2 years of excellent health then spend 90 days in the health state described (as above), followed by 40 years of excellent health, followed by death.

How long would X have to be for you to be indifferent between scenarios A and B?

The free choice of X should reduce biases of question framing and prompting. However, there is some doubt over whether this format with a free choice of X is suitable for use with the general population. The study was performed on 29 students of economics as part of a course of discounting. In common with several other studies, the study sample was from an educated population, educated in the principles of discounting. Also, the health scenarios were rather contrived (42 years of excellent health except for 90 or X days) and the study only considered health losses or monetary payments. The response

to the simple comparison of £ X in 5 years' time and £1000 in 2 years' time may also depend on whether the transaction is a gain or a loss. Furthermore, the comparisons offered were between two future points in time to offset any bias associated with the present. This approach may be too subtle if people have difficulty distinguishing between two different future points in time, especially if they are relatively close together, and it may overcompensate for perception of the future from the present, the very basis of discounting.

A more detailed approach was used by Loewenstein³⁷ to look at the differences between discount rates for gains and losses. The study was based on a sample of 66 undergraduate economics students at the University of Illinois. Three ways of eliciting individuals' relative preferences for immediate versus delayed consumption were used in the study. First, he asked for the amount the

student would pay to obtain the good now (the immediate consumption price) and then how much the student would pay to obtain the object following a time delay (the delayed consumption price), the difference being one measure of relative preference for immediate consumption. Second, a 'delay premium' was estimated by asking how much each would pay to obtain the object immediately and then, having made the purchase, what was the smallest amount each would accept to compensate for a given delay of consumption. Third, individuals were asked how much they would pay to obtain an object at some future time and then, having paid, the most they would be willing to pay to eliminate the delay or speed up consumption. The questions were all based on the hypothetical purchase of a video cassette recorder valued at \$300 and the delay period was 1 year.

A similar, though rather more complex, approach was adopted by Benzion and co-workers³⁸ in their study of 204 "financially sophisticated students of economics" to estimate discount rates from intertemporal choices. Four scenarios were described.

Scenario A (postpone a receipt) concerns the case of a person who has just earned \$y for his or her work in a financially solid public institute. Upon coming to receive the payment, the person is told that the institute is temporarily short of funds. Instead, he or she is assured payment of another amount \$x t time periods from now ...

Scenario B (postpone a payment) concerns the case of a person who must pay immediately a debt of \$y to the same public institute. Being temporarily short of funds, the person proposes instead to pay the institute \$x t time periods from now. The person is willing to furnish the appropriate securities and the institute may or may not accept his or her offer ...

Scenario C (expedite a receipt) concerns the case of a public institute which must pay its employee \$y t time periods from now. The institute offers to expedite the payment of its debt and pay its employee \$x now ...

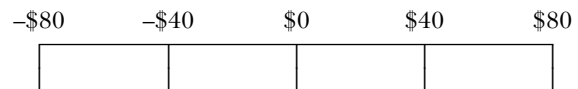
Scenario D (expedite a payment) concerns the case of a person who must pay a debt of \$y to a public institute t time periods from now. Wishing to settle his or her debt immediately, the person offers to pay \$x now. The institute may or may not accept his or her offer.

Given the values of \$y (\$40, \$200, £1000 and £5000) and t ($\frac{1}{2}$, 1, 2 and 4 years), students were asked to specify \$x so that they would be indifferent between \$x and \$y for each of the four scenarios.

Shelley⁴³ repeated the Benzion study³⁸ with 74 accountancy students, who had taken at least one formal course on discounting, with the modification of introducing a neutral value in the outcome time frame (i.e. delay, neutral, expedite). The neutral frame question asked the respondent for today's value for immediate consumption of a good and today's value for future consumption of the same good. The critical difference from the non-neutral frames was that respondents would not experience a relative gain or loss, compared with the expected contract, because of a change in timing. People tend to be loss averse and so perceive changes from a plan or agreement as unattractive.

The study also sought answers on a visual analogue scale (VAS) as follows:

You owe a debt of \$40 in 4 years to a public institute. What is the (negative) value $-\$x$ of that debt to you now? (mark on scale)



Respondents may find an analogue scale easier to complete than choosing a value for X, but presentation of a scale is a prompt and encourages responses in its centre.

The above examples have considered implied private rates of discount. Pope and Perry,³⁹ in contrast, in a study of 304 business and natural science students, attempted to estimate both social and individual rates of discount and whether they might differ. The questions were based on hypothetical scenarios, as follows.

Scenario A. Upon graduation, you obtain a resource endowment such as a fishery, a farm or a forest, which can be passed on to your heirs. It can be managed in different ways to generate any one of five different net income streams (A, B, C, D or E) to be utilised by you, your family and future generations. These values are measured in constant 1987 dollars. That is, the dollar values in all of the years will have the same purchasing power. Also, these values are assumed to be known with certainty. There is no financial risk. Based upon your own personal relative valuation of current versus future returns, select the income stream that would be preferred by you, the private owner and manager of the resource endowment. [Participants received both a graphical and tabular representation of five possible income streams, which represented discount rates of 0.5%, 1%, 2%, 5% and 10%.]

Scenario B. Now assume that this resource endowment is not owned by you. It is a public

resource and is managed by a public resource agency, such as the Forest Service, the Bureau of Land Management or the National Park Service. Which income stream do you think would be selected by the public management agency?

If your answers on questions A and B are different, please explain why.

This study sought a distinction between a social rate of discount and an individual rate, and also used an open question to investigate reasons for any differences. Presentation of the material as graphs rather than numbers may make it easier for people to compare, but it remains possible that people do not really understand what the graphs imply. Furthermore, answers and therefore the implied rate of discount were limited to a choice of one of five proffered figures, which is more restricting than a free choice of X .

A rather different approach to eliciting social rates of return was adopted in a telephone survey conducted in the USA by Cropper and colleagues,^{33,41} in which respondents were asked to take the role of public decision-makers and to choose between two government programmes. For example:

Without new programmes, 100 people will die this year from pollution and 200 people will die 50 years from now. The government has to choose between two programmes that cost the same, but there is only enough money for one.

Programme A will save 100 lives now.

Programme B will save 200 lives 50 years from now.

Which programme would you choose?

Each respondent was presented with only one sample comparison, but the number of lives saved and the time (5, 10, 25, 50 and 100 years) were varied randomly across respondents. Some were also asked about the factors that led them to make the choice. The study sample comprised 1000 members of the population of Maryland, 1200 in Washington DC and 1000 nationally. A telephone survey may have drawbacks compared with a postal survey. In a brief telephone interview respondents may experience more difficulty understanding questions and may be less motivated to consider the issues seriously. However, in a telephone interview respondents feel less pressure to give what they perceive to be a socially desirable response. As respondents did not have to estimate a value of X , the question was perhaps easier for the average person to answer. However, without a value of X for each respondent only orders of magnitude of implied rates of discount are indicated.

To examine the rates of discount that people apply in discounting health states, Redelmeier and Heller⁴² studied a sample of medical students, house officers and doctors to estimate their individual time preferences for three disease scenarios. The study used structured interviews and attempted to estimate personal discount rates by both standard gamble and categorical scaling. The standard gamble asked subjects to compare a probability of experiencing a described state of illness now with a certainty (100% probability) of experiencing the same illness at some future time. The categorical scaling asked subjects to indicate their perceived 'utility' of a period of (defined) illness at a specified point in time on a VAS.

To examine discount rates of health states, Olsen³⁰ studied a random sample of the Norwegian population and senior managers in health departments. The questionnaire together with cover letters, which were delivered by hand, sought comparisons in life saving and health improvement. Questions asked respondents to prioritise between alternative health programmes, as in the following example.

The health service is being allocated additional expenditure, this is to be spent on a programme which saves human lives. Assume now that the only difference between the programmes available is when human lives are saved. (The programmes save lives of the same age. Thus, the same people cannot be saved at different points in time. We do not know who will be saved.)

Programme A will save 1000 lives in 1 year.

Programme B will save 1000 lives in 5 years.

Which of the two programmes would you choose? A, B or A and B are equally good.

If you choose A: imagine that more than 1000 lives could be saved in 5 years. How many lives do you think Programme B would have to save in order for A and B to be considered equally good?

If you find it difficult to give a finite number would you please indicate the range within which the number of lives saved by Programme B in 5 years would have to lie for A and B to be considered equally good.

This study chose a date in 1 year's time as the reference point, instead of the present: the reason given was the desire to avoid the possible influence of higher valuation of known lives than statistical lives. Respondents were permitted to give a range of values for X , if unable to choose an exact value. Although this makes answering easier, use of a range means that the implied rate of discount will be less precise. The samples, which comprised 250 (of 550) randomly selected members of the general public and 77 (of 209) senior health

managers in Norway, allowed for a comparison to be made between the responses of the public and a more expert group. Olsen⁴⁶ suggested that the public perception discount rate could be imputed from comparison by “person trade off” and individual discount rates from comparisons of “statistical lives time trade off”. However, the pilot study included very few subjects in the “time trade off”, so direct comparison could not be inferred.

More recent attempts to elicit private and social rates of discount and to consider health and wealth decisions include the study by Cairns and van der Pol.^{34,47} That study of 473 members of the general public, selected from the electoral register in Aberdeen, used a postal questionnaire. The questionnaire included six intertemporal choices: two life-saving, two private financial choices and two social financial choices. Participants were asked to indicate what level of future benefit would make them indifferent between a specified benefit to be received 1 year from the present and a benefit further in the future, whether short run (2–8 years) or long run (12–19 years). For life-saving choices, respondents were asked to compare two programmes, one that would save 1000 lives 1 year in the future; and another, which would cost the same and would also save X lives, but further in the future. To investigate private financial choices, participants were asked to indicate what sum of money would lead them to be indifferent between £500 to be received 1 year from the present and the delayed more distant sum. Social financial choices involved sums received by the local community for investments in public transport. In this study participants were asked to answer questions by selecting values from a range of offered answers or entering a value of their own choosing. Offering a range should make answering easier than choosing X in an open question, but preselected answers act as prompts and can lead respondents to choose central values. Cairns and van der Pol³⁵ undertook a further study in six towns or counties to investigate how people discount the health of others compared with their own health. That study was reported after completion of this literature review.

Chapman and Elstein⁴⁴ sought comparisons of money, health and vacations, as an alternative good, in a study of psychology students. Their question design was similar to that used by Cairns;⁴⁰ for example, a lottery prize of \$200 now or $\$X$ in t years’ time. The comparisons were all for personal gains. The health and vacation questions were somewhat contrived to produce simple comparisons of the type “1 year now versus

X years in t years’ time” for health or “7 days now versus X days in 6 months’ time” for vacations. Subsequently, Chapman⁴⁵ varied amounts and time spans and sought direct comparison of health (time free of illness) and money that students would be prepared to exchange for health.

Ganiats²⁸ suggested a role for qualitative research methods in developing simple quantitative comparison questions and in interpreting the responses. The study used focus groups to help to develop simple patient vignettes; for example, choosing between interventions that maximise either present or future health but not both present and future health.

Would you choose to take the drug (to relieve migraine, scenario described) for 12 months starting now or for 24 months starting in 6 months?

The comparison, like Cropper’s,⁴¹ offered only two options as answers, which limits the ability to estimate a discount rate. However, in a pilot study focus groups were also asked to discuss rationales for discounting health outcomes.

Another approach worthy of consideration is the factorial survey method.⁴⁸ The underlying assumptions are that people weigh up many factors when making a social judgement, and that inclusion of other variables leads to a more realistic estimate of the variable under study. This method asks individuals to compare two vignettes or to rank a number of vignettes built up from a number of parameters (e.g. age, gender, profession), as well as the variable under study (delay, in a time preference study). This allows researchers to study the effects of other variables, partly conceals the study variable from respondents and, it is argued, thereby allows a less biased estimation of the relationships than the simple univariate comparisons (£1000 now or $\pounds X$ in t years’ time).

An example of the use of the factorial survey technique to examine the perceived justice or injustice of earnings was described by Jasso and Rossi.^{49,50} A total of 200 adults (equal numbers of males and females) were asked to make judgements about the earnings of 600 distinctly different fictitious families. Respondents were asked to rate a sample of 60 descriptions of the fictitious vignettes on a justice evaluation scale. The samples were generated by a random combination of preselected personal attributes: gender, marital status, number of children, education, occupation and age. Unrealistic vignettes were removed. Each

respondent was handed a set of vignettes on cards, a box with nine slots, labelled from 'extremely underpaid (-4)' through 'fairly paid' (0) to 'extremely overpaid (+4)', and asked to place each card in the slot that corresponded to his/her judged evaluation of the vignette.

Backman⁵¹ used the factorial survey technique to measure rules of justice in deciding who should have priority of access to healthcare. The technique asked participants to evaluate the situation of fictitious others rather than of themselves, to allow a more objective evaluation based on a sense of justice. A typical vignette read as follows, with words in bold varied across samples.

Connie S. is a **58-year-old woman** who lives **without** a partner and has **no** dependent children. Connie's fitness and exercise level have always been **good**. She often experiences **very much** pain as a result of her illness. In the short term, her illness has left her with a **poor** opportunity to lead a normal life and a **fair** probability of surviving without surgery. Doctors estimate her chance of maintaining her employment

without surgery to be **full**. She is a **moderate** smoker and a **heavy** drinker. **\$4822** of her taxes are spent by government on healthcare. Connie **has** purchased an extra supplementary healthcare insurance policy.

Participants were asked to rate urgency for healthcare on a 15-point scale from 'not urgent' to 'extremely urgent' for each of the hypothetical individuals. Analysis of many responses for appropriately designed samples allowed estimation of the relative contributions of the independent variables (age, gender, etc.) on relative priority for healthcare. It is suggested that this factorial survey technique could be adopted for estimation of discount rates.

Findings in studies of discount rates

Most studies estimated implied private rates of discount for financial or material goods questions, although some also estimated rates for discounting

TABLE 2 Implied rate of private discounting of money or material goods in empirical studies

Study	Discount rate (%) ^a	Principal explanation of variation	Principal comparisons
Rose and Weeks (1988) ³⁶	Wide variation (see text)	Income, education, age	Lottery prize with relief of chronic back pain
Loewenstein (1988) ³⁷	24–96 ^b	Postpone/expedite	\$300 and 1 year free choice of discount
Benzion <i>et al.</i> (1989) ³⁸	8–60 ^b	Sums involved, time span, postpone/expedite	\$40–5000, 6 months to 4 years, free choice of discount
Pope and Perry (1989) ³⁹	3, ^b 1 ^c	Private vs public ownership	Large sums (500 acre farm), long time span (100 year) offered 0.5–10%
Cairns (1992) ²⁹	14 (11)–29 (20) ^b	Postpone/expedite	£200–2000, 2–10 years free choice discounts
Shelley (1993) ⁴³	7 (7)–28 (49) ^b	Sums involved, time span, postpone/expedite	\$40–5000, 6 months to 4 years, analogue scale
Chapman and Elstein (1995) ⁴⁴ (Chapman, 1996) ⁴⁵	40–400 ^d	Sums involved, time span	\$75–400, at 6 months 50–75, for \$25,000 (lower rates with revised questions)
Cairns and van der Pol (1997) ³⁴	13–41 ^d	Time span	Better fit with proportional and hyperbolic discounting models

^a Summary statistics.
^b Mean (SD where reported).
^c Median.
^d Geometric mean.

on behalf of society or discounting health and made some comparisons. *Table 2* summarises rates of discount reported in studies of discounting of money or material goods. Perhaps the most common feature of the studies considered is that they reported wide variation in mean and median implied discount rates, depending on sums involved and time span, for example 8–60% in Benzion.³⁸ Variations between studies were wider still, ranging from 3%³¹ to 400%.⁴⁴ Some but not all variation reported may be attributed to factors such as the hypothetical sums involved and time spans considered. Variation may also reflect the characteristics of the samples studied and the way in which questions were asked or comparisons framed. The next sections summarise the findings of studies that examined factors associated with variation in rates of discount. The findings of studies that examined differences in social and private rates of discount and discounting of health compared with wealth follow.

Why discount rates vary: expedite or postpone

Loewenstein³⁷ estimated a premium that students would be prepared to pay to bring the 'consumption' of a video recorder valued at £300 forward (i.e. expedite) or alternatively the compensation they would seek if consumption were postponed. The study found higher implicit rates of discount for postponement (mean 96%) than for expediting (31%) and for direct intertemporal comparison (24%) (*Table 3*). Cairns⁴⁰ found that discount rates were higher when expediting a payment (29%) than for postponing a payment (14%). Since payments are negative and receipts are positive, this finding is in broad agreement with Loewenstein's.³⁷ Similarly, Benzion and co-workers³⁸ found that discount rates were higher for postponing than for expediting a receipt (27% vs 18%), in the same

direction as Loewenstein, and that discount rates were lower for postponing than expediting a payment (17% vs 24%).

Shelley⁴³ also found a similar preference for expediting (15%) compared with delaying a receipt (20%) and for postponing (11%) compared with expediting a payment (18%). Shelley's additional finding was that the implied rate of discount in a neutral comparison, neither expediting nor postponing, was closer to the former for both receipts and payments (17% and 18%, respectively). It was suggested that once a decision-maker adjusts to the timing of the event, he/she is reluctant to change the timing because, having adjusted, he/she associates any change with a loss, whether the loss be immediate or in the future. Shelley also discussed situations that may lead to negative discounting. Positive utility may be found in anticipation of a postponed pleasure ('kissing a film star') and negative utility may be associated with postponing a negative event (the dread element). There is broad agreement among these studies in terms of the perception of expediting or postponing, although mean implied rates varied between studies (*Table 3*).

Why discount rates vary: sums involved

Implied discount rates vary according to the sums involved. Benzion and co-workers,³⁸ in a study of postponing or expediting a financial commitment, over times ranging from 6 months to 4 years, found higher mean discount rates for smaller sums: \$40 (29%), \$200 (22%), \$1000 (20%) and \$5000 (14%). In a similar study and using the same sums and time spans, Shelley⁴³ reported a comparable trend in discount rates: 20%, 16%, 15% and 15%, respectively. Chapman and Elstein⁴⁴ also found that discount rates were higher for smaller (fictitious) lottery prize wins; for

TABLE 3 Discount rates and expediting or postponing a financial commitment

Study	Expedite payment	Postpone payment	Intertemporal comparison (payment)
Benzion <i>et al.</i> (1989) ³⁸	24% ^a	17%	–
Cairns (1992) ⁴⁰	29%	14%	–
Shelley (1993) ⁴³	18%	11%	18%
	Postpone receipt	Expedite receipt	
Loewenstein (1988) ³⁷	96%	31%	24%

^a Implied discount rates: summary means over four sums and four time spans.

example, 120% for \$200 and 60% for \$25,000 (both over 2-year time spans). Comparison between studies lends support to the view that people discount smaller sums at higher rates: compare, for example, 24% for a \$300 video recorder³⁷ and 2% for a 500 acre farm.³⁹ This may reflect different attitudes to risk for small and large sums; in other words, people are more prepared to take a gamble on a small sum than on a large one.

Why discount rates vary: time horizons

Five studies examined the effect of time horizons on implied rate of discount and all studies found that discount rates decreased with longer time horizons (*Table 4*). This association appears to be fairly general, whether comparison is over relatively short periods (e.g. 6 months to 4 years⁴⁴) or longer periods (e.g. 2–18 years³⁴) and the association appears to hold also for hypothetical or statistical lives.^{30,33,34} In examples involving life saving, Cropper and colleagues³³ also found that respondents with school-aged children had higher discount rates beyond 25 years than respondents without. It was suggested that this may reflect a self-interest to protect their children.

Olsen³⁰ compared health improvement of statistical beneficiaries with life saving in the Norwegian population and found stronger time preference or higher discount rates for health

improvement (morbidity), 23%, than for life saving (mortality), 17% (medians, over 5 years).

Constant or time variant discount rates

Most calculations of implied rates of discount, based on comparison of perceived equivalence at two points in time, assume that the rate is constant over time. For example, if equivalence between 3 and 5 years hence is in the ratio of say 1:1.5, the equivalence between 1 and 3 years hence would be the same. This assumption seems simplistic in the light of the findings of many studies that show lower average rates over longer time horizons (see above). Various non-constant models have been proposed, one being the proportional model, in which the discount factor decreases with increasing time ($b/b+t$, when b is a constant).⁵² Cairns and van der Pol^{34,47} tested proportional and hyperbolic models in analysis of responses to discounting money and life saving. They argue that individuals are decreasingly time averse and apply lower discount rates over longer time horizons. This may be of relevance to health behaviours and how these may be influenced.

Sample socio-demographic attributes: age

Age (and other personal characteristics) can only be examined as a potential explanatory variable for discounting in population-based studies that

TABLE 4 Discount rates and time horizons

Study	Currency	Time periods and discount rates
Benzion <i>et al.</i> (1989) ³⁸	Money	6 months 29%, 1 year 20%, 2 years 16%, 4 years 15% (means at £1000)
Shelley (1993) ⁴³	Money	6 months 22%, 1 year 19%, 2 years 16%, 4 years 13% (means 'neutral' intertemporal comparison)
Chapman and Elstein (1995) ⁴⁴	Lottery prize	6 months 400%, 1 year 200%, 2 years 120%, 4 years 80% (means, for prize of \$200) (smaller differences for larger prizes)
Cairns and van der Pol (1997) ³⁴	Money	2 years 30%, 6 years 21%, 12 years 19%, 18 years 15% (medians) (similar rates for public money and lives)
Cropper <i>et al.</i> (1992) ⁴¹	Lives save	5 years 17%, 10 years 11%, 25 years 7%, 50 years 5%, 100 years 4% (medians)
Olsen (1993) ³⁰	Lives saved	5 years 17%, 20 years 9% (random population) 5 years 7%, 20 years 6% (health planners) (medians)
Cairns and van der Pol ³⁵	Own and others' health	5 years 6%, 8 years 5%, 13 years 4%

are based on representative age distributions. As many of the empirical studies were of students with little age range, they included no analysis by age. In the population-based studies, Cropper and co-workers⁴¹ in the USA found that, when considering saving lives, age was positively and significantly related to the implicit discount rates, and suggested in explanation that older respondents perceive lesser likelihood of protection or benefit for themselves in future programmes. Cairns and van der Pol,³⁴ in a multilevel analysis of data obtained in Aberdeen, found that older people employed a lower rate to discount statistical lives but a higher rate to discount community benefit to improve public transport. Olsen's study of saving statistical lives or improving health of hypothetical people in Norway found only a weak and non-significant association with age.³⁰ The findings of these studies are somewhat inconsistent with respect to the possible influences of age on discounting hypothetical lives saved.

Sample socio-demographic attributes: ethnic, educational and social class groups

Cropper's telephone survey in the USA found that blacks had a higher rate of discount than any other racial group for public programmes directed at saving lives, but no significant relationships for gender, education, marital status or income.⁴¹ In a study considering wealth and health, Rose and Weeks³⁶ found that discount rates varied with income, age and education, but not with gender or health status.

Olsen³⁰ in Norway reported an association with educational level for hypothetical lives saved and health improvements; the more highly educated discounted at a lower rate. He also observed lower discount rates among health planners than in a random sample of the public (medians 7% and 17%, respectively, for lives saved at 5 years), although this may have been partly confounded by education, social class or other social factors. Cairns and van der Pol reported no statistically

significant relationship between education and discount rate for private or public monetary gain, or in saving hypothetical lives.³⁴

Perspective of the decision: social versus private rates of discount

Few studies have attempted direct comparison of implied rates of discounting by individuals for themselves and for society^{34,35,39,46} (Table 5). Pope and Perry asked students to choose an "income stream" over a long period (100 years) obtainable from a large capital sum, as if receiving the income both for themselves and on behalf of a public body. Both natural science and business students chose lower rates of discount for public compared with private ownership: 2% and 3% (means), respectively. The rates were low because large sums and long time spans were involved and students were advised that the projections were in real terms, already adjusted for inflation. These findings suggest that in the perception of students a public owner/manager would be less interested in gain over the relatively short term than would a private owner/manager.

Cairns and van der Pol³⁴ attempted a direct comparison of implied rates of discount in private and social financial choices in a postal questionnaire of members of the general population. The study showed little difference, with median implied rates ranging from 14 to 30% for private and from 13 to 32% for social investment, the variation being primarily attributable to time horizons, 2–19 years.

Discounting health and wealth comparisons

The findings of studies that have attempted to estimate discount rates in health are summarised in Table 6. Redelmeier and Heller⁴² asked medical students and doctors to consider three disease states from their own perspectives. The study reported median discount rates of 0% for health: nearly two-thirds of responses indicated no time preference. The study made no comparison with personal discounting of material goods. Ganiats²⁸

TABLE 5 Implied rates of discounting in public compared with private financial decisions

Study	Public discount rate (%)	Private discount rate (%)	Scenario
Pope and Perry (1989) ³⁹	0.5 (median) 2 (mean)	1 (median) 3 (mean)	500 acre farm over 100 years Public or private ownership
Cairns and van der Pol (1997) ³⁴	13–32 (medians) 13–42 (means)	14–30 (medians) 13–41 (means)	Cash receipt for public transport vs for personal use

TABLE 6 Implied rates of discounting in health compared with financial decisions

Study	Health discount rate (%)	Principal explanation of variation	Financial discount rate (%) with comparable question structure
<i>Individual health</i>			
Cairns (1992) ⁴⁰	3, 0 ^a (expediting, postponing health losses)		29, 14 ^a (expediting, postponing financial commitments)
Redelmeier and Heller (1993) ⁴²	3 ^a 0 ^b	Time horizon, Medical condition	–
Ganiats (1997) ²⁸	2–72 ^b (health improvements)	Time horizon	–
Chapman (1996) ⁴⁵	30–500 ^c (health improvement)	Duration of benefit	40–400 ^c
Rose and Weeks (1988) ³⁶	75% chose rate > 40 (health improvements)	Income, education, age	50 chose rate > 40 (lottery wins)
<i>Public health</i>			
Cropper <i>et al.</i> (1992) ⁴¹	4–17 ^b (life saving)	Time horizon, individual	–
Olsen (1993) ³⁰	6–17 ^b (life saving) 7–23 ^b (health improvement)	Time horizon, education level	–
Cairns and van der Pol (1997) ³⁴	16–41 ^b (life saving)	Time horizon	13–32 ^b (public transport)
Cairns and van der Pol (2000) ³⁵	4–6 ^b	Time horizon	–
^a Means. ^b Median. ^c Geometric mean.			

also considered the issue from the individual perspective in a study of randomly selected patients in surgery waiting rooms, and found a wide range of discount rates, from 2 to 72%, depending on time horizon. Patients' rationales for discounting in health were explored through focus groups, and issues discussed included ability to prepare for illness, hope, previous experience and friends' and families' beliefs.

Cropper and co-workers⁴¹ and Olsen³⁰ made estimates of the public discount rate in health. In three large samples in the USA, Cropper found median discount rates of 4–17% depending on time horizon, but also very wide individual variation. "A surprisingly large proportion could not be induced to choose future programs, even if 50 times more lives were saved." High rates of discounting future lives were explained by a perceived need to protect self and loved ones, an expectation that society would figure out another way to save future lives and general uncertainty about the future.

Olsen³⁰ found marginally higher discount rates for health improvement than saving lives (23% and 17% medians, respectively), over a 5-year time horizon. This was interpreted to mean that respondents were more willing for society to forgo future health improvements in favour of those presently in need than to forgo future lives saved in favour of lives now. The rates for life-saving comparisons were very similar to those reported by Cropper.

More recently, Cairns and van der Pol³⁵ reported median discount rates of 6% both for own health and for others' health, using open-ended questions, and 5% and 6%, respectively, using discrete choice questions (over 5 or 8 years' delay). These findings suggest that people discount others' health at nearly the same rate as their own. However, another's health may not be perceived as representing the health of the public.

Few studies have attempted to compare directly implied rates of discounting in health with those

implied in the more traditional area of economic comparison. Rose and Weeks described an exploratory study of 154 patients, physicians and other health workers, presented with simple comparisons of present and future monetary gain (lottery prize) and health gain (10 weeks of relief from chronic back pain).³⁶ Wide variations were found in discount rates for both wealth and health: 50% discounted at > 40% and 5% at < 0% for wealth and 75% and 8%, respectively, for health. These findings suggest that people may discount health gains at higher rates than lottery wins.

Chapman and Elstein⁴⁴ described a similar comparison in a study of students. Discount rates for both hypothetical health improvement and lottery wins varied very widely depending on the magnitude of the benefit (e.g. lottery wins \$200–25,000) and time horizons (6 months–4 years). For larger amounts and over longer delays, rates were comparable: for health improvements approximately 30% and for lottery wins approximately 50% (geometric means). Cairns' comparison of health losses with monetary payments found significantly lower rates for health losses in a sample of economics students: 3% and 0% (means) for expediting and postponing health losses compared with 29% and 14% for expediting and postponing financial commitments. The range of implied rates estimated in this study was narrower than in Chapman and rates were generally lower, perhaps partly because of the longer time horizons. The studies differed also in that Chapman compared gains and Cairns compared losses. Cairns and van der Pol³⁴ reported comparison for statistical lives saved with monies received by communities to improve public transport. Responses from their public sample suggested median discount rates ranging from 16 to 41% for life saving and from 13 to 32% for monetary receipt, depending largely on time horizons. Three of the studies that make direct comparisons between rates for health gain or loss and monetary gain or loss suggest broadly comparable rates, while Cairns⁴⁰ suggests a near-zero rate for personal health losses.

Limitations of previous studies

The studies reviewed show great variation in implied rates of discount, both within and between studies (see *Table 2*). An example of between-study variation can be seen in a comparison of Benzion and co-workers³⁸ and Shelley.⁴³ Both studies investigated the effect of expediting and postponing choices with the same questions and

with student subjects, for example, in payment postponements the means of means (over the same range of amounts and time horizons) were 17% and 11%, respectively. Proportionately wider differences were reported in studies of 'public' discount rates; for example, medians of 2%³⁹ and 13%,³⁴ comparing the values for the longest time horizon (*Table 5*). Examples of within-study variation can be seen in Loewenstein³⁷ and Benzion and co-workers,³⁸ with means ranging from 24 to 96% and 8 to 60%, respectively, although both studied relatively homogeneous samples (students) and used a few simple questions.

Much within-study variation in means or medians is explained by the sums involved (higher rates for smaller sums) and by time horizons (higher rates over shorter times, suggestive of proportional or hyperbolic rather than exponential relationships with time). However, there remains much interpersonal variation, little of which can be explained by age, level of education or social class. For example, Shelley, with a sample of accountancy students, reported standard deviations significantly larger than means for all comparisons of \$200 and 1 year or less.⁴³ Some of this interpersonal variation will be due to real individual differences in time preference. However, most authors considered a proportion, and in some studies a large proportion of responses to be unrealistic, implying that questions (comparisons) were misunderstood or that respondents, including economics and finance students, were unable to perform the necessary arithmetic to arrive at a 'sensible' response. To allow for this, several studies excluded a proportion of outliers; for example, Cairns⁴⁰ dropped four from 29 (14%) and Olsen,³⁰ dropped 35 from 250 (14%) and adjusted seven (3%). Some possible explanations for the variations observed, other than real individual differences in temporal preferences, are discussed in the following paragraphs.

The subject, time preference, itself

Time preference and discounting are complicated issues that are seldom discussed or even considered explicitly by the average person. To investigate individual time preference there are basically two approaches: either to observe and interpret behaviour or to ask subjects to make choices between hypothetical alternatives. The papers reviewed fall entirely into the latter category and are mostly quantitative analysing responses to hypothetical questions. Problems arise in composing questions for use with a general population. It can be difficult to find questions

that are both easily understood and correctly interpreted: a balance needs to be found between simplicity and ambiguity. This is discussed further under 'Question format'. The hypothetical nature of the comparisons sought probably leads to more fundamental difficulties. In essence, respondents are being asked to play a game: they are not actually choosing to buy or sell today or tomorrow, which would be nearer to reality. They are not even choosing to win a lottery prize, gain 10 weeks relief from (chronic) back pain or save 1000 lives, but they are being asked to imagine whether they might prefer to win a lottery prize today or tomorrow, and so on. For many of these hypothetical comparisons, respondents have little or no experience. The scenarios themselves may be unrealistic; for example, it may be unrealistic to construct health choices that involve a 'certainty of ill-health'. Simply telling someone that something is certain is not enough to ensure that he/she will treat it as such, particularly when the 'certainty' is hypothetical.

Scenarios

Ganiats,²⁸ following some focus group discussion, suggested that wide variations in implied rates of discount might depend on the vignettes or scenarios chosen. Attempts to create plausible and simple questions, to elicit comparisons of losses or gains at two different points in time, can lead to unrealistic or unbelievable scenarios; for example, 'a programme saves 1000 lives this year or 1200 next' and describing the programme as say a 'drink/drive campaign' allows respondents to question 'why not both years? The effect could carry over from this year to next', or to think 'it couldn't be so effective' or to become distracted by the scenario away from the comparison '1000 now or 1200 next year'. Olsen³⁰ reported that health planners saw some scenarios as 'out of touch with real life' and 'irrelevant'. Scenarios, perhaps particularly for individual health, may be overly contrived. To create questions comparable with one-off financial gains or losses, studies have asked respondents to imagine 'X weeks of relief from chronic back pain', implying a continuous state of ill-health before and afterwards,³⁶ or 'X days with a (described) depressive illness' and otherwise perfect health before and subsequently until death.⁴⁰ Such scenarios may be both unrealistic and be overly demanding on imagination for many who may have little experience of (chronic) illness.

Reference point and question framing

Reference points may influence intertemporal choice. One theory holds that people evaluate future gains and losses as departures from some

psychologically relevant point of reference, rather than as absolute gains or losses, and that people often regard future consumption options as gains, losses or deviations from some previous or standard level of consumption.²⁹ In some situations the reference point can be affected by the way in which choices are expressed, a phenomenon known as framing. This may be of consequence if subtle changes in presentation can result in significant shifts in response.

Several studies have suggested that people choose different rates of discount when receipts or payments (gains or losses) are brought forward (expedited) or delayed/postponed.^{37,38,40,43} This may be a real feature of time preference when the timing of a contract or agreement is revised. However, when questions are presented in their simplest basic form, either forwards or backwards, as for example '£5000 now or £X in 1 year's time' compared with '£5000 in 1 year's time or £X now', and yield different implied rates, one might question whether some of the differences are attributable to the phrasing of the question. Possibly, the first way round the interest rate can be estimated and added, but the second way round it can only be guessed at. People tend not to recognise relatively simple arithmetic tasks out of context. An example reported by Svenson⁵³ found that even undergraduate students, asked to make judgements of cumulative risk over 1 year, based on three variable component risks over three portions of the year, were unable to estimate a weighted average.

Question format

The simplest question design to elicit a time preference rate asks respondents to choose £X for comparison with £1000 now. It would seem logical to use questions of this type, but it has been argued that choosing a figure to fill a blank may be too demanding for some people, particularly with questions more removed from personal experience, as in health or on behalf of the public. To overcome perceived difficulty for some in choosing a value for X, a number of studies have offered respondents a range from which to select their preferred answer or a VAS to mark.^{39,43} However, offering a range of possible answers can create problems of prompting and central tendency, because, when given a range, respondents tend to select a figure near the centre, as they believe the centre to be the 'correct' answer or to be less risky if they are uncertain about the 'correct' answer.

Some studies sought only a 'bigger or smaller' comparison, such as a choice between saving 100

lives now or 200 in 50 years' time – which is better?⁴¹ This only gives a very crude and one-sided estimate of the implied rate of discount, and requires many questions and/or many respondents to yield a discount rate distribution. A combination of proffered answers and open questions may help to guide respondents towards making their choices. For example, Cairns and van der Pol³⁴ gave the option of selecting from a list or choosing their own value. Olsen³⁰ asked respondents to make the binary comparison (A or B better) as an opener and then to estimate how large they would consider B to be to balance A.

Study populations

Many previous studies have been of students.^{37–40,43,45} These accessible samples were limited in range of age, class and educational level, and therefore results obtained from student samples should not be generalised to represent the preferences of the general public.

Furthermore, students in classroom situations could be simply returning taught answers. An example to illustrate this point is the study of resource depletion, in which natural science students were found to have lower rates of discount than business students.³⁹ It would not be surprising if natural science students were taught to protect the environment for future generations (a lower rate of discount) and business students taught to seek a rate of return on capital competitive with comparable (competitor) businesses (a higher rate of discount). If it were true that students return a taught response, the questions would successfully distinguish natural science from business students, but implied rates of discount from such studies may provide little guide to underlying or natural time preference.

Redelmeier and Heller⁴² studied discounting in health with medical students and doctors. This sample selection may have advantages for comparisons of different states of health, as doctors would recognise the medical conditions described, but the study does not make comparison with how doctors would discount material goods.

Personal circumstances and experiences

The issue of the extent to which respondents call on their own personal circumstances when answering

hypothetical questions deserves consideration. This is inevitable and is difficult to control for, as details of relevant personal circumstances may not be known to the researcher.⁴¹ Although simple demographic characteristics, such as age, gender and occupation, may be sought, the researcher is unlikely to know of important individual details that could strongly influence responses to certain questions, such as the loss of all savings through a third party's bankruptcy, a religious conviction against gambling of any kind, loss of a spouse in an aeroplane accident or caring for a handicapped child. Several researchers have suggested that health status could influence perception of future gains or losses, particularly in health but also in wealth. To some extent the influence of personal experiences may be averaged out in studies that include sufficiently large samples and that record people's views, regardless of why they hold their views.

Self-report

The true validity of self-report may be open to question. Nisbett and Wilson⁵⁴ refer to a “public theory”, in which people store ideas about what is generally believed about a situation or issue. It is possible that respondents may answer what they think they should believe, rather than what they actually believe. This may be particularly prevalent when people are questioned about a serious issue about which they know relatively little, such as discounting. Further difficulties may arise when researchers attempt to discover the reasoning behind respondents' decisions. There is some discussion over whether reports of inner processes can be accurate. Self-perception theory presents a sceptical view that, whatever internal information is available, a person cannot make use of it in self-report and therefore that it would be futile to question someone about his/her reasoning behind a decision.⁵⁵ The view that implies that people are no more aware of their own decision processes than an observer would be is controversial. Others have argued that verbal reports can be treated as data.^{56–58} Wright and Rip⁵⁶ make some suggestions as to how respondents can be motivated to report accurately. The interview should be conducted by a stranger, should assure confidentiality and should seek to avoid embarrassment, interrogation and manipulation of responses, and should avoid making the respondent feel that his/her intelligence or wisdom is up for assessment.

Chapter 4

Empirical estimate of implied rates of discounting

Study objectives

The three principal objectives were:

- to enquire whether people discount the future at different rates depending on whether they are making decisions on behalf of society or for themselves as individuals
- to enquire whether implied discount rates differ between health and wealth appraisals
- to see whether members of the general public and health professionals discount differently in either private and social or health and wealth appraisals.

Design

The study was based on structured interviewing of random samples of the public and of healthcare professionals. A structured interview rather than a self-completion postal questionnaire was chosen as the method of approach to optimise response rates, reduce socio-economic bias and maximise quality of response.⁶⁰ It has been suggested that skilled interviewers can establish a good rapport and thereby obtain an atmosphere more conducive to considered answers. Against this must be balanced possible disadvantages of using one-to-one interviews, including a possibility that respondents feel obliged to provide socially desirable answers rather than their own views. However, the issue of discounting and the concepts underpinning the questions in this study were relatively difficult and the findings of previous studies imply that interviewing would be more appropriate than postal questionnaires. One previous study of discounting in health used structured interviewing, but the study interviewed only health professionals.⁴²

The structured questionnaire or interview schedule had four sections. The first section consisted of questions concerning money (or goods) from the perspective of the individual, since this is the origin of discounting. The second section comprised questions concerning health from an individual's perspective. The third and fourth sections contained questions on money (or goods) and on health from the societal

perspective. To estimate the rates of discounting, participants were asked to make comparisons between money (or goods) or states of health now or at some time in the future. These were in the form of either gains or losses, and not purchases or exchanges. This was to ensure that comparisons were simply over time and not affected by individual variations in relative values between goods. Thus, individuals were asked to make comparisons between a given number now and another number at some time in the future. The length of time into the future and the magnitude of the good or health state were varied between and within questions.

Sample

The study was conducted on two samples: the general public and health professionals, including care givers, managers and planners. A random sample of the population was chosen to provide views of discounting more representative than the student samples that have been used in most previous studies. A sample drawn from the general population also allows examination of variations by age, gender and social class, subject to the usual statistical considerations. The health professionals sample was included because it has been suggested that health professionals, including doctors, nurses and professions allied to medicine (PAMs), make judgements of health states and of the costs and benefits of treatments (healthcare interventions) differently from patients or potential patients. Health service managers and healthcare planners were included to see whether their judgements of both health and non-health issues were more considerate of society's views, compared with those of the general public.

The study planned to sample 400 members of the public aged over 18 years, drawn at random from the electoral register in the former county of South Glamorgan, and 200 health professionals drawn at random from the same area. South Glamorgan has been shown in recent censuses to be representative of the population of England and Wales in terms of age and social class distributions, with a local economy comprising primary production, construction and service

industries, and with urban and rural areas. Enumeration districts (EDs) were selected with probability proportional to the latest population estimates to ensure a sample socio-economically representative of the whole county, and samples of names and addresses were drawn at random from each ED.

Questionnaire development and piloting

The experience, findings and limitations of previous studies, identified in the literature search, were taken into consideration in questionnaire design and development. A set of eight to ten questions of gain or loss comparisons was drawn up for each of the four sections. These were discussed between members of the research team and tested on colleagues. After revisions and rewordings, six questions for each section were prepared for piloting in a more representative sample. Questions included only two units, a good and a time, so that comparisons would reflect only time preference (for the good). Questions were not of purchases or exchanges of different goods, to avoid contamination of a time preference effect by a relative values effect.

A detailed pilot study was undertaken to aid development of the questionnaire. Twenty-eight individuals, chosen to be representative of four broad age groups and two broad social class groups (working and middle class), were interviewed individually for about 1 hour each. In these interviews discounting was introduced without use of jargon. Participants were asked how they felt about the issues of discounting and about related topics: saving money, deferring debt, present and future health, the concept of society, the future of society and who should make decisions on behalf of society. They were taken through the pilot questionnaire slowly, and asked about their comprehension and decision processes on answering each question. They were also asked for suggestions for improvement to aid comprehension, reduce ambiguities and simplify comparisons. Interviews were tape recorded to facilitate recall, interpretation and analysis.

The pilot study suggested that participants tended to consider the subject matter of the question and so become distracted from the numerical comparison. For example, in question 4 (see Appendix), participants may believe that compact discs (CDs) will be replaced by minidiscs in 10 years' time and therefore that no number of

CDs then would equate to a given number now. In the case of question 10, participants may hold the view that council houses should not exist in the first place and so the more destroyed by fire the better. Some respondents also described a 'dread element' in questions involving loss, especially concerning loss in individual health (see questions 5–8), in which they considered the anticipation of the event as well as the event itself. The pilot study also indicated some potential for confusion over time spans, for example considering a gain or loss over a period (of 5 years) rather than a one-off gain or loss (in 5 years' time), as noted by Olsen.³⁰ A balance needs to be reached between a scenario that is plausible and a simple wording so that the question, comparing an event now with an event in the future, is easily understood. A final draft of the questionnaire was developed, taking into account lessons learned from the pilot and from the experiences of previous studies in the literature review. A copy of the questionnaire can be found in the Appendix.

The basic design of each question sought comparisons of a future value X with a given present value. Respondents were asked to choose a number X at a given time in the future that would, in their opinion, be equivalent to a given starting value in the present. However, to make the choice of the number X easier, the request for an equivalent future value was taken in two stages.

1. Respondents were asked whether winning a given value, for example £1000, now (option a), was better or worse than an offered figure, say £1200, at some time in the future, say 2 years (option b), on a five-point scale; (a) much better, better, similar, worse or much worse than (b).
2. Leading on from this, they were asked to estimate a value of X that in their opinion would be equivalent to the given starting value now. They were not offered a set of possible figures from which to select an answer, to avoid problems of over-prompting and central tendency.

The final draft questionnaire was piloted in field conditions by two experienced consumer research interviewers. Thirty-five field pilot interviews were conducted with members of the public in their own homes, as planned for the main study (see below). The field piloting showed some continuing difficulty over identification of the task set, that is, the comparison of two values at two different points in time. The interviewers used a common practice of structured interviewing by offering possible responses to the simpler starter question 1 on an

answer card (much better, better, similar, worse, much worse), but gave no assistance with part 2, choosing X , which was the more difficult part of the question to answer.

A further field piloting was undertaken with the use of simple prompt cards, which displayed the skeleton of each question. The skeleton was kept simple, for example, with question 1:

£1000	or	£1100
Now		in 1 year's time

These prompt cards, summarising in writing the first part of each question 1, provided a framework for the comparison in the second part 2 to choose X in place of the offered or suggested £1100. The prompt cards were kept in view throughout the asking and answering of the second part of the question. Although presenting the figures of the starting comparison may act as a prompt, it was considered to be less forcing than displaying a range of values, from which one answer was to be selected. These prompt cards, with the skeleton of the question, greatly assisted respondents in holding the comparison in their minds for their own choice of X .

The final questionnaire comprised 16 questions in total, four in each section: individual money (or economic goods), individual health, societal money (or goods) and societal health, selected from a larger pool, to keep the whole interview relatively short. The values used in the questions were varied in three ways: magnitude of sums involved, time scale and implied discount in the offered starter comparison. For example, with question 1, the starting value was either £1000 or £5000, the timescale was either 1 or 2 years and the comparison figure was £1100 or £1200, if the starting value was £1000, and £5500 or £6000, if the starting value was £5000. These variations were to examine whether the sums involved (smaller or larger), the timescale (shorter or longer) and the offered implied discount rate influenced answers.

Study management

A briefing session was held for all interviewers involved in the study. The background to the study was explained, the questionnaire was described and interviewers were taken through the fieldwork protocol. Interviewers were given lists of

15 names and addresses from each selected ED and asked to obtain seven or eight interviews from each ED. Interviews were conducted at different times of the day, evening and weekends to minimise bias in response, and three calls were made before a potential respondent was regarded as a non-contact. A 10% telephone check was made on each interviewer's work to ensure that interviews had taken place. A research officer also accompanied a limited number of interviews for quality control and to obtain a clearer picture of how the questionnaire was working in the field.

The health professional sample comprised subsamples including doctors, nurses, psychologists, physiotherapists, occupational therapists, dentists, health service planners and administrators. The subsamples were selected at random with the cooperation of professional leads; for example, for hospital doctors, the clinical director, to include all grades; for example, senior house officers, specialist registrars, consultants and academics. Professionals were approached first by telephone and those who were willing to participate agreed a time and place with the interviewer for the interview.

The interview schedules were coded, entered into a data file and checked for validity. The data were analysed using the Statistical Package for the Social Sciences (SPSS). Discount rates were imputed for each of 16 comparisons from respondents' chosen value of X , using the formula

$$1000 = X \left(\frac{1}{1+r} \right)^t$$

where the chosen value X at time t is compared with a starter value of 1000 at time 0 and r is the discount rate. Mean, median, range, and 10th and 90th percentiles were calculated for each question. Responses of the two samples, public and professional, were compared for similarities and differences. Implied discount rates for financial and health questions and for individual and societal questions were compared, and the statistical significance of differences examined by non-parametric tests. Potential associations with question variables, sums involved, time horizons and proffered discount rate, and with personal characteristics, including age, gender, social class and long-standing illness, were examined by multivariate analysis. Age was grouped by decade. All other potential explanatory variables were entered as present or absent (as dummy variables); thus, for example, sums involved were either larger or smaller. Simple linear models were

examined, with threshold level of significance for variable entry set at $p = 0.05$. Given the large number of potential interaction effects and in the absence of any a priori justification for including these, interaction terms were not used in the models estimated. Multivariate analysis was undertaken on the 16 questions independently and not on comparisons between questions or on groups of questions.

Results: characteristics of samples

Completed interviews were obtained with 385 members of the public and with 180 healthcare professionals in the former county and health authority area of South Glamorgan. The personal characteristics of respondents are summarised in *Table 7*. The public sample was compared with 1991 census data for the population of South Glamorgan. The sample was slightly under-represented in the youngest age group (18–24 years) (compared with 13% aged 16–24 years in the census) and over-represented in the two oldest age groups (9% and 7% in the census, respectively), among women (52%), married (44%), widowed or divorced (13%) and retired (37%). This reflects availability at home. Although the interviewers called at various times of day, mothers of young children and older and retired people are more likely to be at home, even in the evenings. The sample nevertheless represents a broad range of age, gender, marital, educational and employment status, and should reflect the variety of views of a general population. Social class was recorded according to the market research classification, by the market research team that undertook the interviewing. This was not directly comparable with the Office of Population, Censuses and Surveys (OPCS) social classifications used in the 1991 census and therefore a direct comparison for South Glamorgan was not possible. However, comparison with proportions for the UK as a whole (AB = 21%, C1 = 28%, C2 = 23% and DE = 28%) showed the public sample to be broadly representative. Thirty-five per cent reported some long-term illness or disability.

The health professional sample included none aged over 65 years, more young people (16% ≤ 24 years) women (66%) and single people (37%), many more with college of further education (FE) or university qualifications and in social classes A, B and C1. The two largest groups of health professionals interviewed were nurses (the largest professional group employed in the NHS) and doctors; others included psychologists, physiotherapists, dentists,

TABLE 7 Personal characteristics of public and health professional samples

	Public (n = 385)	Professional (n = 180)
Age (year)		
18–24	30 (8%)	28 (16%)
25–34	59 (15%)	57 (32%)
35–44	81 (21%)	54 (30%)
45–54	53 (14%)	31 (17%)
55–64	47 (12%)	10 (22%)
65–74	52 (14%)	0
75 +	63 (16%)	0
Gender		
Male	164 (43%)	60 (33%)
Female	221 (57%)	119 (66%)
Marital Status		
Single	86 (22%)	66 (37%)
Married or equivalent	195 (51%)	102 (57%)
Widowed/divorced	99 (26%)	9 (5%)
Working status		
Full time (>30 h/week)	116 (30%)	138 (77%)
Part time (≤ 30 h/week)	38 (10%)	18 (10%)
Unemployed	20 (5%)	0
Student	17 (4%)	20 (11%)
Retired	189 (49%)	0
Last full-time education		
Secondary (age 15)	198 (51%)	9 (5%)
Sixth form	54 (14%)	2 (1%)
FE college	66 (17%)	41 (23%)
University	44 (11%)	56 (31%)
Postgraduate	17 (4%)	70 (39%)
Social class based on occupation of chief earner		
AB	63 (16%)	97 (54%)
C1	130 (34%)	73 (41%)
C2	69 (18%)	6 (3%)
DE	119 (31%)	4 (2%)
Health status		
Very good	116 (30%)	93 (52%)
Good	153 (40%)	78 (43%)
Average	77 (20%)	9 (5%)
Poor	29 (8%)	
Very poor	9 (2%)	

occupational therapists, health service administrators and planners. Nearly all those classified as students were nurses in training and the few respondents with secondary or sixth form qualifications were mostly in secretarial or administrative supporting roles. Nineteen per cent reported some long-term illness or disability.

Imputed discount rates: overall statistics

The imputed discount rates for all 16 questions derived from both the public and professional

TABLE 8 Imputed discount rates

Question	Public sample (n = 385)							Health professional sample (n = 180)						
	N	Mean	Median	Min.	Max.	Percentiles		N	Mean	Median	Min.	Max.	Percentiles	
						10	90						10	90
1. Private gain and money	325	7.67	5.00	-98.00	400.00	-10.22	22.47	172	10.54	9.54	-70.00	100.00	0.00	26.49
2. Private loss and money	304	12.08	9.86	-27.52	115.44	0.00	25.99	172	13.87	12.47	-60.19	101.23	0.00	31.95
3. Private gain and holiday	294	6.86	5.24	-19.73	46.14	0.00	18.47	164	7.39	6.09	-12.94	31.95	0.00	18.47
4. Private gain and CDs	301	12.15	8.78	-55.28	246.41	0.00	41.42	169	18.46	10.67	-36.75	216.23	0.00	41.42
5. Private gain and flu-free days	287	22.47	7.72	-80.00	200.0	0.00	76.80	160	20.70	6.99	-50.00	200.00	0.00	50.00
6. Private loss and days in hospital	297	2.92	0.00	-38.68	56.51	-2.75	10.67	162	3.35	0.00	-33.13	41.42	-5.43	18.92
7. Private loss and risk of death	254	0.03	0.00	-24.81	26.31	-2.01	2.92	159	0.06	0.00	-43.47	25.89	-3.97	5.24
8. Private loss and long-term illness	295	5.63	4.73	-21.40	55.18	0.00	14.87	171	4.12	2.74	-12.94	43.10	0.00	11.17
9. Social gain and money	296	5.35	4.56	-58.37	82.06	-3.66	17.61	170	8.05	7.18	-55.47	298.11	-2.84	17.34
10. Social loss and public housing	294	1.88	0.92	-14.87	25.89	0.00	7.18	160	2.75	1.84	-8.76	25.89	0.00	7.18
11. Social loss and money	301	17.70	9.54	-29.29	491.61	0.00	41.42	172	15.77	9.54	-16.74	274.17	0.00	34.16
12. Social provision and hospital beds	309	0.05	0.00	-58.51	44.22	-2.53	6.12	160	1.36	1.18	-89.13	44.22	0.00	12.25
13. Social loss and deaths	297	1.28	0.00	-71.16	81.71	0.00	6.27	165	1.81	0.00	-41.52	58.74	0.00	10.41
14. Social gain and deaths	294	9.85	2.41	-95.53	231.66	0.00	24.48	168	6.49	0.00	-68.38	77.85	0.00	25.74
15. Social loss and long-term illness	293	3.54	0.96	-40.43	61.54	0.00	9.86	157	3.90	1.84	-12.94	37.97	0.00	11.61
16. Social gain and hospital waiting list	279	0.67	0.00	-47.81	41.42	-2.21	4.14	155	-1.55	0.00	-49.64	11.61	-19.11	7.18

samples are summarised in *Table 8*, which shows the minimum and maximum, interdecile range, median and mean values. The response rates for each question were somewhat higher in the health professional sample than in the public sample: median 93% and 77%, respectively. The response rates varied from question to question: the first (a premium bond win) recorded the highest (96% and 84%, respectively) and the seventh (on risk of death) the lowest: (88% and 66%, respectively). These variations imply that people found some questions more difficult to answer.

There were wide variations in imputed discount rates among responses to all questions, as observed in previous studies (Chapter 3). For example, in question 2 (private loss of money) discount rates ranged from -28% to 115% in the public sample and -60% to 101% in the professional sample. The 10th and 90th percentiles also indicate the breadth of the distribution, 0 to 26% and 0 to 32%, respectively. Negative values arose when people chose higher current values than future ones. However, this finding, that some people appeared to apply negative discount rates, should be interpreted with caution. While it may be possible to rationalise a negative discount rate in a social or health context, it is difficult to see why people would give up more of their own money or goods now in return for less in the future, unless these people are expecting a decline in their disposable incomes over time.

Although there may be little expectation of the analysis finding 'true' discount rates, the extent of the variation in responses does prompt the question of whether these represent plausible discount rates. Possible explanations for wide distributions and some negative values include misunderstanding questions (the comparisons to be made) and relative lack of numeracy (to express comparability). However, there was some correlation between discount rates implied by answers to each question; that is, for many pairings of questions people who discounted one highly, also tended to discount the other highly, implying a degree of consistency. Among 120 comparisons, 27 were significantly correlated at $p < 0.01$ (or 38 at $p < 0.05$) in the public sample and 17 (or 31), respectively, in the professional sample. Despite wide interpersonal variations, the rankings of median discount rates of the 16 questions were very similar in the two samples, although health professionals tended to discount the future more than the public. To check for consistency in the findings, means,

medians and ranks were re-examined after various truncations, removing bottom and top deciles, removing negative values, removing negatives and an equivalent proportion from the upper tail of the distribution. The truncations altered means and medians relatively little and rankings barely at all. It was concluded that despite interpersonal variation there is consistency in the findings.

Private and public discount rates

The data show that respondents in both public and professional samples discounted private gains/losses differently from social ones. This relationship is evident by a simple comparison of the top and lower halves of *Table 8*. Six of the top-ranking eight discount rates were in the top half and related to private gains or losses. For both samples, in 43 of 64 (8×8) comparisons between questions the private rates were significantly greater than the public rates (Wilcoxon). Exceptions were questions 9, an unconditional grant from the European Union and 11, a fine due to the European Union.

In both private and public questions there was a tendency for health professionals to discount more than the public in general. The median discount rates applied in questions 1-4 (private gain/loss concerning money or goods) were 5.0-9.9% in the public sample and 6.1-12.5% in the health professional sample. In questions 9-12 (public gain/loss concerning money or goods), the corresponding discount rates were 0-9.5% and 1.2-9.5%.

Health compared with financial discount rates

Both public and health professional samples discounted health-related scenarios at lower rates than finance-related scenarios. Again, six of the top-ranking eight median discount rates were in finance-related questions, and in 47 of 64 (8×8) comparisons between questions the financial rates were significantly higher than the health rates in the public sample, and similarly in 52 of 64 in the health professional sample (Wilcoxon). For private health-related questions (questions 5-8), the public applied discount rates of 0-7.7% (median) and health professionals' rates of 0-7.0%: the only high median rates were for flu-free days (question 5). The lowest discount rates applied, by both samples, were those in health-related

questions concerning society, with median discount rates of 0–2.4%. The medians were zero for two questions on private health (questions 6 and 7) and three on public health (questions 13, 14 and 16). These findings lend support to the notion that people are less willing to trade amounts of serious illness or loss of life into the future than they are to trade in money or goods.

Factors influencing discount rates: question form

Potential determinants of imputed discount rates were examined in multivariate analysis. Variables entered in the model included three features of the questions (sum involved, time span and proffered comparison value) and nine personal characteristics of respondents (Table 9). The findings of these analyses for all 16 questions are summarised in Tables 10 and 11 for the public and health professional samples, respectively. The tables show standardised regression coefficients (β) for those relationships that are statistically significant at $p < 0.05$, and those significant at $p < 0.01$ are shown in *italic*. For most questions multivariate analysis selected between two and four explanatory variables and the proportions of variance explained (r^2) were low (< 0.2).

TABLE 9 Modelling of implied rates of discount: potential explanatory variables (with comparator variable in bold)

Sum (amount) involved: lower , higher
Time span: shorter , longer
Rate (offered): lower , higher
Sex: female , male
Age: 18–24 , 25–34, 35–44, 45–54, 55–64, 65–74, 75–
Marital status: single , married, separated or divorced or widowed
Employment: full-time , part-time or unemployed or student, retired
Social class: AB , C1, C2, DE
Education: secondary, sixth form or college of further education , university
Number of children
Health score: very poor , poor, average, good, very good
Disability (long-standing): no , yes

Three aspects of question structure were analysed: the sums involved, the time span over which comparisons were sought and the starter discount rates, as implied by the future comparison amounts offered. For example, in question 1, £1000 or £5000, 1 year or 2 years and nearly 5 or 10%. There was some evidence that people applied lower discount rates the longer the period

TABLE 10 Modelling of implied rates of discount, public sample: standardised regression coefficients (β) of explanatory variables entered

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
r^2	0.07	0.16	0.05	0.13	0.10	0.06	– ^a	0.16	0.07	0.07	0.06	– ^a	0.02	0.04	0.02	0.03
Sum					<i>–0.17</i>				<i>–0.14</i>							
Time		<i>–0.12</i>		<i>–0.25</i>	<i>–0.22</i>			<i>–0.31</i>	<i>–0.19</i>	<i>–0.21</i>	<i>–0.22</i>				<i>–0.14</i>	<i>–0.14</i>
Rate		<i>0.20</i>		<i>0.22</i>		<i>–0.13</i>		<i>0.20</i>								
Gender	<i>0.12</i>		<i>0.12</i>						<i>–0.12</i>							
Age	<i>–0.21</i>															
Marital status				<i>0.12^b</i>												<i>0.13^c</i>
Employment		<i>0.27^d</i>		<i>0.13^d</i>							<i>0.12^d</i>					
Social class		<i>–0.23^g</i>	<i>–0.22^g</i>					<i>0.14^e</i>		<i>–0.12^f</i>			<i>–0.15^g</i>	<i>0.15^f</i>		
Education		<i>0.15^h</i>														
No. of children	<i>–0.22</i>									<i>0.13</i>				<i>0.12</i>		
Health						<i>–0.16</i>										
Disability						<i>0.30</i>										

Negative signs denote lower rates than the comparator group. Significant ($p < 0.01$) in *italic*, others $p < 0.05$.

^a No model selected.
^b Married.
^c Widowed.
^d Part-time.
^e Social class C1.
^f Social class C2.
^g Social class DE.
^h Secondary.

TABLE 11 Modelling of implied rates of discount, professional sample: standardised regression coefficients (β) of explanatory variables entered

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
r^2	0.03	0.09	0.05	0.17	0.20	<i>-^a</i>	<i>-^a</i>	0.23	0.08	0.04	0.04	0.06	<i>-^a</i>	0.13	0.06	0.04
Sum																<i>-0.20</i>
Time				<i>-0.22</i>	<i>-0.15</i>			<i>-0.41</i>		<i>-0.19</i>	<i>-0.19</i>					
Rate				<i>0.25</i>											<i>0.23</i>	
Gender																
Age		<i>-0.21</i>			<i>-0.31</i>							<i>-0.17</i>		<i>-0.25</i>		
Marital status				<i>-0.20^b</i>				<i>-0.16^c</i>								
Employment	<i>0.18^d</i>														<i>0.20^d</i>	
Social class																
Education								<i>-0.17^f</i>	<i>0.25^e</i>			<i>-0.18^f</i>				
No. of children		<i>0.15</i>	<i>0.22</i>	<i>-0.26</i>	<i>0.32</i>											
Health									<i>-0.16</i>							
Disability		<i>0.19</i>														

Negative signs denote lower rates than the comparator group. Significant ($p < 0.01$) in italic, others $p < 0.05$.

^a No model selected.
^b Married.
^c Widowed.
^d Part-time.
^e Secondary.
^f University.

being considered. Time was the factor most commonly included in the multivariate model, in nine of 16 questions in the public sample and five of 16 in the health professional sample. The standardised slope (β) in questions where time was significantly associated averaged -0.22 . However, it was not significantly associated in either sample in seven questions.

There was little evidence that people used lower discount rates when larger amounts or sums were involved: two of 16 questions in the public sample and one question in the health professional sample with average $\beta = -0.17$. In four questions in the public sample and three in the professional sample, answers were significantly associated with the starter discount rates, as implied by the offered future comparison; that is, a higher rate of discount when a higher future figure was offered. When data were fitted to models with only the above three factors (i.e. excluding personal characteristics), more associations with these three potential explanatory factors were significant.

Factors influencing discount rates: personal characteristics

There appeared to be few significant relationships between the personal characteristics considered and imputed discount rates. There was some effect of

age in four questions in the health professional sample, with younger people discounting more highly, but in only one question in the public sample, which had a wider age distribution. There were three associations with gender in the public sample in financial questions and none in the professional sample, implying that men and women generally discount health and wealth outcomes at similar rates. Social class was significantly associated for six questions in the public sample, and for four questions classes C2 or DE recorded lower discount rates than AB, the comparator group. There were three significant associations with level of education in the professional sample, suggesting lower rates among the more educated, but less association was seen in the public sample, with a wider range of educational level represented.

There were significant associations between employment status and discount rate in five questions, with part-time workers or students discounting at higher rates than those in full-time work. People with more children tended to apply higher discount rates than those with fewer children in three questions in the public sample and four in the professional sample.

Respondents' health status or long-term illness or disability appeared to have little influence on implied discount rates: significant associations were observed only in questions 2, 6 and 9.

Interpretations

Theoretical considerations

The fundamental assumption that underpins this method of empirical enquiry is that humans adopt a utility-maximising approach to decision-making. This form of rationality assumes that people weigh up the costs and benefits of each choice that is on offer, and opt for that which maximises the net benefit or minimises the net cost. Perhaps even more fundamental is an assumption that choices are necessarily made using a cognitive process.

While interviews such as the ones conducted in this project are likely to encourage a cognitive response to decision-making, it is not necessarily the case that people will apply such logic to choices that they are rarely asked to consider. It may be particularly problematic for the average person to apply a rational approach to making decisions about health when they lack experience of thinking about these decisions in their everyday lives, unlike many financially based decisions. An alternative explanation may be found in the affective responses, which are typically augmented in healthcare situations, where experiences are often extraordinary and sometimes concern matters of life and death.

This caution is made to guard against a naive assumption that people, especially the general public, are exemplars of rational choice. In many situations there may be emotional and structural reasons for the decisions they articulate. Furthermore, it points to the care that needs to be taken to avoid simply reading the responses of the general public as being illustrative of what they would ordinarily do in real life. Behavioural decision theory suggests that preferences are often constructed rather than revealed, which may give more weight to social desirability in the answers than to personal beliefs.⁶¹ The health professionals may be more likely to exhibit this form of rationality as a result of their occupational exposure to the notion of social desirability.

Studies of the standard gamble have revealed problems of assuming the application of expected utility theory. Llewellyn-Thomas and colleagues⁶² and Schoemaker⁶³ have shown the way that people violate the axioms of this theory. Froberg and Kane,⁶⁴ found utility maximisation to be the exception rather than the rule for the tasks explored in a study of health state preferences, mainly for reasons relating to risk aversion. Gains and losses also may be perceived unequally: Kahneman and Tversky⁶⁵ found that pain from

loss was more intense than pleasure from gain. Read and colleagues⁶⁶ found that the task itself may influence other stimuli, such as recall of past experiences, selection of reference points and emotional reactions. An important point made by Froberg and Kane⁶⁷ is that when respondents do not know the answers to questions about preferences or have difficulties articulating their answers, they are more likely to be influenced by the elicitation procedures.

This leads to consideration of the contextual parameters of the research and how these may influence or guide the production of a response, the so-called framing effects. A wide range of implied discount rates in this study and in previous studies begs the question of whether the research questions are intelligible and comprehensible to the respondents. At first acquaintance, the questions are abstract and remote from normal daily activities and some may raise uncomfortable ethical dilemmas.

There are limits to the interpretation of responses to structured questions without studying the comments that accompany performance of the tasks. To pursue the cognitive processes that are being followed, more probing interviews may ask a sample of respondents to explain their reasoning after responding to each question. This type of assisted response was included by Robinson and colleagues⁶⁸ in a comparison of VAS and time trade-off questions. They concluded that there were three issues that led people to provide unexpected or apparently irrational responses. One of these was the particular interpretation that people made of the questions, which led some to ignore the time duration of the state when using the VAS. The second issue was to do with a threshold effect, such that people were unwilling to trade unless the state dropped below a certain level of tolerance, and even then some were quite reluctant to play the game at all. The final issue was to do with the plausibility of the scenarios that were presented, such that some were adamant that certain questions posed unrealistic situations.

There can be a problem of a labelling effect when using highly specific rather than general examples, especially when the example is thought to be unrealistic. In other words, people can think more about the actual scenario and judge whether or not it makes sense to them than about making a choice. This can include taking into account possible future technological or scientific improvements. Cropper and co-workers⁴¹ reported that people's choices reflected current certainties

and future uncertainties and assumptions that society would find solutions that were not currently available. People's personal circumstances, such as ability to cope in the future with the example scenarios may also come into their calculations.

Limitations of the method

The structured interview schedule was designed to take account of problems encountered in previous empirical studies of implied rates of discounting. It developed through several pilot stages to minimise ambiguities and to maximise comprehensibility. The final question structure, a comparison of X in t years' time with 100 now, was standard throughout the schedule for all questions, whether of financial or health choice and whether involving private or public decision-making. All questions were based on simple gains or losses and not on purchases or investments, to examine only time preference and to avoid relative valuations between goods. The risk of death (of an individual) was presented as 300 per million (rather than, for example, 1:3000) to maintain symmetry or direction; that is, that 350 per million is a bigger risk. This structure introduced a degree of artificiality: in real life choices are more often of purchases (buy now, pay later), or investments (save now, consume later) or of alternatives (smoke and drink or go for a run).

A few respondents commented on unrealistic simplicities in the questions and some may have felt that they were being asked to "participate in a game of little consequence".⁶⁹ Question completion rates suggest that a number found difficulty in making quantitative choices, although they had been assisted by the introductory 'greater or less' opening to each question. The median response rates per question among respondents who agreed to take part in the study were 92% in the health professionals sample and 77% in the public sample. The poorest response was in the question on individual risk of death (question 7). The question format, designed for use with respondents ranging in education from primary to postgraduate, attempted to strike a balance between comprehensibility and oversimplicity.

The study was conducted as a structured interview, rather than as a self-administered questionnaire. Interviewing has advantages in volunteer studies of improving response rates and completion and, with many respondents, comprehension, but at the expense of introducing a possible interviewer bias.

A structured interview schedule should minimise interviewer/respondent interaction; however, the pilot studies, some comments by respondents and interviewers and researchers' observations of interviews suggest that some considered the topic, discounting, to be a complex issue, which required some explanation and/or assistance beyond the structured question. It is possible that interviewers could have given help beyond the structure of the interview and prompted answers. However, the number of unanswered questions, varying from question to question, suggests that this was not common. If anything, the interviewers may have erred on the side of keeping strictly to the schedule and thereby giving too little help.

It is possible that interview schedule design, question format and interviewer presentation gave respondents clues as to the results that the research was seeking.⁷⁰ Question design attempted to minimise this by, for example, not presenting a selection of answers from which the respondent should choose. However, the opening comparison (e.g. 1000 now or 1100 in 1 year) could have acted as a partial prompt. Another consideration is that some respondents may have felt that they were being assessed in terms of social desirability;⁷¹ when asked to consider the future on behalf of society they were being invited to be 'socially minded'. To minimise such possible biases, the public questions were designed to be as comparable as possible with individual questions; for example, a win (or a loss) now or in the future to a single beneficiary.

Advances made by this study

The majority of previous empirical studies were of students.^{37-40,43,44} Such studies were inevitably unrepresentative with respect to age, educational attainment and social class. Furthermore, student responses were likely to reflect teaching; as reported, for example, in the comparison of implied discount rates of business and environmental science students.³⁹ The present study intentionally sought the opinions of more generally representative samples, which imposes greater challenges in study design and implementation. It is more difficult to develop questions that are comprehensible and meaningful when presented cold to unprepared volunteers, than it is to choose questions that work with students who have been taught about the theory of discounting. Only three previous studies and one contemporary study representative of general populations have been identified.^{30,34,36,41} Olsen

made the additional comparison of health professionals with the general public, as in the present study. The most relevant comparisons, therefore, are with these three population-based studies. However, those studies used different methods: Cropper in the USA used telephone interviewing, Olsen in Norway delivered questionnaires, and Cairns and van der Pol in Scotland used postal questionnaires. To the authors' knowledge, the present study is the first to use structured interviewing of a public sample.

Most studies have reported wide variations in imputed discount rates and, to clean the data and facilitate interpretation, many have excluded a proportion of outliers. Variation may in part represent real individual differences in discounting, attributable to individual preferences or to personal circumstances, such as age or health status.^{34,41} However, variation may also indicate misunderstandings and inability to make numerical comparisons,⁵³ which provides some justification for the removal of outliers. Feedback from interviewers and researchers' observations of interviews suggests that interviewers could sense when answers were based on reasoned calculation, guesswork or return of the proffered starting values. Interviewer-assessed confidence factors could be incorporated to identify more reliable answers and estimates. The more detailed qualitative findings of the pilot studies suggest that discussion over the implications of a

provisional chosen answer could lead to its revision and thereby reduce the frequency of unrealistic responses. While a few questions in the present study yielded high upper values, for example individual loss (question 4), individual flu-free days (questions 5) and a community fine (question 11), with 90th percentiles of 77%, 41% and 41%, respectively, in the public sample, others have found even higher values. Cropper and co-workers⁴¹ reported that many respondents could not be induced to choose any future option, whatever the suggested increased value.

The study identified a role for some in-depth interviews. These would be valuable in exposing the cognitive processes that respondents followed in answering the questions. More detailed interactive interviewing was used in the pilot phase, to help to develop the structured interview schedule (questionnaire), but this was not extended to the main study. These more open and extended interviews, with 24 people in the pilot study, provided some understanding of an average cognitive process and helped in the interpretation of the findings of the main study. These observations suggest that some respondents found a number of difficulties with the methodology and the abstract nature of the tasks, which might have been overcome by more guidance and prompting from interviewers. However, more guidance on the questions could have led to respondents providing 'desirable answers'.

Chapter 5

Conclusions, recommendations for further research, and implications

Consistency within variation

There was considerable variation in implied rates of discounting among the answers given by the people interviewed. Unanswered questions, variations in imputed rates and 'negative' rates suggest that there were some misunderstandings of the tasks involved and difficulties over making numerical comparisons. Nevertheless, median values, ranking of median values and comparison of rankings between samples were altered little by the removal of outliers. Moreover, health professionals, who were more highly educated and better informed regarding healthcare and choosing on behalf of society, returned rates that were comparable with those returned by the public sample. Furthermore, the median rates for the four questions involving money (questions 1, 2, 9 and 11) were not very different from rates that could have been calculated from gross interest rates, which suggests that respondents were making realistic appraisals of present values of future wins or losses.

Health and financial comparisons

The median rates demonstrated a pattern of lower values for health than for financial comparisons (or comparisons of goods) (*Table 8*). Taking the individual comparison first, these findings suggest that both the general public and health professionals perceive their own future health as more valuable *vis-à-vis* the present than future events concerning money or goods (average of the median discount rates of four questions in each section for health 3.5 and 3.2% and for finance 7.3 and 10.9% in public and professional samples, respectively). The study findings also suggest rather more strongly that both the general public and health professionals perceive the future health of the public as being nearly not discountable. Two of four questions in the public sample and three in the health professional sample yielded median rates of zero.

Individual and societal comparisons

The study identified a pattern of lower rates of discount in societal or public comparisons than in individual or private comparisons. In four questions on wealth the median discount rates ranged from 0 to 9.5% and from 1.2 to 9.5% for societal comparisons (public and health professional samples, respectively) and from 5.0 to 9.9% and from 6.1 to 12.5% for individual comparisons. For health comparison the corresponding median ranges were 0 to 2.4% and 0 to 1.8% for societal and 0 to 7.7% and 0 to 7.0% for individual comparisons.

Determinants of discount rates

The study found statistically significant effects of time span (lower rates over longer time spans) and to a lesser extent sums involved (lower rates with larger sums) and offered comparison rates (lower rates when given lower starting comparisons), as in previous studies. The principal effect of time span clearly supports the view that the discount rate is not time invariant, but is some curvilinear function of time.⁴⁷ The study found little association between discount rates and personal characteristics of respondents (age, gender, education, employment status and social class).

Recommendations for further research

The findings of this review and empirical study together suggest that there may be little more to be gained in understanding of time preference by studies based on hypothetical comparisons of two points in time, which require comparisons in the abstract and intellectualisation of the issues. Further studies may consider using more realistic scenarios involving purchases and exchanges, or the factorial approach to conceal the time element, among a number of other factors. Further research may

adopt the different and potentially complementary approaches of broadly based qualitative studies, employing in-depth interviewing, to understand better the cognitive processes involved in making comparisons over time, and analysis of behaviour in response to real choices and not hypothetical comparisons, to reveal time preferences.

Implications

The findings of the present study and of previous studies in this field suggest fairly clearly that

people acknowledge a difference between the future of society and their own futures. People recognise a more secure future for society than for themselves, and this is reflected in their choice of lower discount rates for public decisions than for private decisions. The median rates of discount chosen by over 500 people were zero for four of the eight public questions presented in this study. These findings will provide reassurance for those policy makers who advocate lower discount rates when making decisions on behalf of society.



Acknowledgements

The authors thank M. Reay for developing and piloting the questionnaire, ERES Research for administering interviews, N. Tebble for reviewing the literature and collating the findings, M. Jones and L. Klier for assistance with data analysis,

J. Hill for typing the manuscript, and many citizens and health professionals of South Glamorgan, who gave of their time to help with this research.



References

1. Price C. Time, discounting and value. Oxford: Blackwell; 1993.
2. Mooney G. Economics in medicine and healthcare. Hemel Hempstead: Harvester Wheatsheaf; 1992.
3. Parsonage M, Neuburger, H. Discounting and health benefits. *Health Econ* 1992;**1**:71–9.
4. Sheldon TA. Discounting in healthcare decision-making: time for a change? *J Public Health Med* 1992;**14**:250–6.
5. Olsen JA. On what basis should health be discounted? *J Health Econ* 1993;**12**:39–53.
6. Mueller DC. Intergenerational justice and the social discount rate. *Theory and Decisions* 1974;**5**:263–73.
7. Beveridge W. Social insurance and allied services. Great Britain Parliament Cmnd 6404. London: HMSO; 1942.
8. West RR, Crosby DL, Jones JH. Mathematical model of integrated haemodialysis and renal transplantation programme. *Br J Prev Soc Med* 1972;**28**:149–55
9. Buxton MJ, West RR. Cost-benefit analysis of long term haemodialysis for chronic renal failure. *BMJ* 1975;**ii**:376–9.
10. Lind R, editor. Discounting for time and risk in energy policy. Resources for the future. Washington, DC; 1982.
11. Portney P, Weyant J, editors. Discounting and intergenerational equity. Resources for the future. Washington, DC; 1999.
12. Drummond MF, Stoddart GL, Torrance GW. Methods for the economic evaluation of healthcare programmes. Oxford: Oxford University Press; 1987.
13. Chancellor of the Exchequer. Required rate of return and discount rates in the public sector. Hansard. House of Commons debates 1988–9, 150, written answer column 187.
14. Spackman M. Discount rates and rates of return in the public sector: economic issues. Working Paper 113, Government Economic Service; 1991.
15. Goodin RE. Discounting discounting. *J Public Policy* 1982;**2**:53–72.
16. West RR. Valuation of human life in long run healthcare programmes. *BMJ* 1985;**291**:1139–41.
17. Robinson JC. The philosophical origins of the social rate of discount. *Milbank Q* 1990;**68**:245–65.
18. West RR. Discounting the future: influence of the economic model. *J Epidemiol Community Health* 1996;**50**:239–44.
19. Drummond MF, Jefferson TD. Guidelines for authors and peer reviewers of economic submissions to the BMJ. *BMJ* 1996;**313**:275–83.
20. West RR. Economic rate of discount and estimating cost benefit in viral immunisation programmes. *Rev Med Virol* 1999;**9**:51–5.
21. Rawls JA. A theory of justice. Cambridge, MA: Harvard University Press; 1971.
22. Arrow KJ. The rate of discount for long-term public investment. In Ashley H, Rudman RL, Whipple C, editors. Energy and the environment. New York: Pergamon; 1976.
23. McGuire A, Henderson J, Mooney G. The economics of health care. An introductory text. London: Routledge and Kegan Paul; 1987.
24. Cohen DR, Henderson JB. Health, prevention and economics. Oxford: Oxford University Press; 1988.
25. Drummond MF, Ludbrook A, Lawson K, Steel A. Studies in economic appraisal in healthcare. Oxford: Oxford University Press; 1986.
26. Christensen-Szalanski JJ. Discounting functions and the measurements of patients' values. *Med Decis Making* 1984;**4**:47–58.
27. Keeler EB, Cretin S. Discounting of life-saving and other non-monetary effects. *Management Science* 1983;**34**:200–13.
28. Ganiats TG. Prevention, policy and paradox: what is the value of future health? *Am J Prev Med* 1997;**13**:12–17.
29. Cairns JA. Discounting and health benefits: another perspective. *Health Econ* 1992;**1**:76–9.
30. Olsen JA. Time preference for health gains: on empirical investigation. *Health Econ* 1993;**2**:257–65.
31. Gyrd-Hansen D, Sogaard J. Discounting life years: whether time preference. *Health Econ* 1998;**7**:121–7.
32. Torgeson DJ, Raftery J. Economic notes: discounting. *BMJ* 1999;**319**:914–5.
33. Cropper ML, Ayded SK, Portney PR. Discounting human lives. *Am J Agric Econ* 1991;**73**:1410–15.
34. Cairns JA, van der Pol MM. Constant and decreasing timing aversion for saving lives. *Soc Sci Med* 1997;**45**:1653–9.

35. Cairns JA, van der Pol MM. The estimation of marginal time preference in a UK-wide sample (TEMPUS) project. *Health Technol Assess* 2000;**4**(1).
36. Rose DN, Weeks MG. Individuals' discounting of future monetary gains and health states. *Med Decis Making* 1988;**4**:334.
37. Loewenstein GW. Frames of mind in inter-temporal choice. *Management Science* 1988;**34**:200–13.
38. Benzion U, Rapport A, Yagil J. Discount rates inferred from decisions: an experimental study. *Management Science* 1989;**35**:270–85.
39. Pope CA, Perry G. Individual vs social discount rates in allocating depletable resources over time. *Econ Lett* 1989;**29**:257–64.
40. Cairns JA. Wealth and time preference. *Project Appraisal* 1992;**7**:31–40.
41. Cropper ML, Aydede SK, Portney PR. Rates of time preference for saving lives. *Economics of the Environment* 1992;**82**:469–72.
42. Redelmeier DA, Heller DN. Time preference in medical decision making and cost-effectiveness analysis. *Med Decis Making* 1993;**13**:212–17.
43. Shelley MK. Outcomes, question frames and discount rates. *Management Science* 1993;**39**:806–15.
44. Chapman GB, Elstein AS. Valuing the future: temporal discounting of health and money. *Med Decis Making* 1995;**15**:373–86.
45. Chapman GB. Temporal discounting and utility for health and money. *J Exp Psychol* 1996;**22**:771–91.
46. Olsen JA. Persons vs years: two ways of eliciting implicit weights. *Health Econ* 1994;**3**:39–46.
47. Cairns JA, van der Pol MM. Saving future lives: a comparison of three discounting models. *Health Econ* 1997;**6**:341–50.
48. Rossi PH, Nock SL, editors. Measuring social judgements: the factorial survey technique. Beverley Hills, CA: Sage; 1982.
49. Jasso G, Rossi PH. Distributive justice and earned income. *American Social Review* 1977;**42**:639–51.
50. Jasso G. On the justice of earnings: a specification of the justice evaluation function. *Am J Sociol* 1978;**83**:1398–419.
51. Backman AM. Distributional justice and priority of access to health services. PhD thesis, University of Wales, Cardiff; 1996.
52. Harvey CM. The reasonableness of non-content discounting. *Journal of Public Economics* 1994;**53**:31–51.
53. Svenson O. Cognitive strategies in a complex judgement task: analysis of concurrent verbal reports and judgements of cumulated risk over different exposure times. *Organisational Behaviour and Human Decision Making* 1985;**36**:1–15.
54. Nisbett RE, Wilson TD. Telling more than we can know: verbal reports on mental processes. *Psychol Rev* 1977;**84**:231–59.
55. Bem D. Self-perception theory: an alternative explanation of cognitive dissonance phenomena. *Psycholog Rev* 1967;**74**:183–200.
56. Wright P, Rip PD. Retrospective reports on the causes of decisions. *J Pers Soc Psychol* 1981;**40**:601–14.
57. Ericsson KA, Simon HA. Verbal reports as data. *Psycho Rev* 1980;**87**:215–51.
58. White P. Limitations on verbal reports of internal events: a refutation of Nisbett and Wilson and of Bem. *Psychol Rev* 1980;**87**:1015–112.
59. Cartwright A. Health surveys in practice and in potential: a critical review of their scope and methods. London: Kings Fund; 1983.
60. Sellitz C, Wrightsman LS, Cook SW, editors. Research methods in social relations. Holt Rinehart Winston: New York; 1959.
61. Payne JW, Bettman JR. Behavioral decision research: a constructive processing perspective. *Annu Rev Psychol* 1992;**43**:87–131.
62. Llewellyn-Thomas H, Sutherland HJ, Tibshirani R, Ciampi A, Till JE, Boyd N. The measurement of patients' values in medicine. *Med Decis Making* 1982;**2**:449–62.
63. Schoemaker PJH. The expected utility model: its variants, purposes, evidence and limitations. *Journal of Economic Literature* 1982;**20**:529–63.
64. Froberg DG, Kane RL. Methodology for measuring health-state preferences – II: scaling methods. *J Clin Epidemiol* 1989;**42**:459–71.
65. Kahneman D, Tversky A. The psychology of preference. *Sci Am* 1982;**246**:160–73.
66. Read JL, Quinn RJ, Berwick DM, Fineberg HV, Weinstein MC. Preferences for health outcomes: comparison of assessment methods. *Med Decis Making* 1984;**4**:315–29.
67. Froberg DG, Kane RL. Methodology for measuring health-state preferences – III: population and context effects. *J Clin Epidemiol*, 1989;**42**:585–92.
68. Robinson A, Dolan P, Williams A. Valuing health status using VAS and TTO: what lies behind the numbers? *Soc Sci Med* 1997;**45**:1289–97.
69. Arnesen T, Nord E. The value of DALY life: problems with ethics and validity of disability adjusted life years. *BMJ* 1999;**319**:1423–5.
70. Orne MT. On the social psychology of the psychology experiment with particular reference to reward characteristics and their implications. *Am Psychol* 1962;**17**:776–83.
71. Rosenberg MJ. When dissonance fails: on eliminating evaluation apprehension from attitude measurement. *J Pers Soc Psychol* 1965;**1**:28–42.

Appendix

Interview schedule for estimating implied rates of discounting

University of Wales College of Medicine, Cardiff
October 1999

(administered by Eres Research and Consultancy, Cardiff)

We are interested in how *you* value the *future*. The following pages include a number of questions which involve making *choices* between *now* and some time in the *future*. Each event could happen either now or at some time in the *future*. We would like you to consider the two choices and decide whether you think the event happening *now* (a) is *better* or *worse* than the event happening at some time in the *future* (b). We then ask you to choose a value/number for (b) that would make you see (a) and (b) as equivalent.

To help explain; the first question is answered for you as an example:

GIVE RESPONDENT EXAMPLE SHEET (note: Example sheet is as below)

Q1a) You win some money on a premium bond. You win either:

- a) £1000 *now*
- or**
- b) £1100 in one year's time

Do you think that **a)** is better or worse than **b)**?

If you think **a)** is better but not much better than **b)** you would answer 'better'.

Thus:

Much better	1
Better	②
Similar	3
Worse	4
Much worse	5

b) How much money won in *1 year's* time do you think is the *same* as winning £1000 now?

£ _____

If you think winning £1000 *now* is better, you would think that the equivalent *in 1 year's* time should be *more* than £1100, perhaps for example £1200. On the other hand, if you think winning £1000 *now* is worse, you would think the equivalent in *1 year's* time should be less than £1100, perhaps £1050.

£ 1050

THERE ARE NO 'RIGHT' OR 'WRONG' ANSWERS, WE ARE INTERESTED IN *YOUR* VIEWS

HAND CARD A TO RESPONDENT FOR DURATION OF INTERVIEW

Q1a) SHOW CARD 1 You win some money on a premium bond. You win *either*:

- a) £1000 *now*
or
 b) £1100 in *2 years'* time

Do you think that **a)** is better or worse than **b)**?

(9)

Much better	1
Better	2
Similar	3
Worse	4
Much worse	5

b) SHOW CARD 1 How much money in *2 years'* time do you think is the *same* (10–14) as winning £1000 *now*? PROBE BUT DO NOT PROMPT. GIVE RESPONDENT SUFFICIENT TIME TO GIVE A CONSIDERED REPLY

£ _____

Q2a) SHOW CARD 2 You lose a wallet containing some money. You lose *either*:

- a) £50 *now*
or
 b) £100 in *5 years'* time

Do you think that **a)** is better or worse than **b)**?

(15)

Much better	1
Better	2
Similar	3
Worse	4
Much worse	5

b) SHOW CARD 2 How much money lost in *5 years'* time do you think is the (16–19) *same* as losing £50 *now*?

£ _____

Q3a) SHOW CARD 3 You are going on your ideal holiday and are offered some extra days at no additional cost. You can have *either*:

- a) 6 extra free days *now*
or
 b) 14 extra free days in *10 years'* time

Do you think that **a)** is better or worse than **b)**?

(20)

Much better	1
Better	2
Similar	3
Worse	4
Much worse	5

b) SHOW CARD 3 How many extra days in *10 years'* time do you think is the (21–22) same as an extra 6 days *now*?

_____ days

Q4a) SHOW CARD 4 You win some compact discs of your favourite music in a competition. You win *either*:

- a) 50 CDs *now*
- or**
- b) 100 CDs in 2 *years'* time

Do you think that **a)** is better or worse than **b)**? (23)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) SHOW CARD 4 How many CDs won in 2 *years'* time do you think is the *same* (24–27) as winning 50 CDs *now*?

_____ CDs

The next four questions are about *health outcomes*. Please indicate whether you think **a)** is better or worse than **b)**, as before:

Q5a) SHOW CARD 5 You are considering a flu vaccination to protect you from flu. You can have a vaccination *either*:

- a) *now* and gain 100 days of freedom from flu
- or**
- b) in 3 *years'* time and gain 200 days of freedom from flu

Do you think that **a)** is better or worse than **b)**? (28)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) SHOW CARD 5 How many days freedom from flu in 3 *years'* time do you (29–32) think is the same as 100 days of freedom from flu *now*?

_____ days

Q6a) SHOW CARD 6 An unexpected illness means you have to spend some time in hospital. It happens *either*:

- a) *now* and you spend 50 days in hospital
- or**
- b) in 4 *years'* time and you spend 75 days in hospital

Do you think that **a)** is better or worse than **b)**? (33)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

- b) **SHOW CARD 6** How many days spent in hospital in *4 years*' time do you think is the *same* as spending 50 days in hospital *now*? (34–36)

_____ days

- Q7a) SHOW CARD 7** You are involved in a transport accident (aircraft, train, bus, car, cyclist, pedestrian). The accident is *either*:

- a) *this year* and your chance (risk) of death is 300 in a million
or
 b) in *20 years*' time and your chance (risk) of death is 350 in a million

Do you think that **a)** is better or worse than **b)**? (37)

- | | |
|-------------|---|
| Much better | 1 |
| Better | 2 |
| Similar | 3 |
| Worse | 4 |
| Much worse | 5 |

- b) **SHOW CARD 7** What chance of death in a transport accident in *20 years*' time do you think is the *same* as 300 in a million *now*? (38–41)

_____ in a million

- Q8a) SHOW CARD 8** A long-term illness leaves you 'below par' for one year, after which you recover fully to your present state of health. You experience *either*:

- a) one year 10% below normal *this year*
or
 b) one year 40% below normal in *5 years*' time
 (where 100% below normal means unable to do anything)

Do you think that **a)** is better or worse than **b)**? (42)

- | | |
|-------------|---|
| Much better | 1 |
| Better | 2 |
| Similar | 3 |
| Worse | 4 |
| Much worse | 5 |

- b) **SHOW CARD 8** How much below normal in *5 years*' time do you think is the *same* as 10% below normal *now*? (43–45)

_____ %

The next four questions are about society as a whole rather than about you as an individual. Some of the questions ask you to make choices for a city (you may consider this as, for example, 'Greater Cardiff', including Penarth, Barry and the Vale of Glamorgan). Please indicate whether you think a) is better or worse than b), as before

- Q9a) SHOW CARD 9** A city council (e.g. Cardiff) receives a major grant from Europe (the EU) with no strings attached. The council can choose to receive *either*:

- a) £400 million *now*
or
 b) £600 million in *5 years*' time

<p>Do you think that a) is better or worse than b)?</p>	<p>(46)</p>	<p>Much better 1 Better 2 Similar 3 Worse 4 Much worse 5</p>
<p>b) SHOW CARD 9 How much money received in 5 years' time do you think is the <i>same</i> as receiving £400 million <i>now</i>?</p> <p>£ _____ million</p>	<p>(47–50)</p>	
<p>Q10a) SHOW CARD 10 A city loses (uninsured) a number of council houses due to fire. The city loses <i>either</i>:</p> <p>a) 50 council houses <i>now</i> or b) 60 council houses in 10 years' time</p> <p>Do you think that a) is better or worse than b)?</p>	<p>(51)</p>	<p>Much better 1 Better 2 Similar 3 Worse 4 Much worse 5</p>
<p>b) SHOW CARD 10 How many council houses lost in 10 years' time do you think is the <i>same</i> as losing 50 houses <i>now</i>?</p> <p>_____ houses</p>	<p>(52–55)</p>	
<p>Q11a) SHOW CARD 11 The European Court requires Cardiff to pay a fine, for example, for environmental pollution of the Bristol Channel. Cardiff can opt to pay <i>either</i>:</p> <p>a) £10 million <i>now</i> or b) £15 million in 5 years' time</p> <p>Do you think that a) is better or worse than b)?</p>	<p>(56)</p>	<p>Much better 1 Better 2 Similar 3 Worse 4 Much worse 5</p>
<p>b) SHOW CARD 11 How much in 5 years' time do you think is the same as £10 million <i>now</i>?</p> <p>£ _____ million</p>	<p>(57–59)</p>	

Q12a) SHOW CARD 12 The number of fully staffed acute hospital beds in Wales may be *either*:

- a) 7000 *now*
- or**
- b) 7000 in *6 years'* time

Do you think that **a)** is better or worse than **b)**? (60)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) **SHOW CARD 12** How many hospital beds in *6 years'* time do you think is the (61–65) *same* as 7000 hospital beds *now*?

_____ hospital beds

The next four questions are about health outcomes. Please indicate whether you think a) is better or worse than b), as before:

Q13a) SHOW CARD 13 A plane crashes and a number of passengers and crew die. The accident happens either:

- a) *now*, and 50 people die
- or**
- b) in *3 years'* time, and 55 people die

Do you think that **a)** is better or worse than **b)**? (66)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) **SHOW CARD 13** How many deaths in *3 years'* time do you think is the same (67–69) as 50 deaths *now*?

_____ deaths

Q14a) SHOW CARD 14 If all emergency services (fire brigade, RNLI, airsea rescue, ambulance paramedics, etc.) save *either*:

- a) 2000 lives *this year*
- or**
- b) 3000 lives in *4 years'* time

Do you think that **a)** is better or worse than **b)**? (70)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) **SHOW CARD 14** How many lives saved in *4 years*' time do you think is the *same* as saving 2000 lives *this year*? (71–75)

_____ lives saved

Q15a) SHOW CARD 15 The health of a city (Cardiff) deteriorates for *1 year* and then returns to its present state: the number of men and women of working age with long-term illness and unable to work increases by either:

- a) 100 long-term ill *this year*
- or**
- b) 120 long-term ill in *10 years*' time

Do you think that **a)** is better or worse than **b)**? (76)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) **SHOW CARD 15** How many additional long-term ill in *10 years*' time do you think is the *same* as 100 *this year*? (77–80)

_____ long-term ill

Q16a) SHOW CARD 16 The health of the people in Britain improves for *1 year* and then returns to its present state: the number of people waiting for hospital inpatient treatment *decreases* by either:

- a) 100,000 *this year*
- or**
- b) 110,000 in *10 years*' time

Do you think that **a)** is better or worse than **b)**? (81)

- Much better 1
- Better 2
- Similar 3
- Worse 4
- Much worse 5

b) **SHOW CARD 16** How many people off the inpatient waiting list in *10 years*' time do you think is the same as 100,000 off the list *this year*? (82–88)

_____ people

About your health

Q17 How good is your health in general? Would you say it was: (89)

- Very good 1
- Good 2
- Fair 3
- Bad 4
- Very bad 5

Q18 Do you have any long-standing illness, disability or infirmity? Long-standing means anything that has troubled you over a period of time or that is likely to trouble you over a period of time.

(90)

Yes

1

No

2

IF YES, please give details:

(91–93m)

ASK ONLY FOR HEALTH PROFESSIONALS

(94)

What is your job title? (WRITE IN) _____

CLASSIFICATION SECTION

<p>SEX OF RESPONDENT Male Female</p>	(95) 1 2	<p>OCCUPATION OF CHIEF INCOME EARNER Actual Job: _____</p>																					
<p>AGE OF RESPONDENT (Write in and code) 16–19 20–24 25–34 35–44 45–54 55–64 65–74 75 and over</p>	(96) 1 2 3 4 5 6 7 8	<p>Position Grade: _____ (give last job if wholly retired or registered unemployed)</p> <p>SOCIAL CLASS (104) (Based on occupation of Chief Income Earner)</p> <table style="width: 100%; border: none;"> <tr><td style="text-align: right;">AB</td><td style="text-align: right;">1</td></tr> <tr><td style="text-align: right;">C1</td><td style="text-align: right;">2</td></tr> <tr><td style="text-align: right;">C2</td><td style="text-align: right;">3</td></tr> <tr><td style="text-align: right;">DE</td><td style="text-align: right;">4</td></tr> </table>	AB	1	C1	2	C2	3	DE	4													
AB	1																						
C1	2																						
C2	3																						
DE	4																						
<p>MARITAL STATUS Single Married or equivalent Widowed/Divorced/Separated</p>	(97) 1 2 3	<p>RESPONDENT NAME: _____ ADDRESS: _____ _____</p>																					
<p>WORKING STATUS OF RESPONDENT Full-time (over 30 hours per week) Part-time (30 hours or less per week) Unemployed/seeking work Full-time student Wholly retired/other permanently not working</p>	(98) 1 2 3 4 5	<p>POSTCODE: _____</p> <p>PLEASE RECORD ENTIRE POSTCODE IF POSSIBLE. IF NOT, RECORD THE OUTWARD CODE, THAT IS THE FIRST 3 to 4 LETTERS/DIGITS</p>																					
<p>LAST FULL-TIME EDUCATION: a) Primary b) Secondary (Age 15) c) Sixth form d) College of FE e) University f) Postgraduate University</p>	(99) 1 2 3 4 5 6	<p>Tel No: _____ No phone X _____</p> <p>THANK RESPONDENT AND CLOSE PROVIDE THANK-YOU LEAFLET</p>																					
<p>STATUS OF RESPONDENT IN HOUSEHOLD *Chief Income Earner/H of H Spouse of Head of Household/CIE Other adult (16 or over)</p>	(100) 1 2 3	<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <tr> <td style="width: 12.5%;">(105)</td> <td style="width: 12.5%;">(106)</td> <td style="width: 12.5%;">(107)</td> <td style="width: 12.5%;">(108)</td> <td style="width: 12.5%;">(109)</td> <td style="width: 12.5%;">(110)</td> <td style="width: 12.5%;">(111)</td> </tr> <tr> <td>(112)</td> <td>(113)</td> <td>(114)</td> <td>(115)</td> <td>(116)</td> <td>(117)</td> <td>(118)</td> </tr> <tr> <td>(119)</td> <td>(120)</td> <td>(121)</td> <td>(122)</td> <td>(123)</td> <td>(124)</td> <td>(125)</td> </tr> </table>	(105)	(106)	(107)	(108)	(109)	(110)	(111)	(112)	(113)	(114)	(115)	(116)	(117)	(118)	(119)	(120)	(121)	(122)	(123)	(124)	(125)
(105)	(106)	(107)	(108)	(109)	(110)	(111)																	
(112)	(113)	(114)	(115)	(116)	(117)	(118)																	
(119)	(120)	(121)	(122)	(123)	(124)	(125)																	
<p>HOUSEHOLD COMPOSITION</p> <p>No. of children (0–15 yrs) <input style="width: 80px;" type="text"/></p> <p>No. of adults (16 yrs +) <input style="width: 80px;" type="text"/></p> <p>TOTAL in household (inc. respondent) <input style="width: 80px;" type="text"/></p>	FOU (101) (102) (103)	<p>Date of interview: _____</p> <p>INTERVIEWER DECLARATION I declare I have conducted this interview face to face with the above named person (who is unknown to me) at his/her address according to your instructions.</p> <p>Signature: _____</p>																					
<p><u>WRITE IN NUMBER OF PERSONS IN EACH CATEGORY AND CHECK THEY ADD TO TOTAL NUMBER IN HOUSEHOLD</u></p>																							

*The Chief Income Earner is the member of the household with the largest income, whether from employment, pensions, state benefits, investments or any other source. This person can be of either sex.



Health Technology Assessment Programme

Prioritisation Strategy Group

Members

<p>Chair, Professor Kent Woods, Director, NHS HTA Programme & Professor of Therapeutics, University of Leicester</p>	<p>Professor Bruce Campbell, Consultant Vascular & General Surgeon, Royal Devon & Exeter Hospital</p> <p>Professor Shah Ebrahim, Professor in Epidemiology of Ageing, University of Bristol</p>	<p>Dr John Reynolds, Clinical Director, Acute General Medicine SDU, Radcliffe Hospital, Oxford</p> <p>Dr Ron Zimmern, Director, Public Health Genetics Unit, Strangeways Research Laboratories, Cambridge</p>
--	---	---

HTA Commissioning Board

Members

<p>Programme Director, Professor Kent Woods, Director, NHS HTA Programme, Department of Medicine and Therapeutics, Leicester Royal Infirmary, Robert Kilpatrick Clinical Sciences Building, Leicester</p> <p>Chair, Professor Shah Ebrahim, Professor in Epidemiology of Ageing, Department of Social Medicine, University of Bristol, Canyng Hall, Whiteladies Road, Bristol</p> <p>Deputy Chair, Professor Jenny Hewison, Professor of Health Care Psychology, Academic Unit of Psychiatry and Behavioural Sciences, University of Leeds School of Medicine, Leeds</p> <p>Professor Douglas Altman, Professor of Statistics in Medicine, Centre for Statistics in Medicine, Oxford University, Institute of Health Sciences, Cancer Research UK Medical Statistics Group, Headington, Oxford</p> <p>Professor John Bond, Professor of Health Services Research, Centre for Health Services Research, University of Newcastle, School of Health Sciences, Newcastle upon Tyne</p>	<p>Professor John Brazier, Director of Health Economics, Sheffield Health Economics Group, School of Health & Related Research, University of Sheffield, SCHARR Regent Court, Sheffield</p> <p>Dr Andrew Briggs, Public Health Career Scientist, Health Economics Research Centre, University of Oxford, Institute of Health Sciences, Oxford</p> <p>Dr Christine Clark, Medical Writer & Consultant Pharmacist, Cloudside, Rossendale, Lancs <i>and</i> Principal Research Fellow, Clinical Therapeutics in the School of Pharmacy, Bradford University, Bradford</p> <p>Professor Nicky Cullum, Director of Centre for Evidence Based Nursing, Department of Health Sciences, University of York, Research Section, Seeborn Rowntree Building, Heslington, York</p> <p>Dr Andrew Farmer, Senior Lecturer in General Practice, Department of Primary Health Care, University of Oxford, Institute of Health Sciences, Headington, Oxford</p> <p>Professor Fiona J Gilbert, Professor of Radiology, Department of Radiology, University of Aberdeen, Lillian Sutton Building, Foresterhill, Aberdeen</p>	<p>Professor Adrian Grant, Director, Health Services Research Unit, University of Aberdeen, Drew Kay Wing, Polwarth Building, Foresterhill, Aberdeen</p> <p>Professor Alastair Gray, Director, Health Economics Research Centre, University of Oxford, Institute of Health Sciences, Headington, Oxford</p> <p>Professor Mark Haggard, Director, MRC ESS Team, CBU Elsworth House, Addenbrooke's Hospital, Cambridge</p> <p>Professor F D Richard Hobbs, Professor of Primary Care & General Practice, Department of Primary Care & General Practice, University of Birmingham, Primary Care and Clinical Sciences Building, Edgbaston, Birmingham</p> <p>Professor Peter Jones, Head of Department, University Department of Psychiatry, University of Cambridge, Addenbrooke's Hospital, Cambridge</p> <p>Professor Sallie Lamb, Research Professor in Physiotherapy/Co- Director, Interdisciplinary Research Centre in Health, Coventry University, Coventry</p> <p>Dr Donna Lamping, Senior Lecturer, Health Services Research Unit, Public Health and Policy, London School of Hygiene and Tropical Medicine, London</p>	<p>Professor David Neal, Professor of Surgical Oncology, Oncology Centre, Addenbrooke's Hospital, Cambridge</p> <p>Professor Tim Peters, Professor of Primary Care Health Services Research, Division of Primary Health Care, University of Bristol, Cotham House, Cotham Hill, Bristol</p> <p>Professor Ian Roberts, Professor of Epidemiology & Public Health, Intervention Research Unit, London School of Hygiene and Tropical Medicine, London</p> <p>Professor Peter Sandercock, Professor of Medical Neurology, Department of Clinical Neurosciences, University of Edinburgh, Western General Hospital NHS Trust, Bramwell Dott Building, Edinburgh</p> <p>Professor Martin Severs, Professor in Elderly Health Care, Portsmouth Institute of Medicine, Health & Social Care, St George's Building, Portsmouth</p> <p>Dr Jonathan Shapiro, Senior Fellow, Health Services Management Centre, Park House, Birmingham</p>
---	--	---	---

Current and past membership details of all HTA 'committees' are available from the HTA website (www.nchta.org)

Diagnostic Technologies & Screening Panel

Members

Chair,

Dr Ron Zimmern, Director of the Public Health Genetics Unit, Strangeways Research Laboratories, Cambridge

Dr Paul Cockcroft, Consultant Medical Microbiologist/Laboratory Director, Public Health Laboratory, St Mary's Hospital, Portsmouth

Professor Adrian K Dixon, Professor of Radiology, Addenbrooke's Hospital, Cambridge

Dr David Elliman, Consultant in Community Child Health, London

Dr Andrew Farmer, Senior Lecturer in General Practice, Institute of Health Sciences, University of Oxford

Dr Karen N Foster, Clinical Lecturer, Dept of General Practice & Primary Care, University of Aberdeen

Professor Jane Franklyn, Professor of Medicine, University of Birmingham

Professor Antony J Franks, Deputy Medical Director, The Leeds Teaching Hospitals NHS Trust

Mr Tam Fry, Honorary Chairman, Child Growth Foundation, London

Dr Susanne M Ludgate, Medical Director, Medical Devices Agency, London

Dr William Rosenberg, Senior Lecturer and Consultant in Medicine, University of Southampton

Dr Susan Schonfield, CPHM Specialised Services Commissioning, Croydon Primary Care Trust

Dr Margaret Somerville, Director of Public Health, Teignbridge Primary Care Trust, Devon

Mr Tony Tester, Chief Officer, South Bedfordshire Community Health Council, Luton

Dr Andrew Walker, Senior Lecturer in Health Economics, University of Glasgow

Professor Martin J Whittle, Head of Division of Reproductive & Child Health, University of Birmingham

Dr Dennis Wright, Consultant Biochemist & Clinical Director, Pathology & The Kennedy Galton Centre, Northwick Park & St Mark's Hospitals, Harrow

Pharmaceuticals Panel

Members

Chair,

Dr John Reynolds, Clinical Director, Acute General Medicine SDU, Oxford Radcliffe Hospital

Professor Tony Avery, Professor of Primary Health Care, University of Nottingham

Professor Iain T Cameron, Professor of Obstetrics & Gynaecology, University of Southampton

Mr Peter Cardy, Chief Executive, Macmillan Cancer Relief, London

Dr Christopher Cates, GP and Cochrane Editor, Bushey Health Centre, Bushey, Herts.

Mr Charles Dobson, Special Projects Adviser, Department of Health

Dr Robin Ferner, Consultant Physician and Director, West Midlands Centre for Adverse Drug Reactions, City Hospital NHS Trust, Birmingham

Dr Karen A Fitzgerald, Pharmaceutical Adviser, Bro Taf Health Authority, Cardiff

Professor Alastair Gray, Professor of Health Economics, Institute of Health Sciences, University of Oxford

Mrs Sharon Hart, Managing Editor, *Drug & Therapeutics Bulletin*, London

Dr Christine Hine, Consultant in Public Health Medicine, Bristol South & West Primary Care Trust

Professor Robert Peveler, Professor of Liaison Psychiatry, Royal South Hants Hospital, Southampton

Dr Frances Rotblat, CPMP Delegate, Medicines Control Agency, London

Mrs Katrina Simister, New Products Manager, National Prescribing Centre, Liverpool

Dr Ken Stein, Senior Lecturer in Public Health, University of Exeter

Professor Terence Stephenson, Professor of Child Health, University of Nottingham

Dr Richard Tiner, Medical Director, Association of the British Pharmaceutical Industry, London

Professor Dame Jenifer Wilson-Barnett, Head of Florence Nightingale School of Nursing & Midwifery, King's College, London

Therapeutic Procedures Panel

Members

Chair,

Professor Bruce Campbell,
Consultant Vascular and
General Surgeon, Royal Devon
& Exeter Hospital

Dr Mahmood Adil, Head of
Clinical Support & Health
Protection, Directorate of
Health and Social Care (North),
Department of Health,
Manchester

Professor John Bond, Head of
Centre for Health Services
Research, University of
Newcastle upon Tyne

Mr Michael Clancy, Consultant
in A & E Medicine,
Southampton General Hospital

Dr Carl E Counsell, Senior
Lecturer in Neurology,
University of Aberdeen

Dr Keith Dodd, Consultant
Paediatrician, Derbyshire
Children's Hospital, Derby

Professor Gene Feder, Professor
of Primary Care R&D, Barts &
the London, Queen Mary's
School of Medicine and
Dentistry, University of London

Ms Bec Hanley, Freelance
Consumer Advocate,
Hurstpierpoint, West Sussex

Professor Alan Horwich,
Director of Clinical R&D, The
Institute of Cancer Research,
London

Dr Phillip Leech, Principal
Medical Officer for Primary
Care, Department of Health,
London

Mr George Levy, Chief
Executive, Motor Neurone
Disease Association,
Northampton

Professor James Lindesay,
Professor of Psychiatry for the
Elderly, University of Leicester

Dr Mike McGovern, Senior
Medical Officer, Heart Team,
Department of Health, London

Dr John C Pounsford,
Consultant Physician, North
Bristol NHS Trust

Professor Mark Sculpher,
Professor of Health Economics,
Institute for Research in the
Social Services, University of
York

Dr L David Smith, Consultant
Cardiologist, Royal Devon &
Exeter Hospital

Professor Norman Waugh,
Professor of Public Health,
University of Aberdeen

Expert Advisory Network

Members

Mr Gordon Aylward,
Chief Executive,
Association of British Health-
Care Industries, London

Ms Judith Brodie,
Head of Cancer Support
Service, Cancer BACUP, London

Mr Shaun Brogan,
Chief Executive, Ridgeway
Primary Care Group, Aylesbury,
Bucks

Ms Tracy Bury,
Project Manager, World
Confederation for Physical
Therapy, London

Mr John A Cairns,
Professor of Health Economics,
Health Economics Research
Unit, University of Aberdeen

Professor Howard Stephen Cuckle,
Professor of Reproductive
Epidemiology, Department of
Paediatrics, Obstetrics &
Gynaecology, University of
Leeds

Professor Nicky Cullum,
Director of Centre for Evidence
Based Nursing, University of York

Dr Katherine Darton,
Information Unit, MIND – The
Mental Health Charity, London

Professor Carol Dezateaux,
Professor of Paediatric
Epidemiology, London

Professor Martin Eccles,
Professor of Clinical
Effectiveness, Centre for Health
Services Research, University of
Newcastle upon Tyne

Professor Pam Enderby,
Professor of Community
Rehabilitation, Institute of
General Practice and Primary
Care, University of Sheffield

Mr Leonard R Fenwick,
Chief Executive, Newcastle
upon Tyne Hospitals NHS Trust

Professor David Field,
Professor of Neonatal Medicine,
Child Health, The Leicester
Royal Infirmary NHS Trust

Mrs Gillian Fletcher,
Antenatal Teacher & Tutor and
President, National Childbirth
Trust, Henfield, West Sussex

Ms Grace Gibbs,
Deputy Chief Executive,
Director for Nursing, Midwifery
& Clinical Support Servs., West
Middlesex University Hospital,
Isleworth, Middlesex

Dr Neville Goodman,
Consultant Anaesthetist,
Southmead Hospital, Bristol

Professor Robert E Hawkins,
CRC Professor and Director of
Medical Oncology, Christie CRC
Research Centre, Christie
Hospital NHS Trust, Manchester

Professor F D Richard Hobbs,
Professor of Primary Care &
General Practice, Department of
Primary Care & General
Practice, University of
Birmingham

Professor Allen Hutchinson,
Director of Public Health &
Deputy Dean of SCHARR,
Department of Public Health,
University of Sheffield

Professor Rajan Madhok,
Medical Director & Director of
Public Health, Directorate of
Clinical Strategy & Public
Health, North & East Yorkshire
& Northern Lincolnshire Health
Authority, York

Professor David Mant,
Professor of General Practice,
Department of Primary Care,
University of Oxford

Professor Alexander Markham,
Director, Molecular Medicine
Unit, St James's University
Hospital, Leeds

Dr Chris McCall,
General Practitioner, The
Hadleigh Practice, Castle
Mullen, Dorset

Professor Alistair McGuire,
Professor of Health Economics,
London School of Economics

Dr Peter Moore,
Freelance Science Writer,
Ashtead, Surrey

Dr Andrew Mortimore,
Consultant in Public Health
Medicine, Southampton City
Primary Care Trust

Dr Sue Moss,
Associate Director, Cancer
Screening Evaluation Unit,
Institute of Cancer Research,
Sutton, Surrey

Professor Jon Nicholl,
Director of Medical Care
Research Unit, School of Health
and Related Research,
University of Sheffield

Mrs Julietta Patnick,
National Co-ordinator, NHS
Cancer Screening Programmes,
Sheffield

Professor Chris Price,
Visiting Chair – Oxford, Clinical
Research, Bayer Diagnostics
Europe, Cirencester

Ms Marianne Rigge,
Director, College of Health,
London

Professor Sarah Stewart-Brown,
Director HSRU/Honorary
Consultant in PH Medicine,
Department of Public Health,
University of Oxford

Professor Ala Szczepura,
Professor of Health Service
Research, Centre for Health
Services Studies, University of
Warwick

Dr Ross Taylor,
Senior Lecturer, Department of
General Practice and Primary
Care, University of Aberdeen

Mrs Joan Webster,
Consumer member, HTA –
Expert Advisory Network

Feedback

The HTA Programme and the authors would like to know your views about this report.

The Correspondence Page on the HTA website (<http://www.ncchta.org>) is a convenient way to publish your comments. If you prefer, you can send your comments to the address below, telling us whether you would like us to transfer them to the website.

We look forward to hearing from you.