THE MEASUREMENT AND VALUATION OF HEALTH

FIRST REPORT ON THE MAIN SURVEY

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EXECUTIVE SUMMARY

CHAPTER 1

* This is the First Report on the Main Survey

* Its purpose is to give a preliminary account of the data and their immediate implications

* It should be read in conjunction with the SCPR Technical Report on the Main Survey

* A Second Report (on modelling) is planned, and other special studies will also follow

* The Main Survey was based on several years of preparatory work

CHAPTER 2

* 3395 interviews were completed (the target was 3235), representing a response rate of 64% from in-scope addresses

* The survey population is a representative sample of the general adult population (Table 2.2), provides good geographical coverage (Table 2.3) and covers a wide range of personal experience of serious illness (Table 2.4)

CHAPTER 3

* Very little of the data was unusable (Table 3.2 and Figure 3.1), and when the unusable data had been discarded each of our data sets was still representative of the general population (Table 3.3)

CHAPTER 4

* The data on self-reported health shows the expected differences by age (Figure 4.2) and social class (Figure 4.3), and marked variation by RHA (Figure 4.5).

CHAPTER 5

* By Thurstone's Method of Paired Comparisons the data from the Ranking Task yields the set of valuations shown in Table 5.2

*	It contains no logical inconsistencies, and is very close to a similar set of valuations based on mean ranks (Figure 5.1)

CHAPTER 6

*	From the VAS ("thermometer") method there emerges the set of valuations shown in Table 6.2, which contains no logical inconsistencies

*	The rank ordering of the states in the VAS task is very close to that from the ranking task, at both group and individual level

*	The actual valuations from these two methods (in Tables 5.2 and 6.2) are also very close to each other (see Figure 6.2)

*	There is a significant difference in the valuations of the professional and managerial groups compared with the rest (Table 6.3) which is closely associated with educational qualifications (Table 6.4).

CHAPTER 7

*	From the TTO task the set of valuations which emerges is shown in Table 7.2, which contains no logical inconsistencies

*	The rankings in this tariff are very close, at both group and individual level, with those in the Ranking Task (Figure 7.1) and with those in the VAS Task (Figure 7.2)

*	The valuations from the TTO task have a relationship with the VAS valuations that were intimated from the Pilot Study data. This relationship is shown in Figure 7.4

*	Of greater concern is an unexpected sharp fall in the valuations assigned by older respondents to the more severe states. It is not clear whether this is "real" or an artefact of the valuation task (see section 7.3.5).

CHAPTER 8

*	The test–retest reliability of the data appears to be good for all methods (see Figures 8.1 and 8.2).

CHAPTER 9

* The standard deviations and inter-quartile ranges for all the valuations generated in the Main Survey were higher than in the Pilot Study, thereby reducing our capacity to establish statistically significant differences between health states.

* When the values given to adjacent states are further tested to identify which are not significantly different from each other when account is taken of the fact that not everyone valued every pair of states, it emerges that only a narrow band (of about 2 or 3 states above and below any specified state) is not significantly different (Tables 9.1 and 9.2)

* Re-examining the Pilot Study data, to see whether the effect of age upon TTO valuations was present, indicated that although there are some suggestions of it, it was certainly not clear cut (Figure 9.1)

* We need to find out whether this effect is an artefact of the TTO task or whether it represents the genuine view of the older respondents.

* All in all we are confident that we have a very good data set which will constitute a rich source of material for deeper investigation in the years ahead.

CHAPTER 1   INTRODUCTION

1.1   The Purpose of the Survey

No country can afford to provide all the health care that might conceivably be of some benefit. It is therefore necessary to establish priorities. Such priority–setting will be needed at various levels, from the face-to-face encounter between individual practitioner and individual patient, to strategic decision–making at the national (and even international) level. Although there is no consensus as to how this priority–setting should be done, there is general agreement on two important matters. The first is that one of the things that should be taken into account is how beneficial different sorts of health care actually are. The second is that the views of the general public are relevant, both in their capacity as taxpayers and in their capacity as potential patients.

As regards the benefits of health care, these can be conceived of in many different ways, one of which is that they comprise improvements in the length and/or quality of people's lives. There are, of course, many other influences at work on the length and quality of people's lives apart from health care. And although health is a pervasive influence upon the length and quality of people's lives, the proximate effects of health care are concentrated on a limited set of all the elements that go to make people's lives long and fulfilling. It has become conventional to term this subset of items "health–related quality of life" (HRQOL), and it is upon that that we shall focus here. Because people value both length of life and quality of life, we must expect there to arise situations where they have to balance changes in one against changes in the other (eg where the relief of pain shortens

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life, or where longer life requires the adoption of a less–preferred lifestyle). This is an important observation to which we shall return later.

As regards the views of the general public, it is not self–evident what it is we should be seeking their views about. Do we focus on the resources devoted to health care, the process of health care, or the outcome from health care? Do we ask about their level of satisfaction with any or all of these things, based on their own or their family's experiences? Or do we try to find out what they think is right as a matter of principle (i.e. what ought to happen)? In our study we have concentrated on outcome as the focus of interest, but within a carefully defined context. The general public are unlikely to be knowledgeable about the relative effectiveness of a wide range of treatments for a wide range of conditions affecting a wide range of people in a wide range of circumstances (even though they may know better than many "experts" what the outcomes have been from particular treatments for particular conditions which they have experienced in particular circumstances). It is the task of clinical researchers and epidemiologists (amongst others) to establish this factual basis. Where the general public's views are crucial is in judging, from their own particular perspective, the subjective value of these different potential health states, when considered one against another.

Thus, the general purpose of this survey has been to establish the relative valuations attached to different health states by members of the general public. Health states have been defined in HRQOL terms, and each respondent has had an opportunity to express their relative valuations of a particular selection of health states in three different ways. From this data can be built up a set of values for a whole community. Any subgroups that

have markedly different valuations from the rest can be identified, and a separate set of valuations calculated for them.

This information can be used in a variety of ways. Where clinical trials collect descriptive data in HRQOL terms that are compatible with our health states, our valuations can be used as a health state index for use in the evaluation process. They can also be used in association with population surveys to measure levels and trends in community health, and to provide the quality adjustment in calculating Healthy Life Expectancy. They can also be used in the calculation of Quality–Adjusted Life–Years (QALYs) both in cost–effectiveness studies and in cost–per–QALY league tables, where a social valuation is required. In all of these ways, they occupy an important niche in the armamentarium of health care evaluation.

1.2 Earlier Preparatory Work

The current survey is the product of more than 5 years of development work, which had its origins in the pioneering work of Rosser and her associates in the 1970s (Rosser and Watts, 1972; Rosser and Watts, 1978; Rosser and Kind, 1978). This was part of a more general interest at that time in the development of Health Status Indexes (Patrick, Bush and Chen, 1973; Torrance, Sackett and Thomas, 1973; Culyer, Lavers and Williams, 1972), which became more sharply focused in Britain in the early 1980s with the increasing policy interest in applying methods of economic evaluation to health care (Ludbrook, 1981; Kind, Rosser and Williams, 1982; Williams, 1985; Forrest, 1986; Allen et al, 1989), which generated several books indicating to non–economists the potential of these techniques

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(Drummond 1981a, 1981b; Drummond et al 1986).

At the time of its publication, Rosser's valuation matrix was the only British–based candidate in the field for use in what subsequently came to be called "cost–utility studies", but it had some obvious flaws. Its descriptive system had the great advantage that it was very simple to use, containing as it did only 29 different health states, all of which were combinations of two HRQOL dimensions, disability and distress. But this simplicity was bought at a price, namely that it was impossible to "unpack" the different things that had been conflated into each of these dimensions, and there appeared to be some ambiguity about the precise meaning of some of them. The main problem however was the valuations themselves, which were derived from a convenience sample of 70 subjects, who were a mixture of doctors, nurses, patients and healthy volunteers (and whose valuations were rather different from each other). The valuation method used was a version of magnitude estimation, which some people considered an inappropriate method to use (since in the form adopted by Rosser it is vulnerable to cumulative error if judgements are faulty). Less convincingly, many people objected to the valuations themselves as intuitively implausible, but, since there were no viable alternatives with which to compare them, these objections must have been based on little else but introspection.

Thus our starting point was Rosser's descriptive system and Rosser's valuation method, but when we applied these to a sample of the general public (Gudex et al, 1993), we found very different valuations from those Rosser had obtained. At the same time we also tried out other valuation methods, and explored the properties of other possible descriptive systems. The other valuation methods we used were time–trade–off (TTO) and three

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variants of category–rating, including the use of a visual analogue scale in the form of a thermometer, as used originally by Torrance, and then also being used by the Euroqol Group in postal surveys. The results led us to the view that the thermometer and the TTO method were superior to magnitude estimation, and should be pursued further, together with the Standard Gamble (SG) method. As regards alternative descriptive systems, we had conducted a large survey of lay concepts of health (van Dalen et al, 1994), funded by the Nuffield Provincial Hospitals Trust, and using the data from this study to appraise different systems, we concluded that (with some small amendments) the Euroqol Classification of HRQOL was, on balance, the best for our purposes. An important consideration here was that it had more dimensions than Rosser's Classification, and although this meant that the number of cells in the system increased from 29 to over 200, this was still a good bit less than most of the rival systems. So we moved on to the next phase (in 1991) committed to the Euroqol descriptive system, and testing the relative merits (for a large–scale household interview–based survey) of SG or TTO as the main valuation method (to be used alongside Ranking and the VAS "Thermometer").

This extensive Pilot Survey, in which SCPR became our collaborators for the first time, was complicated by the fact that we tested each of these two valuation methods (SG and TTO) in two variants, one "with props" and one "without props". The "props" in question were A4 sized Boards which looked rather like slide–rules, on which respondents were encouraged to indicate their judgements about the options presented to them within each method (Thomas and Thomson, 1992; Thomson, 1993; Gudex, 1994a, 1994b). Although all methods had some strengths and some weaknesses, this experiment led us to conclude that we were likely to get the best quality data from the TTO method with props, so this

is what we adopted as the main valuation method in the major survey (Dolan et al, 1993).

Meanwhile the Euroqol Classification had also undergone some minor modifications, and in the form used in the Pilot (and subsequently in the main survey) it had 245 different cells in it (which included "unconscious" and "dead") (see Table 1.1 for details). It is not possible to get any one respondent to value anything like this number of states, so one of the preparatory tasks was to find out what the maximum tolerable number was. We concluded that no respondent should be asked to value (by each of three different methods) more than 15 states. This was an important decision for the subsequent study design, since it influenced the number of respondents needed to provide adequate coverage of all the states needing valuation.

The final preparatory task was to run a "dress rehearsal" of the Main Survey, operating as closely as possible to what we would be doing in the Main Survey. This threw up no additional problems of any significance, and we finally went into the field with the main survey in the Autumn of 1993.

1.3   The Study Design

1.3.1   The choice of sample

The objective was to elicit the views of a representative sample of the non-institutionalised adult population of England, Scotland and Wales, by interviewing them in their own homes. Broad geographical coverage was required in case it emerged that there were marked

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regional differences in valuations.

Details of the sampling procedure are contained in Erens 1994, but in essence a three stage procedure was adopted. The first stage was to select 80 postcode sectors, stratified by 16 health regions (the 14 English RHAs plus Scotland and Wales) and 2 socioeconomic bands. Within each of these 32 groupings, postcode sectors were ranked in order of population density. The second stage was to select 76 addresses from across the whole of each selected postcode sector, thus generating 6080 addresses. The final stage was to select one adult randomly at each address.

1.3.2 The choice of health states

The Euroqol Classification generates 245 theoretically possible health states, some of which are unlikely to occur in practice. Respondents cannot handle more than 15 each, and about 40 are required for modelling purposes (ie to estimate valuations for the states that are not directly valued). Valuations for two of the states ("unconscious" and "dead") cannot be estimated from the valuations given to any other state, so must be directly valued. The state 11111 ("healthy") is essential to the re-scaling of the VAS (thermometer) data, so must also be directly valued. For all other states we had discretion.

In exercising that discretion we had several considerations in mind. First of all, we wanted the states to be widely spread over the valuation space in terms of mildness or severity (as indicated from earlier valuation data). Secondly, we wanted the set of states to include all plausible combinations of "levels" across each of the 5 dimensions, so as to be able

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to test for significant interaction effects (for example, is the weight given to "moderate pain or discomfort" different if it is combined with "some difficulty in walking" from what it is when combined with "moderately anxious or depressed"?). Thirdly, we wanted to stay as close as possible to the selection of states that had been used in a major Finnish Survey. Fourthly, we wanted to exclude states which seemed prima facie implausible to respondents, so as to sustain motivation and credibility. The result of applying these criteria was the selection of states shown in Table 1.2.

The reason why the states in Table 1.2 are stratified in the way they are is that, apart from unconscious and dead (for which we had to have valuations from everyone), we wanted the two "reference" states (11111 and 33333) to act as a common frame of reference for all respondents. We also wanted each individual to have in their valuation set 2 of the 5 mildest states (11112, 11121, 11211, 12111, and 21111). Amongst the remaining 36 states we needed to ensure balance at individual level between the relatively "mild", "moderate" and "severe" states. Thus 3 out of each group of 12 states were randomly selected within this stratification system for each individual respondent.

Our next problem was sample size. Here, apart from cost, two considerations were dominant. First of all we needed enough observations to be able to detect small differences between the valuations given to different states. It was estimated (see Annexe 1.A) that to detect a .05 difference at the .01 significance level would require a minimum of approx 1200 observations on each state. Since the stratification plan would entail only 25% of the respondents valuing any state that fell within the main block of 36 states, this would entail an achieved survey population of about 4800 respondents. Secondly we

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needed to be able to detect significant differences in valuations between different sub–groups of the population (eg by age, or social class, or geographical location). Where such differences divide the population into 2 roughly equal–sized groups (eg male/female) things are fairly straightforward. But if we wanted to compare the elderly with the rest of the population, the ratio of the respective sizes of the two subgroups might be 1:3, and with social class or geographical location we might have half–a–dozen different sub–groups in which we are interested. It is the size of the smallest subgroup which is crucial. In the end we settled on a target sample size of 3235, which should enable us to detect a .05 difference between health states at the .05 level of significance, and a similar difference between the valuations given by different subgroups provided we have no more than 4 of them (of roughly equal size) in any one comparison. When the size drops to about 200, the best we can do is detect a .1 difference in valuations at a 5% level of significance.

1.3.3 The basic structure of the interview

A detailed report, including the interview materials, has been provided by SCPR (Erens 1994), so here we will concentrate only on the basic structure. The core of each interview contained five elements:

> Self–reported health
>
> Ranking of states
>
> VAS (Thermometer) rating of states
>
> TTO rating of states
>
> Personal background data

The self-reporting of health was conducted using the Euroqol Descriptive system, by asking each person to describe their own health today using the 5-dimensional 3-level classification system. They were then asked to rate their health, as described, on the VAS thermometer. This "thermometer" has "Best imaginable health state" at the top end, and "Worst imaginable health state" at the bottom end, as is calibrated with a 0 to 100 scale. The purpose of this preliminary task was twofold: partly to collect the information itself, to see whether current health status affected valuations, but partly also to familiarise respondents with the descriptive system (and the VAS thermometer) that they were going to use later in the interview.

The ranking of states was conducted with the predetermined set of 15 states appropriate to that specific respondent (as explained above). It was explained that each state was to be regarded as lasting for 10 years without change, followed by death. The standard description of each state was printed on a card, and the cards were handed as a batch to the respondent (in random order), but excluding the state "immediate death", which was presented after the other states had been ranked.

With the cards still set out before the respondent in the rank order he or she had chosen, the respondent was asked to indicate where on the VAS (thermometer) scale they would rate the best state, and then where they would rate the worst state (again stating that each state was to be regarded as lasting for 10 years without change, followed by death). They were then asked to select the state which came closest to being half-way on the scale between where they had rated the best, and where they had rated the worst state. After rating this state wherever they thought it should go, the process was repeated for the state

which fell roughly halfway between the middle state and the best state, and then for the state which fell roughly halfway between the middle state and the worst state. After that they could rate the others in any order they wished. The purpose of this "bisection" process was to ensure that the resulting valuations have interval scale properties (Stevens, 1971).

The cards were then gathered up, and the states 11111 and immediate death removed, since these states play a different role in the TTO method, the actual valuation process concentrating on the other 13 states. The TTO board was produced and its use explained. The 13 states were then valued one by one, using whichever side of the board was relevant. One side is relevant for states that are regarded by the respondent as better than being dead, and the other side for states that are regarded by the respondent as worse than being dead. In the former case respondents were led by a process of "bracketing" to select a length of time in the state 11111 that they regarded as equivalent to 10 years in the target state; the shorter the "equivalent" length of time, the worse must be the "target" state. Respondents are given an opportunity to refuse to trade-off any length of life in order to improve its quality. In the case of states worse than dead, the choice was between dying immediately and spending a length of time (X) in the target state followed by (10-X) years in the state 11111. The more time required in the state 11111 to compensate for quite a short time in the target state, the worse must be the target state.

Finally personal background data were collected from each respondent (see Annexe A for details), the purpose of which was both to test the representativeness of the achieved sample, and for subsequent use in testing whether valuations varied systematically with

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respect to any of them. Respondents were also asked whether they would be willing to be re-interviewed at a later date.

1.3.4 Retest interviews

In order to test the reliability of the three valuation methods, a sub-sample of approximately 200 respondents was to be interviewed approximately 3 months after the original interview. Respondents selected for reinterview were to be representative of the full sample in terms of sex, age, and qualifications, and collectively were to cover all 45 health states.

Respondents were reinterviewed by the same interviewer who had conducted the original interview with them, and the interview itself was identical, using the same health states as had been valued previously. The exception was that in the background data some additional questions were asked about any experience of illness, in self or others, that the respondent had had since the original interview.

1.3.5 Interviewer selection, training and quality control

A great deal of emphasis was placed on interviewer training. All of the 85 SCPR interviewers attended personal briefings (held in Birmingham, London, Manchester and Newcastle) which involved intensive training in the three valuation methods. A full set of written project instructions was also provided, containing a scripted example interview. After the briefing and before starting their assignments, each interviewer carried out two

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further practice interviews on family or friends.

Assignments were issued in two "waves". The first consisted of 10 addresses per interviewer. Questionnaires returned from this "first wave" were carefully checked, and any interviewers who appeared to be having problems were asked to attend a half-day re-briefing session before they were permitted to carry on with their assignment (13 were so re-called). The second "wave" of 66 addresses per interviewer were then issued (about 4 weeks after the first wave).

The main fieldwork was conducted between August and November 1993, and the reinterviews during December 1993.

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Table 1.1   The EuroQol Descriptive System

Mobility

1.   No problems walking about
2.   Some problems walking about
3.   Confined to bed

Self–Care

1.   No problems with self–care
2.   Some problems washing or dressing self
3.   Unable to wash or dress self

Usual Activities

1.   No problems with performing usual activities (e.g. work, study, housework, family or leisure activities)
2.   Some problems with performing usual activities
3.   Unable to perform usual activities

Pain/Discomfort

1.   No pain or discomfort
2.   Moderate pain or discomfort
3.   Extreme pain or discomfort

Anxiety/Depression

1.   Not anxious or depressed
2.   Moderately anxious or depressed
3.   Extremely anxious or depressed

Note: For convenience each composite health state has a five digit code number relating to the relevant level of each dimension, with the dimensions always listed in the order given above.   Thus 11232 means:

    1   No problems walking about
    1   No problems with self–care
    2   Some problems with performing usual activities
    3   Extreme pain or discomfort
    2   Moderately anxious or depressed

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Table 1.2   EuroQol States Selected for Study

A.   Each respondent valued:

        11111
        33333
        unconscious
        immediate death

B.   Each respondent valued 2 of the following:

        11112
        11121
        11211
        12111
        21111

C.   Each respondent valued 3 states from Set 1, 3 states from Set 2 and 3 states from Set 3.

SET 1	SET 2	SET 3
12211	13212	33232
11133	32331	23232
22121	13311	23321
12121	22122	13332
22112	12222	22233
11122	21323	22323
11312	32211	32223
21312	12223	32232
21222	22331	33321
21133	21232	33323
11113	32313	23313
11131	22222	33212

ANNEXE 1.A   SAMPLE SIZE CALCULATIONS

A1   The purpose of calculating a sample size is to establish the minimum number of observations required to minimise the likelihood that differences in valuations of health states arise by chance. We have two principal objectives that bear upon the choice of sample size. The first is to be able to detect significant differences in the valuations given to different health states. The second is to be able to detect significant differences in the valuations given to any particular state by different subgroups of the general population. In the first case the key element is the number of valuations available for each state. In the second case the key element is the number of people in the subgroups whose valuations are to be compared.

A2   The sample size needed to detect a difference between two means is determined according to the following formula:

$$N = \frac{2(SD^2)}{DIFF^2} \times (\phi(SIG + POWER))^2$$

where the various terms have the following meaning:

N is the size of the sample
SD is the standard deviation
DIFF is the absolute size of the difference it is desired to detect
ϕ is a function of the desired power of the test and the desired significance level
    (derived from standard normal tables)
POWER is the desired power of the test
SIG is the desired significance level

In our case the values of these parameters are as follows:

POWER	=	80%
SIG	=	0.05 or 0.01 (we wished to test the implications of both)
DIFF	=	0.025, 0.05, or 0.10 (we wished to test the implications of all three)
SD	=	0.35 (based on the mean SD for the TTO Props valuations in the Pilot Survey)

The above formulation is based on the assumption of normal distributions. But our experience had shown that we were more likely to be working with skewed distributions. Therefore we would be using the Mann–Whitney U Test, which has about 0.95 of the efficiency of a t–test when the distribution is normal. As a "rule of thumb" therefore, we have adjusted our calculations by 1/0.95 to account for this lower efficiency.

A3 Using these parameter values, the required sample sizes for the comparison of differences in the valuations given to different states are given in Table A1. In the TTO method the smallest difference that it is generally possible to express is .025, or 3 months. To detect such a small difference at the 5% significance level required us to have 3235 valuations for each state. The complication here is that it is impossible for each respondent to value all states, so the number of valuations obtained for most states is much less than the survey population size. For instance, 36 of our chosen states were valued by only 25% of the respondents, so for these states a survey sample size of four times the figures in Table A1 would be needed. As will be seen from Table A1, for these states, it would require a survey size of 3235 to reach the number of valuations required to detect, at the 0.05 level of significance, a 0.05 difference in the valuations assigned to two states. Only for the states valued by everyone would a sample size of 3235 make it possible to detect a .025 difference, and that would only be achievable with a 5% level of significance.

A4 In order to detect differences in the valuations given to a particular health state by different subgroups of the population, the minimum number of people required in any subgroup is given in Table A2 (the numerical similarity with Table A1 should be noted!). Although the numbers in the two tables are identical, the interpretation is rather different. The complication here is that we cannot assume that the subgroups we are interested in will be of approximately equal size, accounting for about half of the whole survey population. If this were so (and it is likely to be approximately so if we wish to compare men with women), then the survey population size would need to be twice the numbers shown in Table A2. Although the age distribution of the population could also be dichotomised into two equal-sized groups, we envisaged that we might want to compare the elderly with the non-elderly, in which case we would have a subgroup which comprised only about 25% of the survey population, so the numbers in Table A2 would need to be multiplied by 4 to arrive at the desired size of the survey. For other subgroup analysis (eg by employment or occupational status, or by housing tenure) the situation may be even worse. Since most such comparisons involve subdividing the survey population into three or more sub-groups of unequal size, it seems prudent to assume that the smallest sub-group will comprise about 25% of the whole survey population. Thus if the sample size were 3235, we would have a minimum of 809 valuations for each health state, or about 200 per smallest subgroup. This should enable a 0.1 difference in valuations between subgroups to be detected at the 5% level.

A5 Our sample size was therefore set at 3235.

Table A1   Number of Valuations Required for Each Health State

Size of difference to be detected	Required Significance Level	
	0.01	0.05
0.025	4827	3235
0.05	1207	809
0.10	302	203

Table A2   Minimum Number of Respondents Required in a Subgroup

Size of difference to be detected	Required Significance Level	
	0.01	0.05
0.025	4827	3235
0.05	1207	809
0.10	302	203

CHAPTER 2   THE STUDY POPULATION

2.1   Response Rate

As detailed in 1.3.1, 6080 addresses were selected for sampling. Of these, 706 (12%) were

found to be 'out of scope' of the survey, being non–residential, empty/derelict, untraceable,

or even not yet built.

Of the remaining 5324 addresses, 3395 interviews were achieved, giving a response rate of

64% on in–scope addresses. Table 2.1 shows reasons for unsuccessful interviews.

2.2   Representativeness of the Sample

The achieved sample was compared with the general population using data from the 1991

Census and the 1992 General Household Survey (GHS). The survey data were first weighted

to correct for the effect of varying household size on selection probabilities. Each respondent

was given a weight according to the number of adults living in the household.

The sample has nearly identical characteristics as the general population (Table 2.2).

2.3   Geographical Coverage

Table 2.3 shows the percentage of respondents living in the 8 standard economic regions and

the 14 Regional Health Authority (RHA) areas of England and in Wales and Scotland. It will

be seen that good geographical coverage has been achieved.

2.4   Other Characteristics of the Study Population

2.4.1   Experience of illness

Personal experience of illness: 31.8% (1076) of respondents reported that they had had a
serious illness at some time in their life. One third of these respondents failed to give full
data (including month of the year) on duration of their most recent illness. Of the remainder,
approximately equal numbers reported durations of under 1 year and more than 1 year (see
Table 2.4). Similar proportions (41% and 37%) of respondents reported that their illness was
either still continuing at the time of interview or had ended more than 5 years ago.

Experience of illness in others: 72.1% (2445) of respondents reported that somebody close
to them had had a serious illness at some time. Respondents could refer to more than one
such experience, and thus in total, there were 3770 reports of serious illness in others. Most
(82.0%) cases referred to serious illness in close family members (grand/parent, grand/child,
sibling, spouse or partner), see Table 2.4. Most experience was of long–term illness and in
half the cases the illness had ended more than 5 years ago.

Experience looking after ill people at work: 15.2% (512) of respondents reported that they
had, at some time in their life, had a job that was concerned with looking after people who
were ill or not able to care for themselves. Of these respondents approximately two–thirds
had been directly involved in patient treatment: 159 (31.1%) as nurses, doctors or other health

professionals (physiotherapists, ambulance staff, social workers etc), 160 (31.3%) as home helps or care assistants (including houseparents, nursing auxiliaries), and 12 (2.3%) in the voluntary sector. The remaining one-third were not involved directly in patient care: 137 (26.8%) were hospital administrators, porters, chefs, cleaners, technicians etc, 14 (2.7%) were student nurses or doctors and 8 (1.6%) were 'other' (athlete, trainer etc). 24 (4.7%) gave incomplete data.

2.4.2   Other characteristics

Average household size was 2.5 people, with average of 0.7 children under 15 living at home. 95.1% of the other household members were either partner/spouse or child of the respondent. 6.9% were parents, 4.8% were other relatives and 3.1% were unrelated. Most of the respondents (89%) held legal responsibility, either alone or jointly, for their home.

31% of respondents were current smokers, of whom 33% smoked 20 or more cigarettes per day (28% less than 10 and 39% 10-19 per day).

2.5   Interview-Related Variables

When judging the health states, respondents were drawing on a wide range of experience of illness. 29% thought only of their own personal experience, a further 20% thought only of someone else's experience, 15% thought of both themselves and someone else while 36% were not thinking of anyone directly.

Respondents were asked if the way in which they valued the health states was affected by anything that might happen in their life over the next ten years. About a third (34%) of respondents reported that it was affected: details of the event expected and its influence on their judgement are still to be analysed.

92 interviewers conducted the 3395 interviews with an average of 37 per interviewer.

2.6 Summary

1. A response rate of 64% on in-scope addresses has been achieved.

2. The selection process has been successful in achieving a representative sample of the British general population.

Table 2.1   **Response Rate for Survey**

Reason for no interview:

– Refusal by selected person	732	
– Refusal of all information	402	
– Ill/away/senile	224	
– No contact at address	175	
– Broken appointment	136	
– Proxy refusal	127	
– No contact with selected person	74	
– Inadequate English	53	
– Other reasons	6	
Total unsuccessful interviews	1929	36%
Total completed interviews	3395	64%
Total in–scope addresses	**5324**	**100%**
Out of scope addresses	756	
Total addresses sampled	**6080**	

Table 2.2   **Representativeness of the Sample**

Unless otherwise stated, GHS data are calculated for adults aged 16+ years and Census data for adults 18+ years.
For study population N=3395.
Percentages not summing to 100 are due to rounding.

	Survey (unweighted) %	Survey (weighted) %	1992 GHS %	1991 Census %
Sex[1]:				
Men	43	46	47	48
Women	57	54	53	52
Age:				
18–24	9	11	11	13
25–34	22	22	20	20
35–49	25	26	27	26
50–59	14	14	15	14
60–64	7	7	7	7
65+	24	19	21	21
Age within sex:				
Men:				
18–24	4	5	6	7
25–34	10	10	9	10
35–49	11	12	13	13
50–59	6	7	7	7
60–64	3	3	3	3
65+	10	9	9	8
Women:				
18–24	5	6	6	7
25–34	12	12	10	10
35–49	14	15	14	13
50–59	8	8	7	7
60–64	4	4	3	3
65+	14	10	12	12
Qualifications:				
Degree	9	10	8	–
Higher educ.	11	11	10	–
A level	9	10	11	–
GCSE A–C	20	20	23	–
GCSE D–G	11	11	11	–
Foreign/other	3	3	3	–
None	37	34	35	–

Table 2.2 continued...

	Survey (unweighted)	Survey (weighted)	1992 GHS	1991 Census
Tenure[2]:				
Own outright	26	26	25	23
Mortgage	40	44	42	47
Rent LA/HA	24	21	25	21
Rent private	8	8	7	6
Other	2	2	2	2
Social Class[3]:				
I–II	29	30	–	30
IIIN	24	25	–	22
IIIM	20	21	–	21
IV–V	25	24	–	21
Other	1	1	–	3
Accommodation[4]:				
Detached house	22	–	20	20
Semi–detached	31	–	31	29
Terraced	26	–	28	29
Flat	19	–	20	21
Other	2	–	1	1
Economic position:				
In paid work	48	53	–	56
Seeking work	6	6	–	5
Students	2	3	–	2
Sick/disabled	4	4	–	4
Retired	22	19	–	20
Other	18	16	–	13
Marital status:				
Single	17	17	21	–
Married/cohab.	60	68	64	–
Widowed	13	8	9	–
Divorced	10	7	6	–

(1)   GHS data based on adults aged 18 and over

(2)   Note that unweighted survey data should be compared with GHS data (based on households) but weighted survey data should be compared with Census (based on individual adults 18+yrs)

(3)   Census data based on adults aged 16 and over

(4)   GHS and Census data based on households not persons

Table 2.3   Geographical Coverage of the Sample

For study sample, N=3395.

	SAMPLE (unweighted) %	SAMPLE (weighted) %	1992 GHS %
Standard region			
North	6	6	6
Yorks + Humberside	8	7	9
East Midlands	11	10	7
East Anglia	4	4	4
South East	25	26	30
South West	11	11	9
West Midlands	9	9	9
North West	12	12	12
Wales	4	4	5
Scotland	11	10	9
RHA area			
Scotland	11	10	9
Northern	6	6	6
Yorkshire	6	6	6
Trent	9	9	9
East Anglia	4	4	4
North West Thames	6	6	5
North East Thames	6	6	6
South East Thames	5	5	7
South West Thames	4	5	6
Wessex	7	7	5
Oxford	4	4	6
South Western	6	7	6
West Midlands	9	9	9
Mersey	5	5	4
North Western	7	7	8
Wales	4	4	5

Table 2.4   Experience of Serious Illness in Self and Others

	N	%
Experience of illness in self		
Duration: <1 month	66	9.4
1–12 months	277	39.3
1–5 years	177	25.2
5+ years	183	21.0
TOTAL	703	100.0
(Missing	373)	
Ended: still continuing	429	41.1
in last year	55	5.3
1–5 years ago	172	16.5
5+ years ago	388	37.2
TOTAL	1044	100.0
(Missing	32)	
Experience of illness in others		
Close family member	3066	82.0
Other relative	491	13.1
Friend	154	4.1
Other	27	0.7
TOTAL	3738	100.0
(Missing	32)	
Started: in last year	240	6.4
1–5 years ago	889	23.9
5+ years ago	2596	69.7
TOTAL	3725	100.0
(Missing	45)	
Ended: still continuing	801	21.6
in last year	309	8.3
1–5 years ago	764	20.6
5+ years ago	1831	49.4
TOTAL	3705	100.0
(Missing	65)	

CHAPTER 3   DATA QUALITY

This chapter deals with the quality of data collected from 3395 respondents, focussing in turn on the achieved coverage of health states, the amount of missing data and then logical inconsistency within each of the ranking, VAS and TTO methods. For all three methods the data have been examined to determine whether the data from any respondents (or interviewers) should be excluded from further analysis. Criteria for exclusion are as stringent as possible and thus data have been excluded only when absolutely necessary.

3.1   Coverage of States

As described in 1.3.2 the 45 states were divided into 5 groups.

Group 1: 11111, 33333, unconscious and death.

      All respondents should have rated these states.

Group 2: 11112, 11121, 11211, 12111, and 21111.

      Each respondent should have rated 2 of these states.

Group 3: consisting of 12 mild states.

      Each respondent should have rated 3 of these states.

Group 4: consisting of 12 intermediate states.

      Each respondent should have rated 3 of these states.

Group 5: consisting of 12 severe states.

Each respondent should have rated 3 of these states.

Table 3.1 shows that there were major differences between the intended and the actual number of times each state was used.

Discrepancies between intended and actual use arose for two reasons. Firstly, the interviewers did not need to use all the card allocation sheets assigned to them and thus the different states within each group would not have been rated exactly the same number of times.

Secondly, there were 41 cases where the interviewer used the wrong state(s) in an interview. In 15 of these only one state was used incorrectly, e.g. state MV was used instead of state MG, while in another case 2 states were chosen incorrectly. In the other 25 cases all the states were incorrect indicating that the interviewer had used the wrong card allocation sheet.

The net effect of these errors within and between groups of states was small since in the majority of cases a state was replaced by another belonging to the same group. It can be inferred from the fourth column of Table 3.1, that overall there were 4 fewer states from Group 3 than intended, 3 more states from Group 4 and 1 more state from Group 5.

3.2 Missing, Incomplete or Unusable Data

3.2.1 By variable

The data set from 3395 respondents was near complete (Table 3.2). Ranking was the most complete of the three methods but even on TTO the maximum missing data was only 2.7% for any one state (see Figure 3.1). The states with the most missing data were not always the most severe ones.

3.2.2 By respondent

For each valuation method respondents with insufficient data for further analysis were identified. These included respondents with a large amount of missing data, or with VAS scores that could not be standardised ('death' equal to or greater than 11111; 11111 and/or 'death' missing). In addition, for modelling a tariff, at least 3 states must be valued (besides 11111 and 'death') on both VAS and TTO.

3.2.2.1 The Ranking Exercise

Data for the vast majority (over 99%) of respondents were complete. However, the rank for each state was determined by its position within the set of 15 presented to each respondent, so that any missing data would compromise the information content. Hence, only the data from respondents with a complete set of rankings were used in the analysis of the ranking data. A total of 31 respondents were excluded on the grounds of missing data.

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A further 39 respondents ranked death above all states except 11111. Data from these respondents were excluded also.

A total of 70 respondents were excluded from the analysis of the ranking data; their ID numbers are listed in Annexe 3A. Interviewer comments on these respondents are listed in Annexe 3D. One third made some specific mention of death (usually recent bereavement) and the physical or mental state of the respondent was also a common feature of interviewers' comments.

3.2.2.2   The VAS Valuation Exercise

The following respondents had insufficient VAS data for analysis:

27 with completely missing VAS data

13 with only 1 or 2 states valued

12 with 11111 and/or death missing

29 with death rated equal to or higher than 11111

 3 with less than 3 states valued besides death and 11111

 0 with all states given the same value

-----

84 total

A further 19 respondents had rated death higher than all other states except 11111 i.e. they were saying that if they were in any other state than perfect health they would rather be dead.

In all cases death was scored greater than 90.

The ID numbers of these 103 respondents are shown in Annexe 3A. The respondents were scattered over 50 interviewers with the maximum per interviewer being 6.

Interviewers' comments about these respondents are reproduced in Annexe 3D. The most frequent comment related to the respondent's inability to understand one or other of the valuation methods.

3.2.2.3 The TTO Valuation Exercise

The following respondents had insufficient TTO data for analysis:

15 with completely missing TTO data

13 with only 1 or 2 states valued

13 with all states given the same value

-----

41 total

The majority of respondents giving the same score to all states held beliefs such that 'Because of her religion she could never choose death rather than 10 years of illness' or 'life is always better than death'. These respondents were considered 'conscientious objectors'.

A further 7 respondents had rated all states as worse than death i.e. they were saying that if

they were in any other state than perfect health they would rather be dead.

The ID numbers of these respondents are shown in Annexe 3A.

These 48 respondents were scattered over 31 interviewers with the maximum per interviewer being 4.

Interviewers' comments about these respondents are reproduced in Annexe 3D. Again, a frequent comment was that the respondent was unable to understand the task(s) presented to him/her. In addition, there were refusals to do TTO because of lack of personal experience of the health states and further comments suggested that some respondents found the interview depressing, often because of a recent bereavement.

3.2.3 By interviewer

3.2.3.1   The Ranking Exercise

The vast majority of interviewers recorded a complete set of rankings. Twenty-three interviewers account for the 32 respondents with any missing data. Two interviewers had missing ranking data for 3 respondents; 5 interviewers had missing data for 2 respondents.

Given such small numbers, no further investigation of interviewer-related exclusions were made.

3.2.3.2   The VAS Valuation Exercise

On average, 3.1% of each interviewer's respondents had <u>at least one state</u> with missing/unusable data.   42% (39) interviewers had complete VAS data sets from all respondents (see Figure 3.2). The 3 interviewers with highest rates of missing data are shown in Annexe 3B. None of them had required remedial training and their respondents were similar to the rest of the sample in terms of background characteristics. The rate of missing data was so low that there seemed no justification to exclude their data from the survey.

3.2.3.3   The TTO Valuation Exercise

On average, 8.7% of each interviewer's respondents had <u>at least one state</u> with missing/unusable data. 14% (13) of the interviewers had complete TTO data sets from all respondents (see Figure 3.3). The 3 interviewers with highest rates of missing data are shown in Annexe 3B. Interviewer #5.1 carried out only two interviews and one of these was incomplete.

3.2.4 <u>TTO Special Cases</u>

Where an interviewer had failed to record the final question on the TTO valuation task (i.e. if time in good health was 'something and six months'), the coder recorded the value for the state up to that point but ended the score in '49' for states rated better than death and '499' for states rated worse than death. 0.2% (50 out of 25569) 'better than death' responses ended in '49' and 0.6% (106 out of 16387) 'worse than death' responses ended in '499'. These 156

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responses were spread amongst 41 of the interviewers, with the maximum being 18 (interviewer #40). 32% (16) of the 50 failures to code the final 'better than death' question were scored 0.949 (i.e. at the very top end of the scale) and 32% (34) of the 106 failures to code the final 'worse than death' question were scored −9.499 (i.e. at the very bottom of the scale). Scores ending in '49' were spread across most of the states, with no more than 5 on any one state. Scores ending in '499' were also spread across most of the states but 34% (36) of the 106 were associated with 'unconscious' and 33333.

In the main data analysis, scores ending in '49' have been rounded up to '50' and scores ending in '499' have been rounded up to '500'. In both cases the valuation is thus assumed to be 'something and a half years'.

3.3   Internal (Logical) Consistency

Due to the ordinal nature of levels within each EuroQol dimension, there are some states that should be given a higher ranking and score than other states e.g. state 22323 should be ranked and rated lower than 22112 because it is equal or worse on each dimension. The definition of logical consistency used here is a 'strong' one as the better state is required to be valued higher than the worse state and not just equal to it.

There were 402 such comparisons for the ranking and VAS methods and 360 for the TTO (11111 was not valued directly).

Each respondent valued a different set of states and thus had a different number of possible

comparisons. An inconsistency rate (expressed as a percentage) has been calculated for each respondent, where

inconsistency rate = number of actual inconsistencies

_____

number of possible inconsistencies

3.3.1 The ranking exercise

Excluding the respondents indicated in section 3.2.2.1, inconsistency rates were computed for the remaining 3325 respondents who had complete data on the ranking procedure. The mean inconsistency rate across these respondents was 2.6%, with over half of all respondents (56%) recording no logical inconsistencies.

Five percent of respondents recorded an inconsistency rate in excess of 12%, and these were classified as 'high' rate respondents. Respondents in this group were more likely to have lower education ($p<0.001$), to be retired ($p=0.004$), to be in social classes IV/V ($p<0.001$), to rent rather than own their accomodation ($p<0.001$), to report experience of past illness ($p<0.05$), to display major difficulty with ranking, rating and TTO methods ($p<0.001$), to report problems with mobility ($p=0.002$) and pain ($p<0.001$), and to be older ($p=0.002$).

3.3.2 The VAS valuation exercise

Excluding the 103 respondents described in 3.2.2.2, the remaining 3292 respondents had an

average logical inconsistency of 2.5%. About half (57.4%) of respondents had no inconsistency at all.

The 178 respondents in the top 5% for VAS inconsistency (i.e. inconsistency rate greater than 11.11%) were more likely (on Mann–Whitney tests) to be female ($p<0.01$), to be separated/divorced or widowed ($p<0.01$), to be retired ($p<0.001$), to be aged 60+ ($p<0.001$), to have no qualifications ($p<0.001$), to be smokers ($p<0.001$), not to be home owners ($p<0.001$), to be in social classes III–V ($p<0.001$), to have worked with ill people ($p<0.05$), to report 'own health' problems on all EuroQol dimensions ($p<0.001$ for mobility & pain; $p<0.01$ for selfcare, usual activities & mood) and to have difficulty with all valuation methods ($p<0.001$ each). **2** of them were among the 48 with missing, incomplete or unusable TTO data (#4803 and #5287).

3.3.3 The TTO valuation exercise

Excluding the 48 respondents described in 3.2.2.3, the remaining 3347 respondents had an average logical inconsistency of 6.2%. More than a quarter (28.2%) of respondents had no inconsistency at all.

The 171 respondents in the top 5% for TTO inconsistency (i.e. inconsistency rate greater than or equal to 20.0%) were more likely (on Mann–Whitney tests) to be separated/divorced or widowed ($p<0.01$), to be retired ($p<0.001$), to be aged 60+ ($p<0.001$), to have no qualifications ($p<0.001$), not to be home owners ($p<0.001$), to be in social classes III–V ($p<0.01$), to report 'own health' problems on all EuroQol dimensions ($p<0.05$ each), to have

difficulty with all valuation methods (p<0.001 each), and to refuse re–interview (p<0.05). **8** were among the 103 with missing, incomplete or unusable VAS data and thus were excluded from further analysis of the TTO data set.

Interviewer #5.1 was found to be in the top 5% for TTO inconsistency. Since this interviewer also had missing data and conducted only two interviews her data were excluded from both VAS and TTO data sets.

3.4   Exclusions from the Data Set

3.4.1   From the Ranking data set

A total of 70 respondents have been excluded from the analysis of the ranking data. These 70 respondents were statistically significantly different from the remaining 3325 respondents (see Table 3.3 and Annexe 3C) in that they were more likely to

    record some problems with mobility (p <0.01)

    have reported difficulty with ranking, rating and TTO procedures (p<0.001)

3.4.2   From the VAS data set

In total the data from 107 respondents have been excluded from further analysis of the VAS data set. These are the 103 respondents described in 3.2.2.2, the 2 respondents described in 3.3.2 and the 2 respondents from interviewer #5.1.

These 107 respondents were statistically significantly different from the remaining 3288 respondents in a number of ways (see Table 3.3 and Annexe 3C):

Socio-demographic:

– higher mean age (t-test,t=5.59,p<0.001)

– more were separated/divorced/widowed (X^2=18.6,df=1,p<0.001)

– more had no qualifications (X^2=6.5,df=1,p<0.05)

– more were retired (X^2=24.6,df=2,p<0.001)

Own health:

– more had past/current serious illness (X^2=5.7,df=1,p<0.05)

– more had problems with mobility (X^2=15.7,df=1,p<0.001)

– more had problems with usual activities (X^2=4.1,df=1,p<0.05)

– more had problems with pain/discomfort (X^2=4.9,df=1,p<0.05)

– more had problems with anxiety/mood (X^2=14.9,df=1,p<0.001)

– own health status was rated lower (M–W U=129763.0,p<0.01)

Performance of interview:

– more had major difficulty on ranking (X^2=101.2,df=1,p<0.001)

– more had major difficulty on VAS (X^2=181.0,df=1,p<0.001)

– more had major difficulty on TTO (X^2=66.2,df=1,p<0.001)

– fewer agreed to a reinterview (X^2=45.0,df=1,p<0.001)

– took longer to complete interview (t-test,t=2.45,p<0.05)

3.4.3 From the TTO data set

In total the data from 58 respondents have been excluded from further analysis of the TTO data set. These are the 48 respondents described in 3.2.2.3 plus the 8 described in 3.3.3, plus the 2 from interviewer #5.1.

These 58 respondents were statistically significantly different from the remaining 3337 respondents in a number of ways (see Table 3.3 and Annexe 3C):

Socio-demographic:

– higher mean age (t-test,t=5.46,p<0.001)

– more were separated/divorced/widowed (X^2=18.8,df=2,p<0.001)

– more had no qualifications (X^2=16.0,df=2,p<0.001)

– more were retired (X^2=21.7,df=2,p<0.001)

– more rented their home (X^2=3.9,df=1,p<0.05)

Own health:

– more had past/current serious illness (X^2=6.5,df=1,p<0.001)

– more had problems with mobility (X^2=13.9,df=1,p<0.001)

– more had problems with pain/discomfort (X^2=4.7,df=1,p<0.01)   – more had problems with anxiety/mood (X^2=4.3,df=1,p<0.05)

Performance of interview:

– more had major difficulty on ranking (X^2=120.9,df=1,p<0.001)

- more had major difficulty on VAS (X^2=145.7,df=1,p<0.001)

- more had major difficulty on TTO (X^2=196.0,df=1,p<0.001)

- fewer agreed to a reinterview (X^2=43.2,df=1,p<0.001)

3.4.3   From the combined VAS and TTO data sets

To ensure equivalent numbers of respondents when examining the relationship between the VAS and TTO valuation methods, only respondents with complete data sets on both methods have been included. Thus in total the data from 399 respondents have been excluded from the combined VAS and TTO data set:

   107   already excluded from VAS data set

    58   already excluded from TTO data set

    27   further with any state missing on VAS

   247   further with any state missing on TTO

   - 41   common to more than one group of exclusions

   398

These 398 respondents were statistically significantly different from the remaining 2997 respondents in a number of ways (see Table 3.3 and Annexe 3C):

Socio-demographic:

- mean age higher (t-test,t=6.19,p<0.001)

– more were separated/divorced/widowed (X^2=15.7,df=2,p<0.001)

– more had no qualifications (X^2=26.9,df=2,p<0.001)

– more were retired (X^2=34.2,df=2,p<0.001)

Own health:

– more had past/current serious illness (X^2=10.7,df=1,p<0.01)

– more had problems with mobility (X^2=9.1,df=1,p<0.01)

– more had problems with mood (X^2=4.3,df=1,p<0.05)

Performance of interview:

– more had major difficulty on ranking (X^2=68.4,df=1,p<0.001)

– more had major difficulty on VAS (X^2=142.7,df=1,p<0.001)

– more had major difficulty on TTO (X^2=157.9,df=1,p<0.001)

– fewer agreed to a reinterview (X^2=37.5,df=1,p<0.001)

The 398 respondents were spread across 85 interviewers.

3.5 Summary

1. Full *coverage* of the 45 health states was achieved through the system of card allocation sheets. There were no major differences between the intended and the actual number of times each state was used.

2. There were few *missing data* from 3395 respondents. Ranking was the most complete

of the three methods but even on TTO the maximum missing data was only 2.7% for any one state.

3. *Logical consistency* within method was also surprisingly high, with an average of of 97.5% on the VAS and 93.8% on the TTO.

4. Four separate data sets have been examined here: a ranking data set, a VAS data set, a TTO data set and a combined VAS and TTO data set.

5. Some respondents have been excluded from each data on the grounds of missing data and logical inconsistency but, despite stringent criteria, the numbers are extraordinarily small: 107 (3.2%) respondents have been excluded from further analysis of the VAS data set, 58 (1.7%) respondents from the TTO data set and 398 (11.7%) respondents from the combined data set. Although the excluded respondents have tended to be those older than 60 years and with no educational qualifications, the respondents remaining in each data set are still representative samples of the general population (see Table 3.3).

Table 3.1   **Intended versus achieved use of each state**

STATE	INTENDED[1]	ACTUAL[2]	DIFFERENCE*
11111	3395	3395	0
33333	3395	3395	0
unc.	3395	3395	0
death	3395	3395	0
11112	1358	1347	−11
11121	1358	1359	+ 1
11211	1358	1376	+18
12111	1358	1354	− 4
21111	1358	1354	− 4
12211	849	854	+ 5
11133	849	853	+ 4
22121	849	856	+ 7
12121	849	851	+ 2
22112	849	858	+ 9
11122	849	849	0
11312	849	849	0
21312	849	839	−10
21222	849	849	0
21133	849	845	− 4
11113	849	844	− 5
11131	849	834	−15
13212	849	848	− 1
32331	849	849	0
13311	849	839	−10
22122	849	836	−13
12222	849	854	+ 5
21323	849	847	− 2
32211	849	855	+ 6
12223	849	851	+ 2
22331	849	841	− 8
21232	849	848	− 1
32313	849	862	+13
22222	849	858	+ 9

Table 3.1 Continued...

STATE	INTENDED[1]	ACTUAL[2]	DIFFERENCE[*]
33232	849	854	+ 5
23232	849	845	− 4
23321	849	848	− 1
13332	849	839	−10
22233	849	849	0
22323	849	844	− 4
32223	849	847	− 2
32232	849	853	+ 4
33321	849	848	− 1
33323	849	861	+12
23313	849	850	+ 1
33212	849	848	− 1

1 − nominal total based on interviewers completing equal numbers of interviews
2 − actual total

* A positive number means that a state has been valued more times than intended, a negative number that it has been valued fewer times than intended.

Table 3.2   Missing, incomplete or unusable data by variable

All figures represent percentage of data missing
(n=3395)

Age	Sex	Marital	School	Qualifs	Social Class	Accom
0.1	0	0.11	0.2	0.1	2.9	0.1

Rent	Smoke	Illjob	Illself	Illother	Judge	Next10yrs
0.3	0.1	0.8	0.3	0.1	0.3	0.5

Diffrank	DiffVAS	DiffTTO	Reint	Timeint
1.3	1.4	1.7	1.1	0.3

MOB	Selfc	UAct	PAIN	MOOD	CROWN
0.2	0.3	0.2	0.2	0.2	0.4

Table 3.3   Characteristics of respondents

Figures are percentages except for **Own** health and Time taken.

	RANKING DATA SET n=3325	VAS DATA SET n=3288	TTO DATA SET n=3337	COMBINED DATA SET n=2997	GHS[1]
Mean age (S.D.)	47.8 (18.3)	47.5 (18.2)	47.7 (18.3)	47.1 (18.1)	–
% aged over 64	23.5	21.3	23.1	21.9	15.0
Female	56.7	56.7	56.8	56.9	52.0
Sep/div/widowed	23.0	22.6	22.8	22.0	15.0
No qualifications	36.8	36.5	36.5	35.5	34.0
Retired	22.4	22.0	25.6	24.6	–
Rent home	32.7	32.9	33.1	33.3	34.0
Prof/managers	18.5	16.1	15.1	15.0	18.0
Current smokers	30.9	31.0	30.9	30.9	28.0
Past/current illness	31.6	31.4	31.5	30.8	–
Prob. mobility	18.1	17.9	18.1	17.7	–
Prob. selfcare	4.2	4.3	4.2	4.1	
Prob. usual activ.	16.2	16.0	16.2	16.1	–
Prob. pain/discom.	32.8	32.7	32.8	32.7	–
Prob. anx/dep	20.8	20.5	20.8	20.4	–
Own health–median (IQR)	90.0 (75–95)	90.0 (75–95)	90.0 (75–95)	90.0 (75–95)	–

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[1] General Household Survey, Series GHS no.23, OPCS, HMSO, London, 1992.

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Table 3.3 Continued....

	RANKING DATA SET n=3325	VAS DATA SET n=3288	TTO DATA SET n=3337	COMBINED DATA SET n=2997	GHS[2]
Major diff.–ranking	11.0	10.4	10.6	9.8	–
Major diff.–VAS	8.3	7.6	8.0	6.7	–
Major diff.–TTO	5.0	4.8	4.7	3.6	–
Time taken–mean (S.D.)	53.8 mins (14.5)	53.7 mins (14.4)	54.2 mins (14.6)	53.7 (14.5)	–
Refused reinterview	15.6	15.2	16.7	15.8	–

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[2] General Household Survey, Series GHS no.23, OPCS, HMSO, London, 1992.

Figure 3.1

Health states scores missing or unusable by method

Number of states

	<0.5	0.5-0.9	1.0-1.4	1.5-1.9	2.0-2.4	>2.4
Ranking	16	28	1	0	0	0
VAS	0	6	10	17	11	1
TTO	0	0	6	19	10	8
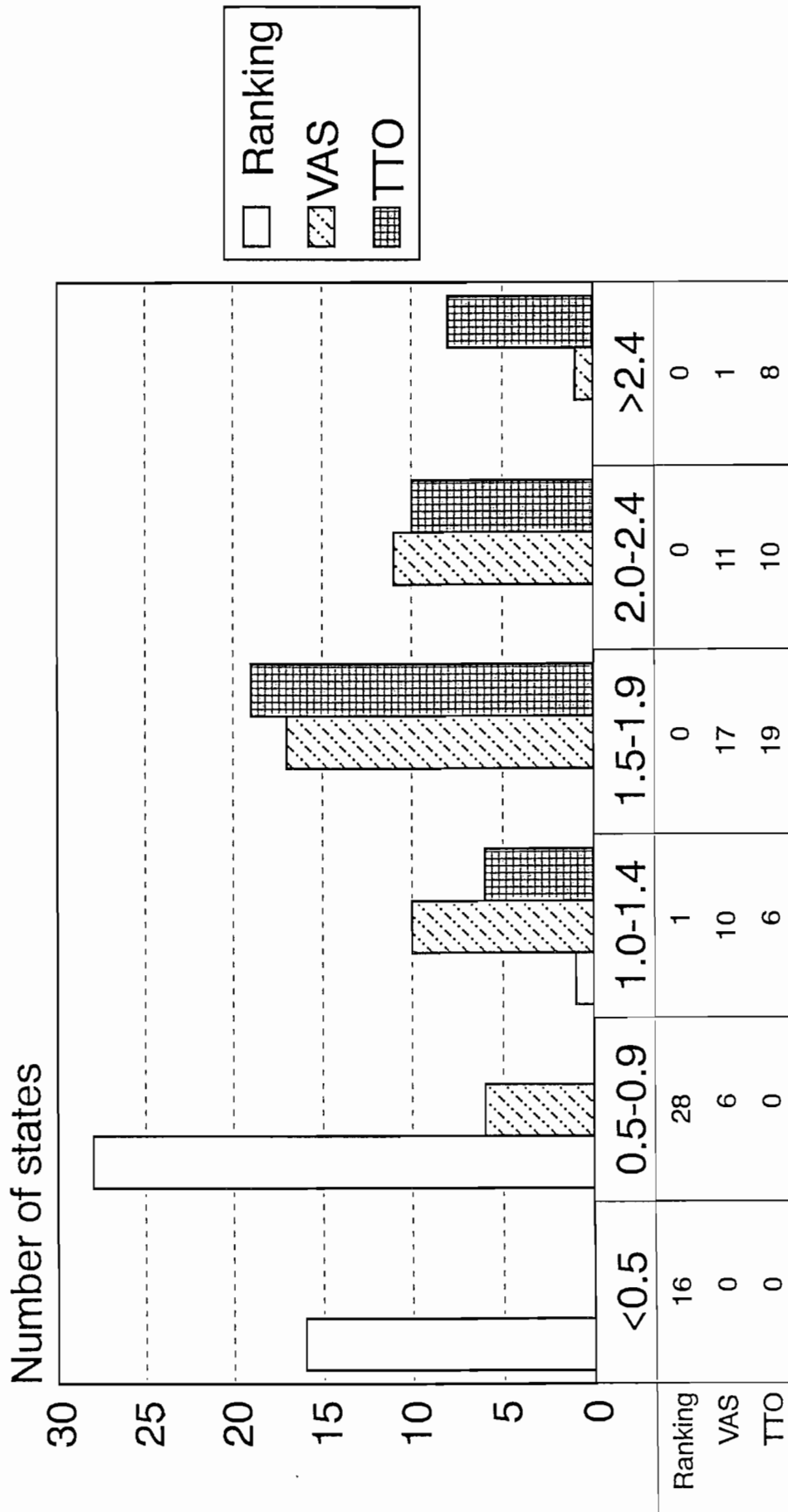
Percentage missing data

Figure 3.2

Missing or unusable health state scores by interviewer - VAS

VAS	0	0.1-3.0	3.1-6.0	6.1-9.0	9.1-12.0	>12.1
VAS	39	20	14	9	7	3

Number of interviewers

Percentage missing/unusable data

Figure 3.3

Missing or unusable health state scores by interviewer - TTO

Number of interviewers

Percentage missing/unusable data

TTO	0	0.1-8.0	8.1-16.0	16.1-24.0	24.1-32.0	>32.0
	13	35	31	5	4	4
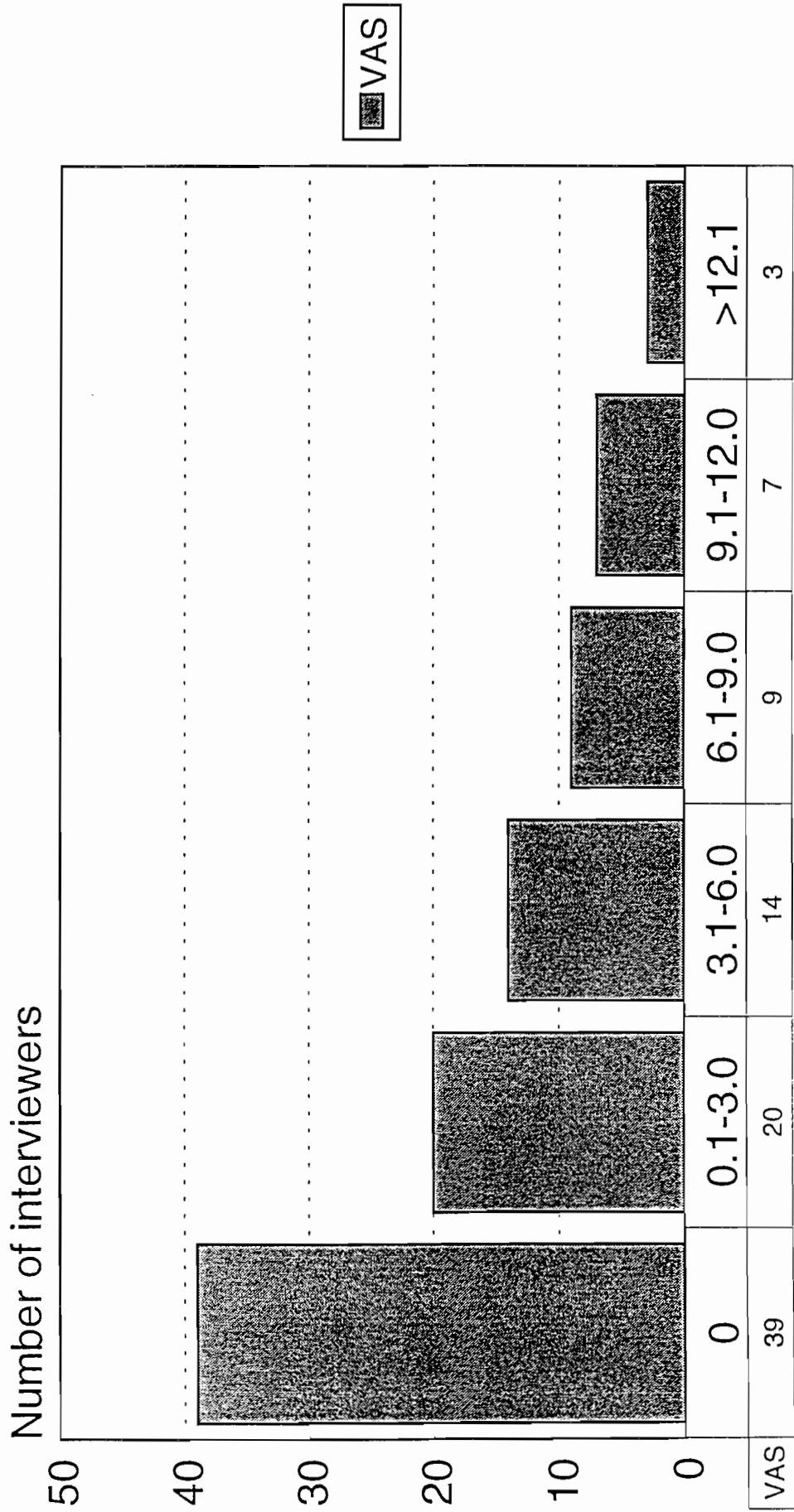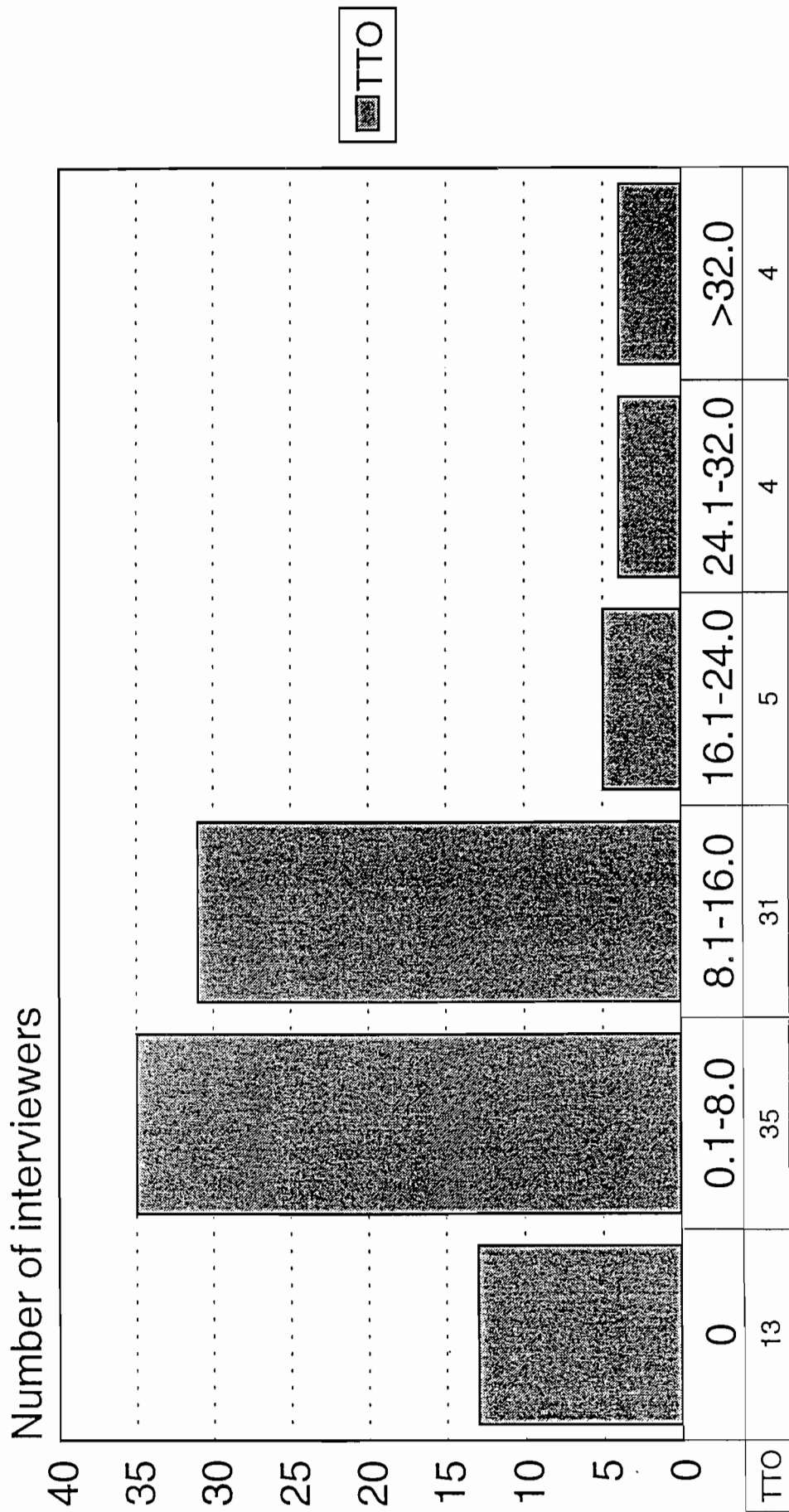
ANNEXE 3A   RESPONDENTS EXCLUDED FROM RANKING, VAS AND TTO DATASETS

RESPONDENTS EXCLUDED FROM RANKING DATASET

1.   **31** respondents with incomplete ranking data
        175   177   487   490   740   751   753   967   1434   1619   2015   2238   2567   3018   3376   3656
        3839 3968 4255 4411 4455 4531 4711 4808 5133   5190   5209   5239   5308   5416   5425

2.   **39** respondents with DEATH rated higher than 11111 :
        415   542   591   850   956   1350   1965   2184   2279   2302   2663   2865
        3044   3057   3101   3251   3258   3441   3485   3842   4166   4212   4217   4323
        4452   4460   4525   4587   4603   4619   4742   5065   5246   5307   5508   5596
        5883   5905

RESPONDENTS EXCLUDED FROM VAS DATA SET

1.   **27** respondents with completely missing VAS data:
        175   177   487   490   753   969   1090   1303   1392   1434   2001   2141   2238   3083   4255   4513   4523
        4531   4711   4823 5048   5057   5190   5226   5239   5993   5995

2.   **13** respondents with 13 14 or 15 states missing:
         79   121   163   795   1418   2184   2454
        3262   4864   5202   5209   5542   6054

3.   **12** respondents with 11111 and/or DEATH missing:
         78   126   243   1532   1933   1954
        1959   1975   2534   3460   4241   4525

4.   **29** respondents with DEATH rated higher than 11111:
         97   392   415   591   836   911   947   956   1327   1744   1767   2315   3044   3101   3194   3245   3499
        3858   4020   4188   4212   4217   4232   4315   4527 4619   5065   5081   5307

5.   **3** respondents with <3 states valued <u>besides</u> 11111 + DEATH:
        526   3857   5225

6.   **19** respondents with DEATH rated higher than all other states except 11111:
         542   648   964   1938   2116   2302   2663   2865   3057 3251
        3258   3485   3842   4343   4452   4460   4742   5246   5596

7.   **2** respondents with high inconsistency on VAS and unusable data on TTO:
        4803 5287

8.   **2** respondents from interviewer #5.1:   307 and 308

RESPONDENTS EXCLUDED FROM TTO DATA SET

1.   **15** respondents with completely missing VAS data:
         487   490   795   1422   2141   2387   3508   4255
        4525   4696   4846   5209   6050   6054   6069

2.   **13** respondents with 11 or 12 states missing:
         215   691   749   827   943   969   1317
        1443   1464   1505   2184   4722   5190

3.   **13** respondents with the same score for all states:
         319   347 1091 1353 2195 2364 2410
        2512 3348 3394 3689 3862 5375

4.   **7** respondents with all states worse than death:
         866 1272 3794 4803 5287 5483 5596

5.   **8** respondents with high inconsistency on TTO and unusable data on VAS:
         175   753 3075 4232 4711 4823 5057 5239

6.   **2** respondents from interviewer #5.1: 307 and 308

ANNEXE 3B   INTERVIEWERS ASSOCIATED WITH MISSING DATA

1. *VAS Valuation Exercise:*

Interviewer #14.3: 2 of 15 (13.3%) interviews were incomplete on the VAS. One respondent had 4 missing states and the other had rated death higher than 11111. Two further respondents (879,908) were in the top 5% for VAS inconsistency.
These 15 respondents reported more pain/discomfort than the rest of the sample (Fisher's Exact Test p<0.05) but were otherwise similar.
This interviewer had replaced another interviewer.

Interviewer #56: 6 of 35 (17.1%) interviews were incomplete on the VAS. One respondent had all VAS data missing, one had omitted to value death and the other four had rated death higher than 11111.
There was a greater percentage of women among these 35 respondents than among the other 3360 (X^2=5.5,df=1,p<0.05) but they were otherwise similar.

Interviewer #69: 6 of 37 (16.2%) interviews were incomplete on the VAS. Three respondents had all VAS data missing and three had rated fewer than 3 states. Two further respondents (5201,5243) were in the top 5% for VAS inconsistency.
These 37 respondents had similar characteristics to the rest of the sample but, according to the interviewer, more of them had major difficulty with each of the valuation tasks (Ranking:X^2=9.0,df=1,p<0.01; VAS:X^2=15.6,df=1,p<0.001; TTO:X^2=4.9,df=1,p<0.05)

2. *TTO Valuation Exercise:*

Interviewer #5.1: 1 of 2 (50%) interviews were incomplete on the TTO. No statistically significant differences from the rest of the sample. Interviewer was replaced after completing 2 interviews.

Interviewer #31: 4 of 12 (33.3%) interviews were incomplete on the TTO. These 12 respondents were more likely to have qualifications (X^2=13.3,df=2,p<0.01) than the rest of the sample.

Interviewer #40: 4 of 12 (33.3%) interviews were incomplete on the TTO. These 12 respondents were more likely to have problems with self-care (X^2=25.0,df=1,p<0.001) than the rest of the sample.

ANNEXE 3C   CHARACTERISTICS OF RESPONDENTS WITH MISSING, INCOMPLETE OR UNUSABLE DATA

All figures are percentages except for age, own health and time taken.

	EXCLUDED FROM RANKING n=70	EXCLUDED FROM VAS n=107	EXCLUDED FROM TTO n=58	EXCLUDED FROM COMBINED SET n=398
Mean age (S.D.)	53.3 (20.0)	63.0 (19.7)	61.4 (19.0)	53.7 (19.5)
Female	59.2	57.0	50.0	55.5
Sep/div/widowed	32.4	40.5	44.8	31.0
No qualifications	42.3	48.6	62.1	48.0
Retired	25.4	37.4	52.0	37.5
Rent home	39.4	35.5	45.6	33.8
Past/current illness	36.6	42.5	52.6	39.0
Prob. mobility	29.6	33.3	37.5	23.9
Prob. selfcare	8.5	3.9	5.4	5.6
Prob. usual activ.	19.7	23.5	19.6	17.8
Prob. pain/ discomfort	36.6	43.1	46.4	35.4
Prob. anx/dep	28.2	36.3	32.1	24.9
Own health–median (IQR)	84.0 (76–95)	80.0 (70–90)	82.5 (60–97)	87.0 (70–95)
Major diff.–ranking	22.5	41.9	58.2	24.0
Major diff.–VAS	22.5	45.5	55.8	25.0
Major diff.–TTO	18.3	22.8	51.1	19.1
Time taken–mean (S.D.)	55.2 mins (17.2)	55.0 mins (18.4)	52.0 mins (17.1)	54.6 mins (15.4)
Refused reinterview	22.5	40.2	53.2	28.8

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ANNEXE 3D   INTERVIEWERS' COMMENTS

1. RESPONDENTS EXCLUDED FROM THE RANKING EXERCISE

0175

This poor lady was not able to understand the whole thing. She obviously was not totally competent mentally. She got too upset and agitated to contribute so I had to abandon.

0177

Respondent was totally unable to rank and rate the health states. He just could not understand what was wanted. We went onto tto – I don't think that he fully understood that either. It was quite a struggle. He just didn't have the intelligence to understand.

0415

This is a very old woman she seemed alright to start with and then she kept saying death was the only thing to get her away from her neighbour. I think she was also getting tired.

0487

When I made the appointment to recall I had no idea she had recently been bereaved. Her husband died on 2.9.93 after a long illness and it would have been much too upsetting for her even to look at the cards.

0490

Respondent suffered bereavement in January 93 Husband died of a heart attack. Considering her age and circumstances it would have been unfair to subject her to evaluate the cards. I doubt if she would have managed them especially the TTO It was out of the question in her case.

0956

Life long salvationist.

0740

She said life was precious everyone has to suffer before they die. (lovely lady looked after herself, wore lots of make up very heavy black eyebrows)

0751

This person was in bed. He is riddled with arthritis and has just had a heart attack. He wants to die. He believes we should be given the choice!

1434

I've had a stroke and often my mind goes blank. He kept saying that. He just could not sort out the cards into order or put them on the thermometer said it was beyond him. He did see things more clearly on the TTO board but it took a long time.

2184

This asian lady is at her wits end. The 2 children still at home scream and hit people all the time and break things regularly. She tells me she screams and cries every day, she just can't see how she'll get through the year + a quarter until 3-year old goes to school. An intelligent lady originally is now a nervous wreck.

2238

Respondent could not read cards owing to poor eyesight therefore had to read out cards for her. Hopeless to try ranking states and thermometer scale.

2567

I felt she didn't understand the time t/off very well. In fact I went over some of them twice and on all but one still obtained same replies.

3044
Think ranking is biased by religious beliefs.

3101
Enjoyed giving information if of benefit.

4212
Friend was present – we thought respondent would not understand but I think we were proved wrong.

4255
Tried to read the cards but even with his 1960's reading glasses he couldn't manage it.

4411
This respondent lost her mother when she was 14 years old from stomach cancer, it was a case that was left too late. She, like her mother, does not like going to the doctors.

4525
Elderly frail lady could only relate to her present health state and could not do any TTO. Son does all her financial affairs – just wanted to chat – had difficulty reading cards and understanding them. I read them out but she could not remember the states.

4619
Very welcoming – I left wondering if nursing had had an effect on her choices etc. seemed bright enough.

4693
This lady had tried to refuse me and I had called several times and finally persuaded her. I had barely started than she had two sets of parents arrive so there was some distraction.

4711
Refused to do rating exercise. Couldn't see how to do it but took a lot of time considering the health states. Seemed to reply parrot fashion in TTO exercise.

5190
Respondent talked continuously of his mother who died in January 1993 after a long illness. He was unable to answer without basing answers upon his experience looking after his mother and became upset and unable to continue.

5239
Respondent was slightly deaf and also had trouble with her spectacles. I repeated and explained the questions but she didn't understand some of them. When she sorted the cards she read each one and put it down without making any attempt to change the order. I asked her to check the order when she'd finished but she didn't change anything.

5508
Man said that because he is a Catholic would find it difficult to say that he preferred death to even very poor quality of life.

2. RESPONDENTS EXCLUDED FROM VAS DATA SET:

0078
Was visibly tired and little confused after completing section 3 which led to problems with the health scale. Apart from that she did very well and seemed to understand the remaining sections.

0079
It became evident early in the interview that this lady was in a confused state. She kept asking a friend who was present his opinion and also my own – I was beginning to wonder if she was answering under our influence. I felt it was unkind to keep pressuring her.

0097
Initial hesitancy but good thereafter

0121
Respondent found the thermometer ratings too difficult. I had to spend quite a bit of time trying to make myself understood with the ranking. She found it difficult to concentrate – quite a nervous lady.

0126
Initially I felt this respondent had problems reading. However, after explaining health states again I don`t think this was the case.

0163
Respondent just could not grasp the rating! I'm not sure what went wrong but in the end I abandoned it.

0175
This poor lady was not able to understand the whole thing. She obviously was not totally competent mentally. She got too upset and agitated to contribute so I had to abandon.

0177
Respondent was totally unable to rank and rate the health states. He just could not understand what was wanted. We went onto tto – I don`t think that he fully understood that either. It was quite a struggle. He just didn`t have the intelligence to understand.

0307
Respondent said that his answers were based on speculation as he did not know how he would respond to prolonged pain or depression the number of health conditions were so numerous and varied it was confusing and difficult to make a logical response.

0308
Respondent was 75 years old. He terminated the interview, at third card. He felt time scale had no relevance at his age, and was becoming agitated. His wife was present and requested interview be terminated.

0415
This is a very old woman she seemed alright to start with and then she kept saying death was the only thing to get her away from her neighbour. I think she was also getting tired.

0487
When I made the appointment to recall I had no idea she had recently been bereaved. Her husband died on 2.9.93 after a long illness and it would have been much too upsetting for her even to look at the cards.

0490
Respondent suffered bereavement in January 93 Husband died of a heart attack. Considering her age and circumstances it would have been unfair to subject her to evaluate the cards. I doubt if she would have managed them especially the TTO It was out of the question in her case.

0526
Took me 2 visits to get this amount of interview. Lady very cross and rather upset. Had to stop interview at her request. She found it depressing.

0648
43a Usual problem. This person also said prayer would help (churchgoer) which would affect the health states ranking for that person. I could only suggest that person tried to put that aside acknowledge the difficulty of such.

0753
Not very bright person could not get at what we were after. Could not understand at all at first. I continued rather than abandon with tto.

0795
This old lady was not able to sustain any concentration for any period of time and had very limited understanding of what was being asked of her. I tried my best for a long as I thought practical for her and then when she didn`t understand the tto board I did not persist.

0836
Respondent has depression also is trying to deal with an adult daughter who has depression. This has made her choices as they are.

0947
Hallucinating and expressing persecutory delusions. Difficulties with comprehension and I'm not certain that this was the person I originally selected.

0956
Life long salvationist.

0969
Respondent is a loner without electricity and is obviously chronically depressed. Needed great persuasion to take part.

1090
Respondent – Bangladeshi – could not attempt to rate health states but we managed to struggle through rest. We only really conversed through respondent's husband who spoke reasonable English. Respondent's own English was negligible.

1392
She just couldn't understand how to rate health states on thermometer but could rate her own health. She seemed quite mixed up at times. After the interview she told me her daughter had just found out she had another cancer and that her grandson was killed and left three small children.

1418
He kept saying he couldn't imagine being in these states

1434
I've had a stroke and often my mind goes blank. He kept saying that. He just could not sort out the cards into order or put them on the thermometer said it was beyond him. He did see things more clearly on the TTO board but it took a long time.

1767
Respondent most interested.

1933
It took a lot of repeated explanation about the ranking of health states. He kept thinking it was to do with his health state now – he is very anxious and depressed – has been like this for nine years. I think he eventually understood what he was supposed to do, but he could not cope with the thermometer rating.

1954

Respondent elderly but quite bright. He did find ranking health states very difficult though. I had to explain lots of times what was needed. I think he tended in the end to rank them by the squares. He couldn't grasp the thermometer rating either and didn't want to rate all of them.

1959

Respondent didn't like the tto exercise. She said it was very difficult to choose between the imaginary lives. She said how did she know what she would choose, as some of the states were awful and unthinkable. She had great difficulty in "imagining" what she would choose. She also got very anxious about giving the states a score on the thermometer scale.

1975

This respondent really had no idea of what he was doing. I had to explain everything several times – and he still sat there staring not knowing what to do. I didn't pursue the thermometer rating as he really did not have a clue of what was wanted. I had to help him with the ranking – I was going to stop the interview, but carried on to see how he coped with tto exercise. He managed to complete this but I had to repeat each one several times. I feel he chose without full comprehension.

2001

Respondent got quite confused with ranking health states and needed constant explanations. With TTO she kept changing her mind and saying it was very difficult.

2116

The most important issue to this respondent seemed to be how much of a burden she would be on her relatives should she be confined to bed or unable to look after herself.

2141

English not too bad but not up to understanding what I wanted him to do. Very happy to tell me all about his own health problems.

2184

This asian lady is at her wits end. The 2 children still at home scream and hit people all the time and break things regularly. She tells me she screams and cries every day, she just can't see how she'll get through the year + a quarter until 3–year old goes to school. An intelligent lady originally is now a nervous wreck.

2238

Respondent could not read cards owing to poor eyesight therefore had to read out cards for her. Hopeless to try ranking states and thermometer scale.

2413

Very quick and alert despite being 76.

2454

During the TTO both the respondent and wife complained about the bulk of the question and of the morbid subject matter of the questions both of them asking me if it was about euthanasia.

2534

Took ages but due more to comments than difficulties.

3044

Think ranking is biased by religious beliefs.

3083

Unable to complete thermometer couldn't understand at all.

3101

Enjoyed giving information if of benefit.

3194
I had to keep reminding him that he had to imagine he was in the health states. Initially he kept saying they didn't apply to him.

3245
Respondent felt interview was too long and had to concentrate too much.

3262
I don't think you could do a second interview as it was too difficult doing the first one. Respondent just could not understand.

3460
Respondent refused to rate several health states – said the rest were all under 40.

3499
Is a committed christian therefore has no fear of death. Has a great influence on her answers in that she thinks a life in heaven is better than most of the health situations given.

3857
Respondent got very angry at what he considered the stupidity of the question. Wife tried to calm him but he would not complete.

3858
Respondent found it difficult to assess unconsciousness and immediate death–if one had no dependants or next of kin it is not serious but thinking of his wife made it difficult for him to categorise. Told him to think of himself only. Putting the cards into order at Q.5 he put them as the worst states because of relatives then on VAS switched to putting them at the top of the list because there would be no pain. Inconsistent.

4020
Can't stand pain at all. Considered death or unconsciousness better because he wouldn't know anything about it.

4212
Friend was present – we thought respondent would not understand but I think we were proved wrong.

4232
Notice own health rating and grading. Also see ex job and the fact that his baby was being sick – I don't think he could cope – do another day? Well I think he still would find it too demanding. I felt very sorry for him.

4255
Tried to read the cards but even with his 1960's reading glasses he couldn't manage it.

4315
Could not understand the thermometer scale very well – I had to fill it in for her and although she had the cards in front of her she had great difficulty rating them. Also had difficulty with ranking the health states – kept thinking of her own health state rather than that on the cards.

4513
The respondent has a strong Christian belief that we are given our life to live as fully as possible until it is taken away not by our own decision – not by any human decision. Would not complete parts of the interview.

4525
Elderly frail lady could only relate to her present health state and could not do any TTO. Son does all her financial affairs – just wanted to chat – had difficulty reading cards and understanding them. I read them out but she could not remember the states.

4619
Very welcoming – I left wondering if nursing had had an effect on her choices etc. seemed bright enough.

4711

Refused to do rating exercise. Couldn't see how to do it but took a lot of time considering the health states. Seemed to reply parrot fashion in TTO exercise.

4823

Ap card seems like non functioning – strange coincidence as doing this on Diploma in Social Work course. Emotion perception of the self through the experience – chronic ill health could be confronted and avoid this measurement as a possibility. It might be measured in one way. Intrigued the deep feelings.

4864

Refused rating – couldn't see the point of it.

5048

Most difficult I've done. I was'nt sure if she could read, she had glasses but said she had difficulty and I had to read everything to her several times. She seemed to understand what was required, definitely did not want to suffer pain etc. and death was preferable. Felt there was no–one to help her, husband and only daughter dead. Lacked concentration, could not do rating just could not understand.

5057

Although he seemed sensible and able to understand his ratings were very odd. He read each card I placed them in order on table in front of him. My impression was that he would rather be dead than suffer anything however mild. Possibly because he lived alone and knew he couldn`t cope. House very dirty and smelly. He showed me sores on his leg and said doctor could do nothing for it. I think he probably was just glad to have someone to talk to. He is on meditation presumably for his diabetics. Said he took urine samples, but no–one came to collect them nowadays. His conversation seemed very coherent possibly thought I had something to do with nhs.

5081

Hard to tell exactly how much difficulty as she appeared very coherent, but her concentration slipped occasionally and things had to be explained again in the middle of the question. Very interested – extremely intelligent. Only problem concentration.

5190

Respondent talked continuously of his mother who died in January 1993 after a long illness. He was unable to answer without basing answers upon his experience looking after his mother and became upset and unable to continue.

5202

It was difficult to tell if respondent understood or not. He just sat with the cards I explained as much as possible and he put them in order. At the TTO I'm not sure whether he was upset or thought it was a waste of time.

5209

I have heard all about this lady`s childhood, family health, job – she is lovely to talk to but it is quite impossible to get any sort of response to the questions. She gives the impression of being mentally clear but talks only of the past.

5225

Respondent was anxious to finish interview and gave the impression of saying something quickly without a lot of thought to get through faster.

5226

Respondent didn't understand the questions or what he had to do. I explained as much as possible and eventually he put the cards into order but very quickly so I'm not sure how much thought went into it.

5239

Respondent was slightly deaf and also had trouble with her spectacles. I repeated and explained the questions but she didn't understand some of them. When she sorted the cards she read each one and put it down without making any attempt to change the order. I asked her to check the order when she'd finished but she didn't change anything.

5993

Lovely lady but never really got the hang of this – kept trying to relate it all to herself despite my repeated explanations. However she was delightful and wonderfully healthy for nearly 80 – she looks about 60.

5995

Delightful couple. Extremely interesting wonderful old cottage. Being renovated. Very kind and interesting people – both performers and educators.

6054

I cut short this interview the lady was getting upset at her inability to understand . Her brain tumour has affected her powers of comprehension. She would have helped if she could but needed her husbands help in ranking the cards. There was no point in continuing.

3. RESPONDENTS EXCLUDED FROM TTO DATA SET:

0215

Respondent didn't understand the ranking She just kept telling me which card related to her and that none of the others were 'her' She kept going on and on about how terrible she thought the whole thing and what was the point etc. etc. By the time we got to TTO she wanted to know how I dared ask her to think about dying. She told me that I was depressing her. She said that this was the worst interview she had ever done and I was to tell them that!! She said she would answer questions on any subject but she wouldn't think about dying. This tirade went on for ages and ages.

0307

Respondent said that his answers were based on speculation as he did not know how he would respond to prolonged pain or depression the number of health conditions were so numerous and varied it was confusing and difficult to make a logical response.

0308

Respondent was 75 years old. He terminated the interview, at third card. He felt time scale had no relevance at his age, and was becoming agitated. His wife was present and requested interview be terminated.

0319

She lost her husband suddenly in 1989 and quite genuinely answered all time trade off exercise as being the same simply because she could not care what happens to her. She has no family or friends and although she is not all depressed life has lost its meaning for her and what happens to her does not really matter to her at all – she just does not care about anything.

0487

When I made the appointment to recall I had no idea she had recently been bereaved. Her husband died on 2.9.93 after a long illness and it would have been much too upsetting for her even to look at the cards.

0490

Respondent suffered bereavement in January 93 Husband died of a heart attack. Considering her age and circumstances it would have been unfair to subject her to evaluate the cards. I doubt if she would have managed them especially the TTO It was out of the question in her case.

0691

Very nice man – found it all too much went back second time – he is not 100%. Well, tried to help but could not, be bothered with it. Has too many problems himself cannot see the point in this exercise. He was getting worked up and too excited had to stop.

0749

He said he could not do TTO 'how can you do this if there is nothing wrong with you' he kept asking.

0795

This old lady was not able to sustain any concentration for any period of time and had very limited understanding of what was being asked of her. I tried my best for a long as I thought practical for her and then when she didn't understand the tto board I did not persist.

0827

This elderly lady was very ill and confused and didn't want to do the interview at all. She struggled through the first 2 sections but was not able to continue.

0943

Respondent had a hectoring wife and he was somewhat tremulous with the first tto. He was obviously unable to deal with the question of death or life and took some calming down in order for Q27 etc. to be completed.

0969

Respondent is a loner without electricity and is obviously chronically depressed. Needed great persuasion to take part.

1091

This lady said that because of her religion she could never choose death rather than 10 years of illness.

1317

Respondent never quite understood questions despite my giving him help and encouragement. Made a joke out of it mainly I think to cover his inability to grasp the meaning of the questions.

1353

Answers based on a where there's life there's hope philosophy.

1422

Respondent states:– phrase a question. Also remarked on his friend being in hospital taken in on Saturday – told he's got cancer and will probably see Christmas. Says he spent long time over weekend talking to him and his life is in the hands of God. God has a purpose for all of us and therefore it is not our choice whether we live or die.

1443

She seemed very confused and didn't seem to understand the cards took me ages to explain and try and show how to sort cards to start with. She got very anxious and also said somebody knocking on her door at 2.30am in the mornings.

1464

Became unhappy to continue said he was a very spiritual person (ethnic origin – black) and it's all in God's hands. Said he found it all depressing – curtailed and did latter part of interview only – which he was happy to do.

1505

Took some time to understand cards. Great difficulty with rating and ranking – also hearing aid problems. At tto could not continue after two cards, said she was very depressed and this made it worse. Brother died in October and had only just returned from being at his home.

2141

English not too bad but not up to understanding what I wanted him to do. Very happy to tell me all about his own health problems.

2184

This asian lady is at her wits end. The 2 children still at home scream and hit people all the time and break things regularly. She tells me she screams and cries every day, she just can`t see how she`ll get through the year + a quarter until 3–year old goes to school. An intelligent lady originally is now a nervous wreck.

2195

He was an extremely jovial chap and believes you take what comes. He understood what I was wanting him to do, but said he would never give up any time however bad things were.

2364

Respondent just kept saying `No` I'd always rather have life, ie would not sacrifice even few weeks if in the worst situation.

2387

The respondent could not rank cards easily and found it quite impossible to do trade off. He said that unless he himself had been in these states of health, he could not judge. The one thing you cannot measure is the will to live. i gave him every encouragement but he just downed tools and said "I can`t where trade off was concerned. Suffers from depression, but a nice man who tried to be helpful.

2410

Respondent said "I would be quite happy if I went to bed tonight and died. I am not depressed or anything – I`ve just had a good long life". She just opted for death all along however slight the disability or however long the time.

2512
Qc above answered no in contrast to others (a and b) because he said life was always better than death. He, at the end of the interview, said he was surprised that although I did my job well I didn't know more about the purpose of the survey.

3348
Whatever was said during the trade off exercise – the lady said she wanted to die – she is in a stable state of mind but only wants to join her late husband. Very compus mentus.

3394
No problems – man of few words.

3508
'Load of nonsense, never usually lets people in and certainly never does surveys but thought it looked alright' However did part but gave up on time trade off with 'You've got to do the best you can – it's no good whining – some women are very good at that but I just get on with it'

3689
He said after two cards in the tto I would want to live no matter what was wrong with me.

3862
Respondent perhaps because he is a clergyman felt he should not choose death but live to his appointed time whatever the problem.

4255
Tried to read the cards but even with his 1960's reading glasses he couldn't manage it.

4525
Elderly frail lady could only relate to her present health state and could not do any TTO. Son does all her financial affairs – just wanted to chat – had difficulty reading cards and understanding them. I read them out but she could not remember the states.

4696
This lady has big problems and has help 18 hours a day and though she wanted to help it would have been inhuman to force the issue. I did what she could with my help and then did second section.

4722
Respondent declined to complete the tto. Very politely but firmly told me it was rubbish, that he might change his mind but we were asking for a definite answer, that you don't have choices like these etc. There was no changing his mind. He said yes, there were times when he might comment I'd rather be dead than like that, but he could see no point in continuing – it made no sense.

4846
Refused to complete tto – didn't see the survey had any relevance – couldn't distinguish easily between the health states on the cards.

5190
Respondent talked continuously of his mother who died in January 1993 after a long illness. He was unable to answer without basing answers upon his experience looking after his mother and became upset and unable to continue.

5209
I have heard all about this lady's childhood, family health, job – she is lovely to talk to but it is quite impossible to get any sort of response to the questions. She gives the impression of being mentally clear but talks only of the past.

5375
Respondent felt life was sacred and whatever was wrong with him he would never choose to die. He would always hope a cure could be found before he died.

6050
This respondent was very hard work claiming the whole exercise was impossible. I just could not get her to continue she did say if she was in better health she might have been able to take it all more seriously.

6054
I cut short this interview the lady was getting upset at her inability to understand. Her brain tumour has affected her powers of comprehension. She would have helped if she could but needed her husbands help in ranking the cards. There was no point in continuing.

6069
This lady did not like talking about death and suddenly made the excuse that she had to urgently go out.

4. FURTHER RESPONDENTS EXCLUDED FROM COMBINED VAS/TTO DATA SET

0074

Respondent had great difficulty initially in deciding about the cards then at the TTO section she decided she did not want to continue further as she felt she was not giving a true interpretation. Persuasion of no avail. Right at the beginning she said she would rather die than have all these things wrong with her and that was her answer. Tried to persevere with her but she just hates these kind of things.

0086

Respondent has very definite ideas about how he would feel about states of health.

0197

Respondent had no problems

0207

Respondent's grandaughter was present otherwise I don't think that I would have got interview. Respondent seemed very alert but all the cards confused her. I can't say how many of her answers were really thought out. We abandoned TTO before the end as she had had enough. She wasn't too keen on being asked the same things again.

0325

Respondent seemed to get fixed. I don`t think she was paying too much attention – she stood up during the last card she did and said she didn`t want to do any more – she did however answer the background questionnaire without protest.

0357

Thought a fair bit about the situation.

0387

Very hard interview, both respondent and wife were annoyed and kept shouting and swearing at each other arguing about survey. Respondent kept referring to his own illness. Didn`t understand it or want to. If anyone came back he`d fling them down the stairs.

0469

Immediate grasp of TTO

0477

Kept remarking on the fact that the health states on some cards were contradicatory.

0614

Takes time to register – how to do health states. This person, after arranging them, picked them like a pack of cards, and then dealt them out again.

0617

The 2 dummy and 1 proper have all had trouble with x instructions on page 2 and need a lot of help to start to understand them. Also see Pages 12 to 27 – insisted on X on 10

0619

We left out two states on pages 24, 25, because person very distressed, as lost two sons in last two years, one by accidents at work and still waiting for inquests. Terrible thing at work.

0630

I still forgot to ask question 7 – didn't seem to see it until 5.30AM today when I remembered and on checking found the omission. Sorry. However she was very definite in her choices so I don't think she would have sacrificed any time. She works with mentally disabled persons which affected her choices she said.

0686

Although said only referred to himself when TTO referred to a friend and an aunt who had gone through some of these I felt he was talking about these people so had reflected in answer.

0703
He did not want to be a burden to anyone.

0719
Very sure of himself.

0748
Quick mind. Good respondent.

0759
He kept saying all the time at TTO 'I am going to die anyway in next 3 years' Very explosive personality kept telling me how he threatened neighbours. With demonstrations nearly using me. You don't have to have a nervous disposition to interview this guy!

0887
Ranked states by no of black boxes etc. rather than reading what each said. Reading the cards depressed her.

1018
Respondent was Asian but understood English. She did discuss some of ratings with husband – difficult to know just what was said. Most were her ideas.

1093
Respondent was not terribly happy with the Time Trade Off exercise. She found it difficult to imagine some of the situations. She said also that her religion would never let her choose to die although she thought being unconscious was different.

1131
Very pleasant respondent but a difficult interview as getting an opinion sometimes like drawing teeth.

1356
Interview had to be rather hurried because respondent was in his office and very busy. So found TTO decisions difficult because hadnt time to think and imagine himself in them. Interview carried out at work place.

1758
Respondent chair bound (with crutches) following a serious car accident a week ago.

1772
When given cards thought it was stupid and wanted to finish. 10 minutes later agreed to continue. Impatient yet curious. Proceeded to end Arm in plaster and claimed to be in some pain.

1774
An electricity cut meant that the second part of the interview was carried out in candle light later aided by gas light.

1777
Very sharp and quick responses once underway. A computer mind.

1810
Respondent had a glass right eye. Showed much interest in the survey. Appeared to understand the situation posed very well.

1811
Radiologist

1812
Very sharp, crisp response, definite opinion.

1824
Remarkable. A very sharp young man who has little free time.

1836
I don't think the respondent fully understood the survey or its purpose although I tried to explain to her in detail. She was concerned about her family most of the time and not able to concentrate fully.

1978
The only problem was a delinquent dog.

2090
Respondent was a bit unstable. He said he suffered from depression. His reading skills did not appear good and he found it very difficult to comprehend each card as a state of health.

2235
Respondents English reading was very poor. Had to give up on the rating thermometer and give some help placing cards. Had to read out all cards on Trade Off section. Hard work!

2325
The time taken for the different stages was taken up by the thought that went into the ratings not difficulty encountered.

2327
She didn't put much thought into any section of this interview.

2328
Had hip replacement 8 weeks ago so has lots of experience of pain. Also has had larynx removed so has plenty of experience of health problems. 3 brothers/sisters plus himself have had hip replacements and another brother is having his done soon.

2347
Elderly so tooke time but had definite answers for the 'trade off' sections.

2439
Although DE – UN were rated midway on the scale on the TTO life was always rated sweet at any price.

2467
Shown as married at 27. Husband in nursing home long term.

2519
Respondent put a lot of thought into this interview when ranking and rating.

2580
Asked me to leave. Said that the survey was ridiculous – (perhaps because of the difficulties he had) (see above replies to 43, a,b,c) Then refused to do last section and ref. tel. no. and name – He said we can get it from the electoral roll.

2643
This girl was very bright indeed and quick.

2679
Had very definite opinions. Spends Sundays doing voluntary work in local hospital and says that as a result she would not want a cabbage existence. Also said she had thoroughly enjoyed the interview.

2700
Lady who thought things through – said it was very difficult. Says if chosen again hopes questions will be easier.

2727
First part of interview interrupted by 3 telephone calls (I have deducted 10 minutes total time) Very intelligent lady who found difficulty imagining recovery from certain states in the Time Trade Off exercise.

2826
Leg in plaster cast twisted ligament.

2915
This respondent had great difficulty as she is quite old not very well and can only see with one eye. I had to help with filling in the thermometer scale as she couldn't see it properly.

3018
I had to abandon this interview part of the way through because this man appeared to be quite alright when talking to him generally, it became apparent when we started doing the Category Rating Thermometer that something was wrong. He sorted the cards out to some degree but said he couldn't see the point in sorting them out at all and would not complete the task. I started doing the TTO he would answer to a point but would not finish it off to the end and said he wasn't going to do all the cards anyway. He said he had had a heart attack and that he knew something was wrong with his memory but was very vague about any details. He could not really remember the last job he had done, settled for painter and decorator but would give no other details. I don't really think he could remember. His wife was there for some of the time. I feel she could have been a bit more helpful but seemed to be amused by it all. So I decided to tactfully bring it to a close as I felt I wasn't getting anywhere. Also refused to give his name.

3045
Fascinating. Interested and pleased to have been able to co-operate.

3059
S.P. said at ranking you could be deaf dumb blind or all three this would be worse than XT

3064
Interview abandoned because of great difficulties explaining to S.P. what was required of him. Seemed to grasp it but I realised during 'time trade off' thaat he hadn't a clue. I would have had to prompt him so I thought it better to stop. (I didn't tell him that he hadn't completed)

3081
S.P. found interview interesting was very argumentative (see job title)

3203
He was just judging the scale rating by the black squares.

3231
Unable to answer some of the questions.

3292
Respondent became agitated at the length of time the TTO exercise took – a little impatient but I did manage to complete.

3297
He soon got the hang of the whole exercise and apart from personal preference had little difficulty after Ranking the health states.

3335
This respondent is a domestic in a charitable hospice. She seemed well prepared for the questions and had no problems coping with the exercises.

3400
Considering the lady was unwell and 86 years old she did well. Daughter helped lay out cards but respondent did most of questionaire on her own.

3503
'Make your decisions day by day. Depends on how much you're affecting your family around you or how much they need you.' Basically believes that where there's life there is hope.

3511
Felt it would all be very different if he lived in Bosnia e.g. and also that religion must play a part in some people's answers – but no mention made of it.

3558
I felt some of the answers in TTO seemed rather inconsistent but I don't know why. We had an appointment and I arrived on time and her husband wasn't expected home until the following day. We had tea and biscuits and respondent appeared to me to be relaxed.

3625
I did query word 'same' when he gave it as answer. He remained standing by table throughout interview and would not sit down.

3673
Slightly retarded I didn't know if it was male or female – odd. Found it all very difficult to understand.

3681
She's obviously in a lot of pain herself. She was unable to get on the floor and had great difficulty getting out of her chair.

3740
This respondent is confined to a wheelchair and suffers from cerebral palsy – though she says she has no illness.

3779
This respondent rather strange – obsessed with son, taken away from her as a baby because she was incompetent to look after him. Reunited recently and now thinks he's trying to cheat her out of her money.

3781
Respondent not very interested thought some of the 'states' ridiculous i.e. confined to bed but able to wash and dress etc. consequently was very off hand with trade-off questions and temperate scale.

3803
Not terribly interested.

3845
Asked me to note that she thinks people should be given pills to end their life if in severe pain.

3853
This respondent rated the health states on the thermometer in a bizarre way giving low scores to states which were not very serious. She took quite a time to sort them into order but seemed to ignore that order when placing them on the scale. This may have been due to her mental state as she was not unintelligent.

3880
She quickly grasped principal and went like an express train.

3886
Had a phobia about being a burden – hence the low scores and preferring to die.

3971
Don't feel pain like other people do. Son was crying constantly for three years until only recently.

4014
But was very tired (only 2 hrs. sleep, both children ill) and constantly distracted by the children during interview.

4017
Wooden leg, sometimes has pains in heart since Tuesday.

4031

She took time to understand but got progressively better through each section.

4106

I think respondent found the Time Trade Off very depressing.

4135

Respsondent very depressed by whole thing and couldn't see the point of it all. Needed to prompt at Q.36 – she obviously had problems and had already mentioned her arthritis several times. She needed a lot of encouragement to complete the TTO exercise.

4339

He felt it went on a bit. Says perhaps I caught him at the wrong time. Found boring after a while. Found questions hard to answer. Said it was like playing a game. He was very very slow on the first part of the interview, talked and deliberated a lot and kept saying what hard work it was. Had to be persuaded to take part in the first instance.

4365

The respondent had real difficulties with the interview despite reading the questions several times. I felt she really didn't know what was expected of her so I terminated the interview.

4493

We were interrupted several times. A toddler was present initially but was sent to bed and cried throughout. Respondent wanted to finish interview quickly. I had difficulty with it due to interruptions and lost my concentration. Respondent was not very happy toddler came back down during classification questions.

4510

Respondent hurried interview – did not read cards closely nor really got the idea of comparing health states.

4519

Respondent said he found it very difficult to deal with concepts of compare health states. He felt the TTO was a bit artificial. Experienced at market research as aunt is supervisor for a company.

4535

Respondent could not accept concept of TTO Kept saying it was unrealistic.

4539

This lady got very upset and tearful but went on. She seemed very depressed.

4562

Respondent tired quickly lost concentration – when using side 2 of board often compared the two h alves of life A rather than compared "whole" of life A with B – repeating question arrived at an answer but I think by then concentration was lost.

4579

She kept saying she felt she was contradicting h erself – was concerned that she wasn't making the right answer despite reassurances – I felt she got quite confused at times.

4627

Worked very quickly yet seemed to consider each item well.

4686

She thought I was asking her about her health – got confused and annoyed with the cards.

4726

She is very scathing of conventional medicine. She is a trained homeopath. 'I found it totally depressing It brings the mind towards death People dont want to think about death and illness'

4807

Didn't seem logical in ranking cards and similarly in transferring to thermometer. Didn't particularly like the survey and only spent a very short time on these exercises. Didn't seem logical or consistent after rating first four cards in TTO and lost his train of thought. Grandson cried persistently throughout the interview.

4814

She rated some of the more drastic states as better than death only because she needs 10 years from now for her daughters to grow up.

4819

Grandaughter aged 3 died from cancer – a rare form – after 4 weeks illness where doctors had diagnosed constipation. In time trade off she could only say she would always choose life

4834

As with many people her biggest concern was that other members of her family should not be burdened by her state of health.

4842

Her replies did seem inconsistent at times.

5003

This lady did not like doing this at all she kept saying she didn't know what she would prefer. She said at 83 she probably did not have many years anyway. She also kept saying that if her husband was still alive she wanted to live as long as him even with health problems.

5036

Having done two today of similar age and mentality I think the most difficult part for them is the thermometers and possibly the age and being alone influences thinking to a great degree.

5103

Although many health states were given the same scores this was not because the respondent had difficulty with the tasks but because he genuinely felt them to be equal.

5124

Very comprehensive and easily understood survey.

5133

History of nerves with many members of the family. Anorexia and asthma etc.

5257

This lady had no real understanding of what she was being asked to do. I think we assume a sense of logic and a level of comprehension that some people do not have.

5276

Respondent felt that her ranking of the health states was a total mess. She was unable to cope with this exercise.

5283

The interview was carried out over two evenings because of a forgotten appointment. The respondent did not like the questions which made him nervous and confused. He did not understand the rating on the thermometer scale which I attempted to clarify for him, unsuccessfully it appears, and I felt I could not pressurise him further.

5537

I'm not 100% certain respondent was fully understanding interview. She kept telling me about her ailments rather than answering questions directly. Sometimes I felt she just didn't understand.

5586

Elderly lady said that it was virtually impossible to give ranking and impossible to give time trade offs because she honestly could not say unless she was actually in the situation whether she would prefer a shorter lifespan or not.

5738

Respondent's work is very much to do with people with ailments, and throughout she was clearly recalling many experiences (see 37b) but in some ways this seemed to make her choices rather more difficult to arrive at. She had especial difficulty in imagining states of anxiety/depression – see tto cards IW/PB.

5788

This was an amazingly bright and alert 82 year old man but felt that some of the health states contained contradictory elements that could not exist in the same health state.

5789

This respondent became increasingly restless finally saying she could not do any more. It was probably unfortunate that a lot of 'bad' ones came out first.

5849

This was a very difficult interview

5886

Mrs. Jones felt unless you were in each health state you would not know what you would do or whether you could cope.

5968

Very nice chatty people. Husband kept trying to take over – he had very stgrong views. However, respondent just carried on regardless and gave her views.

5976

Very difficult respondent – more or less refused once, eventually agreed but belligerent. Didn't think too hard about any of it and totally lost his temper at the background information section so no information there and obviously no reinterview.

6049

This lady is a Jehovah Witness 'only one person can give life and only one can take it away'

6077

This man tried his best but due to his epilepsy found it very difficult to concentrate. I don't think I managed to get him to understand completely what we wanted him to do He was continually comparing his own health state rather than the ones on the cards.

CHAPTER 4   SELF-REPORTED HEALTH

4.1   The Data

Data on the self-reported health of respondents were collected in two forms:

(a)   <u>descriptive</u> – consisting of the level of reported problem on each of the 5 EuroQoL dimensions;

(b)   <u>evaluative</u> – consisting of a score between 0 and 100 recorded on the standard EuroQoL visual analogue scale, indicating a global assessment of the respondent's own health on that day.

No respondents were excluded from the analysis reported in this Chapter.

4.2   Self-Reported Problems on EuroQol Dimensions

4.2.1   <u>Overall distribution</u>

Figure 4.1 shows the overall frequency of reported problem for each of the EuroQoL dimensions. The low percentages of respondents indicating extreme problems with mobility and self-care, reflects the nature of the sampling procedure and the need for face-to-face interviews. By far the highest proportion of problems reported by respondents was associated with the pain dimension: 29.2% indicated some pain or discomfort, and 3.8% indicated extreme pain or discomfort. Over 20% of respondents indicated some problem with anxiety or depression.

4.2.2   <u>Reported problems by age group</u>

For the purposes of further reporting, the 3 level structure of the EuroQoL classification has been reduced to 2. Levels 2 and 3 – indicating some and extreme problems – were combined to yield a dichotomous variable indicating absence or presence of a problem. For all

dimensions the percentage of respondents reporting some degree of problem increases with age. Figure 4.2 gives the rate of problem reported for each of 3 age groups – under 40, 40 to 59, 60 and over. The pain dimension again shows the highest rate, with the older age group recording a rate of 52.1%. As might be expected, this age group also recorded a high level of reported problem with mobility. Levels of reported problem for all 5 dimensions were significantly different across the age groups (p < 0.001).

4.2.3 Reported problems controlling for age

Given the clear influence of age upon self–reported problems, the relationship between a number of background variables and frequency of reported problem was examined in each of the same 3 age groups. There were no significant differences between male and female respondents in any age group for mobility, self–care, usual activity or pain. However, there were differences in level of reported problems for mood in the under 40s and over 60s age groups, with female respondents having significantly higher rates (p=0.2 and p=0.002 respectively) – around 50% above the level for male respondents. The pattern can be seen in Figure 4.3(a).

The distribution of reported problem by social class was examined (again controlling for age). The general pattern is one of increasing problem with increasing age. However, there were no significant differences for the self–care dimension, and only the 40–59 year olds recorded a significant difference on usual activity. The distribution of problem for mobility, pain and mood are given in Figures 4.3(b – d). Differences in rate for mobility were statistically significant for the 2 older age groups (p=0.003 for both). Differences for all 3 age groups on the pain and mood dimensions were significant.

A more pronounced pattern of differences emerged when rates of problem were compared across respondent subgroups with different educational qualifications as can be seen in Figure 4.4(a–e). The differences on the mobility and self–care dimensions were not statistically significant for the under 40s. Unlike social class, there were significant differences for the 2 older age groups, with respondents who have no qualifications more often reporting problems (p=0.006). Differences on usual activity, pain and mood were significant for all 3

79

age groups – respondents with no qualifications having higher rates of problem than respondents with intermediate or further qualifications.

Rates of reported problem were examined for respondents who owned, and for those who rented, their accommodation. Again rates tended to increase with increasing age. Rates for the under 40s on the self-care, usual activity and pain dimensions were not significantly different for the two subgroups. However, for mobility and mood there were significant differences on all 3 age groups. For the 40–59 and over 60s age groups there were significant differences on all EuroQoL dimensions.

4.2.4   Variation in reported problem by geographical area

Respondents' area of residence was classified according to Regional Health Authority (RHA) and Standard Economic Region (SER). Respondents in Wales and Scotland were categorised separately. Figures 4.5(a–e) show the distribution of reported problem on the five EuroQoL dimensions plotted by RHA. There were statistically significant differences in the reported rates for each dimension, but it should be noted that these rates have not been standardised for age. Northern and Yorkshire RHAs recorded high levels of problem with mobility, selfcare and usual activity, and Northern RHA showed the highest rate of problem with pain. East Anglia recorded the highest rate of problem with anxiety/depression. A feature of all the distributions is the range of variation across RHAs with the highest rates being 2 to 3 times greater than the lowest rates.

A similar pattern of differences can be seen in the rates for the Standard Economic Regions displayed in Figures 4.6(a–e).

4.2.5   EuroQoL health states

So far the level of self-reported problem for each of the 5 dimensions has been treated independently. By combining this information, each respondent can be classified in terms of one of the 243 EuroQoL health states. The frequency distribution of these 'natural' states is given in Table 4.1. A total of 77 states are defined in the survey population. 57% of

respondents were in state 11111, indicating no problem on any dimension. 90% of respondents were classified in terms of 12 states.

Extreme problems were found on the usual activity, pain or mood dimensions for 22 states, but for only 3 and 5 states on the mobility and self-care dimensions respectively. 56 of the 77 states included a problem with pain.

4.3   Self-Rated Health Status

4.3.1   Distribution by age and sex

Respondents were categorised into one of seven age groups and mean scores for their visual analogue scale ratings were computed. Figure 4.7 shows that mean self-rated health status remained virtually constant across the first three age groups, with a gradual decline thereafter, with the over 75 year-olds recording a mean rating some 85% of that recorded for the 3 youngest age groups.

Figure 4.8 gives the mean self-rated health status for male and female respondents in each of the age groups. There were no statistically significant differences in the mean values for each age group.

4.3.2   Influence of other variables

Figure 4.9 shows the mean self-rated health status for three social class groups, for each of the seven age groups. For all age groups mean self-rated health status declined as social class moves from I/II to IV/V. With the exception of the 18-24 and 35-44 olds values for social class I/II were statistically significantly different from the others.

Variation in self-rated health status with differing levels of educational qualification can be seen in Figure 4.10, which shows a similar pattern to that described for social class. Mean self-rated health status was significantly higher for respondents with a degree or further education, than for respondents with no qualifications.

Figure 4.11 gives the mean self-rated health status for respondents grouped according to their housing tenure. Owner occupiers in all age groups recorded a significantly higher value than respondents of the same age who rented their accommodation ($p < 0.01$ for all age groups).

4.3.3 Variation in self-rated health status by geographical area

Figures 4.12 and 4.13 present the mean self-rated health status for Regional Health Authorities and Standard Economic Regions. There were statistically significant differences in the self-rated values across both the RHAs ($F = 2.111$, $p < 0.01$) and the SERs ($F = 3.302$, $p = 0.001$). Amongst the RHAs Oxford and South West Thames, together with Wales, recorded the highest values while Yorkshire and Northern recorded the lowest values. A similar pattern emerged from the SERs, with North and Yorkshire/Humberside recording lower values, and East Midlands and Wales recording higher values.

4.3.4 Self-rated and self-reported health status

Data on self-reported problems were recoded so as to classify respondents into one of two groups – those with no reported problem, and those with any reported problem on any EuroQoL dimension. Figure 4.14 gives the mean self-rated health status for each subgroup. It can be seen that for those respondents with no reported problems, the mean self-rating remains constant up to age 65, and the subsequent decline in value for the remaining age groups, is relatively small. This contrasts somewhat with the mean values for those with some reported problem. Here the mean value *rises* in the first three age groups, before falling to a near constant level for the remaining four age groups.

4.4 Summary

1. 33% of respondents reported a problem with pain and 21% reported a problem with anxiety or depression.

2. Significant differences in self-reported health status were found according to age group (on all 5 dimensions), sex (on mood), social class (on mobility, pain and mood),

education (on usual activities, pain and mood) and home ownership (on all 5 dimensions). Geographical variation was also noted with the highest rates being 2-3 times greater than the lowest rates.

3. Significant differences in <u>self-rated</u> health status were also found according to age group, social class, education, home ownership and geographical area.

Table 4.1   Self–reported EuroQoL health state

EuroQoL state	number of respondents	% of total	cumulative percentage
11111	1925	56.7	56.9
11121	313	9.2	66.2
11112	215	6.3	72.6
11122	125	3.7	76.2
21121	108	3.2	79.4
21221	92	2.7	82.2
21222	82	2.4	84.6
11221	52	1.5	86.1
21122	49	1.4	87.6
11222	42	1.2	88.8
21111	30	.9	89.7
22222	30	.9	90.6
21211	23	.7	91.3
22221	23	.7	92.0
11211	20	.6	92.5
21232	20	.6	93.1
22232	16	.5	93.6
11212	13	.4	94.0
21231	13	.4	94.4
21321	12	.4	94.7
22332	11	.3	95.1
11113	10	.3	95.4
11123	10	.3	95.7
11131	10	.3	95.9
21112	10	.3	96.2
22231	10	.3	96.5
22331	8	.2	96.8
21131	6	.2	97.0
21322	6	.2	97.1
12221	5	.1	97.3
21123	5	.1	97.4
21212	5	.1	97.6
22322	5	.1	97.7
11223	4	.1	97.8
11232	4	.1	98.0
21132	4	.1	98.1
21233	4	.1	98.2
21311	4	.1	98.3
22233	4	.1	98.4
22333	4	.1	98.6
21331	3	.1	98.6

Table 4.1 Continued...

EuroQoL state	number of respondents	% of total	cumulative percentage
22223	3	.1	98.7
22321	3	.1	98.8
11231	2	.1	98.9
11233	2	.1	98.9
12111	2	.1	99.0
21113	2	.1	99.1
21223	2	.1	99.1
22212	2	.1	99.2
11132	1		99.2
11213	1		99.2
11313	1		99.3
11321	1		99.3
11322	1		99.3
12121	1		99.3
12123	1		99.4
12222	1		99.4
12223	1		99.4
21213	1		99.5
21313	1		99.5
21323	1		99.5
21332	1		99.6
21333	1		99.6
22111	1		99.6
22121	1		99.6
22122	1		99.7
22131	1		99.7
22133	1		99.7
22211	1		99.8
22323	1		99.8
23121	1		99.8
23321	1		99.9
23322	1		99.9
23332	1		99.9
31111	1		99.9
32323	1		99.9
33311	1		100.0[*]

* Data were incomplete for 14 respondents

Figure 4.1

Frequency of self-reported problem

% respondents

Mobility 18.3 0.1

Self-care 4.1 0.1

Usual activity 14.2 2.1

Pain 29.2 3.8

Mood 19.1 1.8

☐ Some problem ■ Extreme problem

86

n = 3395
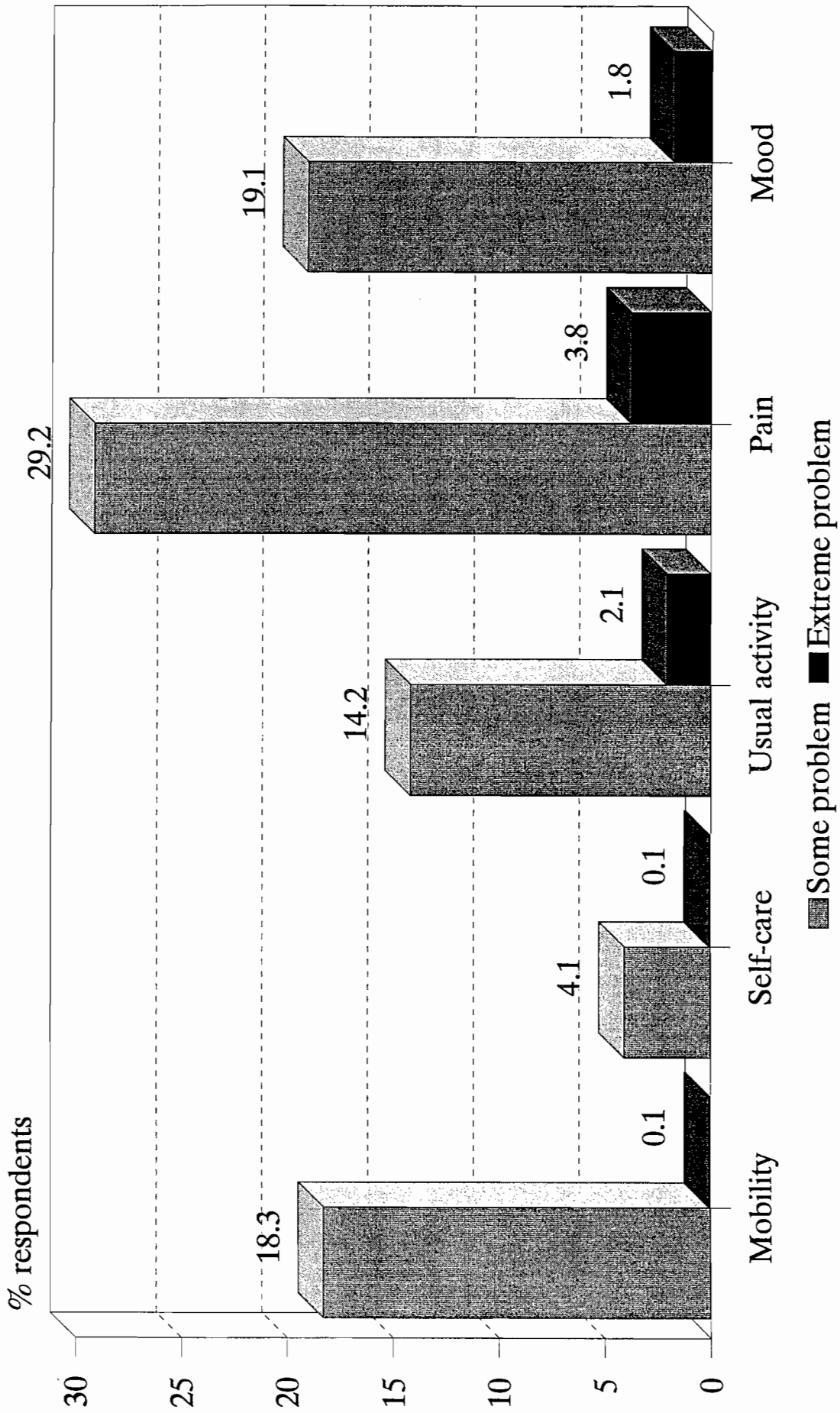
Figure 4.2

Frequency of reported problem
Distribution by age group

% respondents

Mood	22.6	26.6
Pain	34.1	52.1
Usual activity	15.9	28
Self-care	4.7	7.8
Mobility	15.6	37.2

Age group
■ under 40   ▨ 40 - 59   ⊞ 60 and over

n = 3395
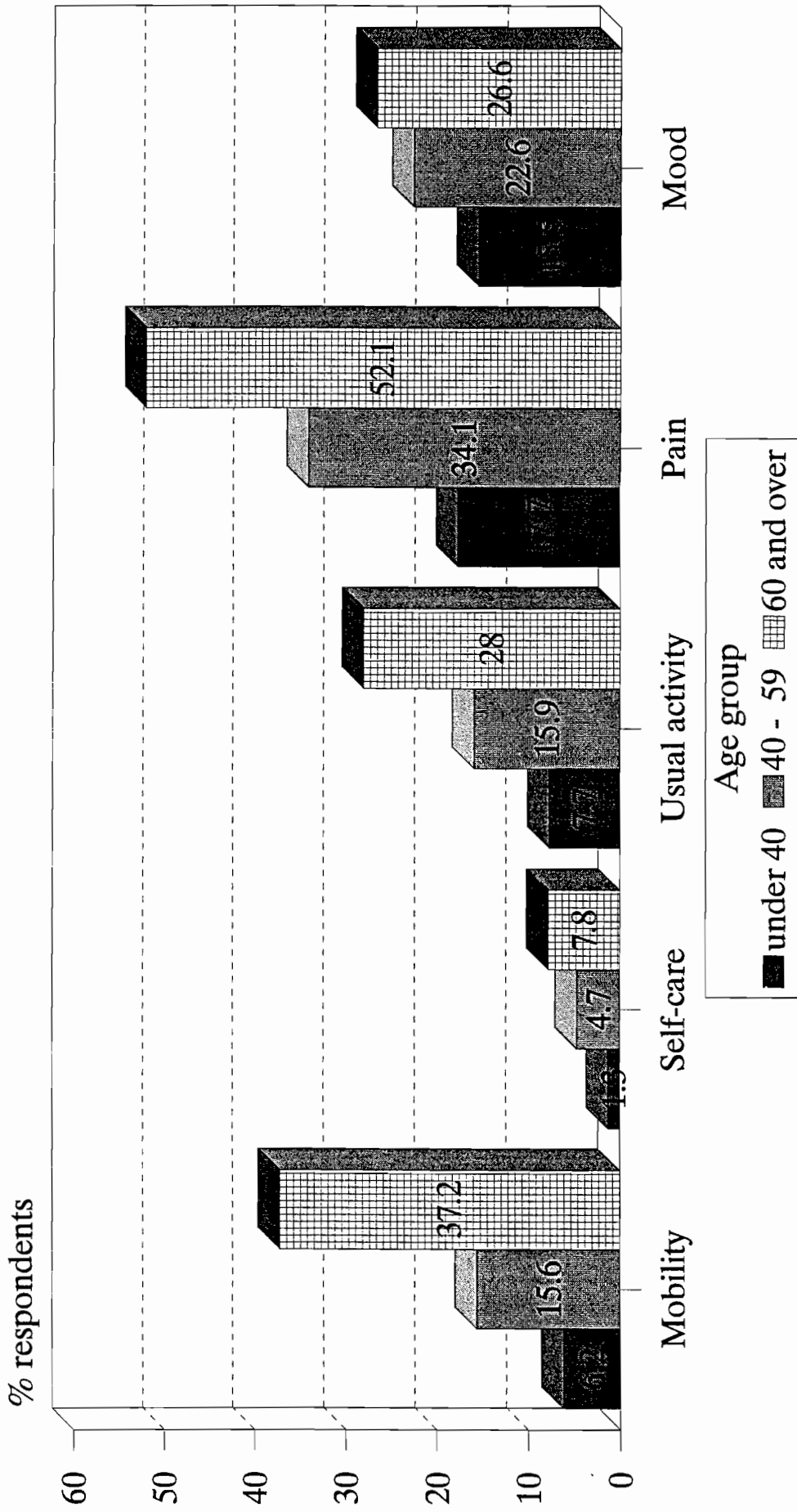
Figure 4.3

(a)

Reported problems with mood
Distribution by sex

(b)
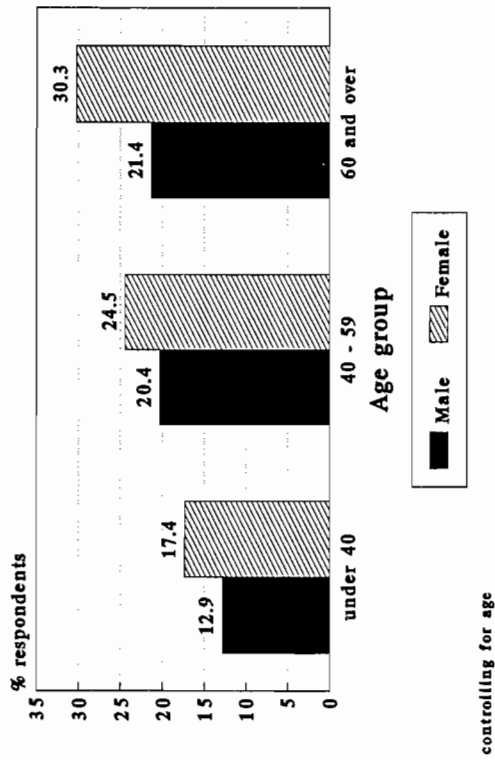
Reported problems with mobility
Distribution by social class

(c)
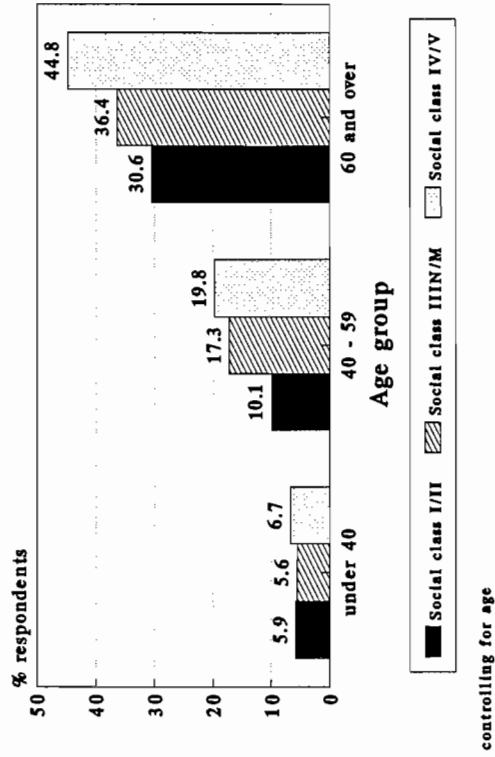
Reported problems with pain
Distribution by social class

(d)

Reported problems with mood
Distribution by social class

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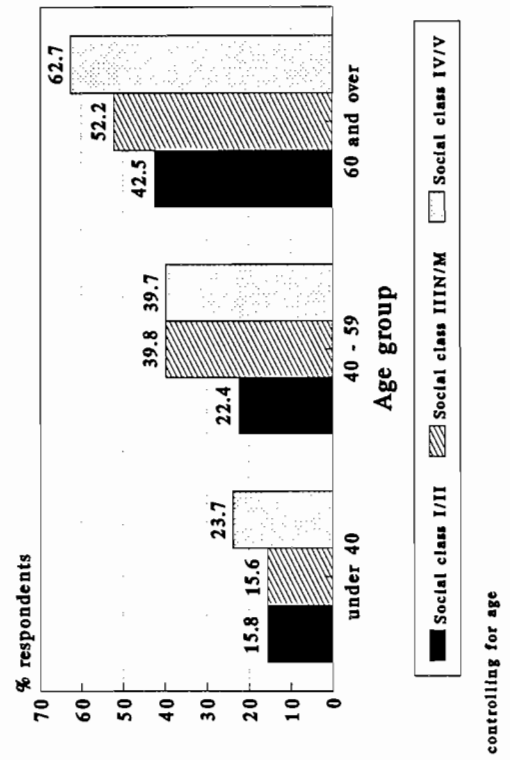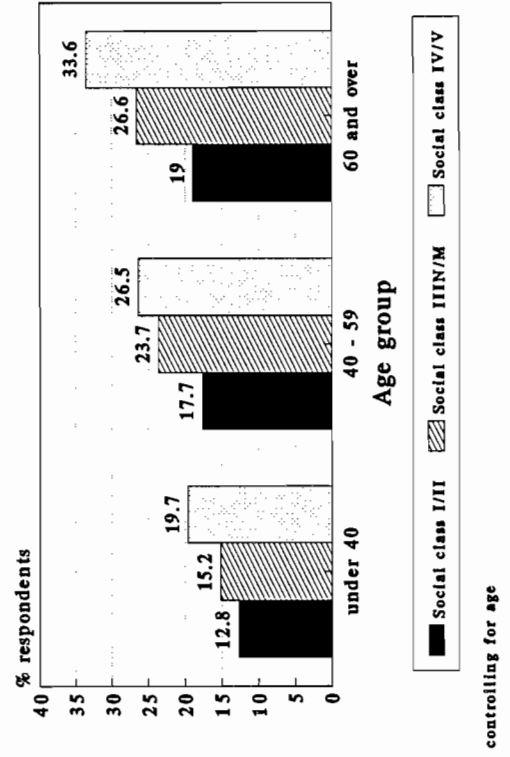
Figure 4.4(a)

Reported problems with mobility
Distribution by level of education

% respondents

	under 40	40 - 59	60 and over
Degree / higher ed.	5	7.3	25.6
A / O / GCSE	6.1	14.1	28
None	8.6	21.3	43

Age group

■ Degree / higher ed.   ▨ A / O / GCSE   ▦ None
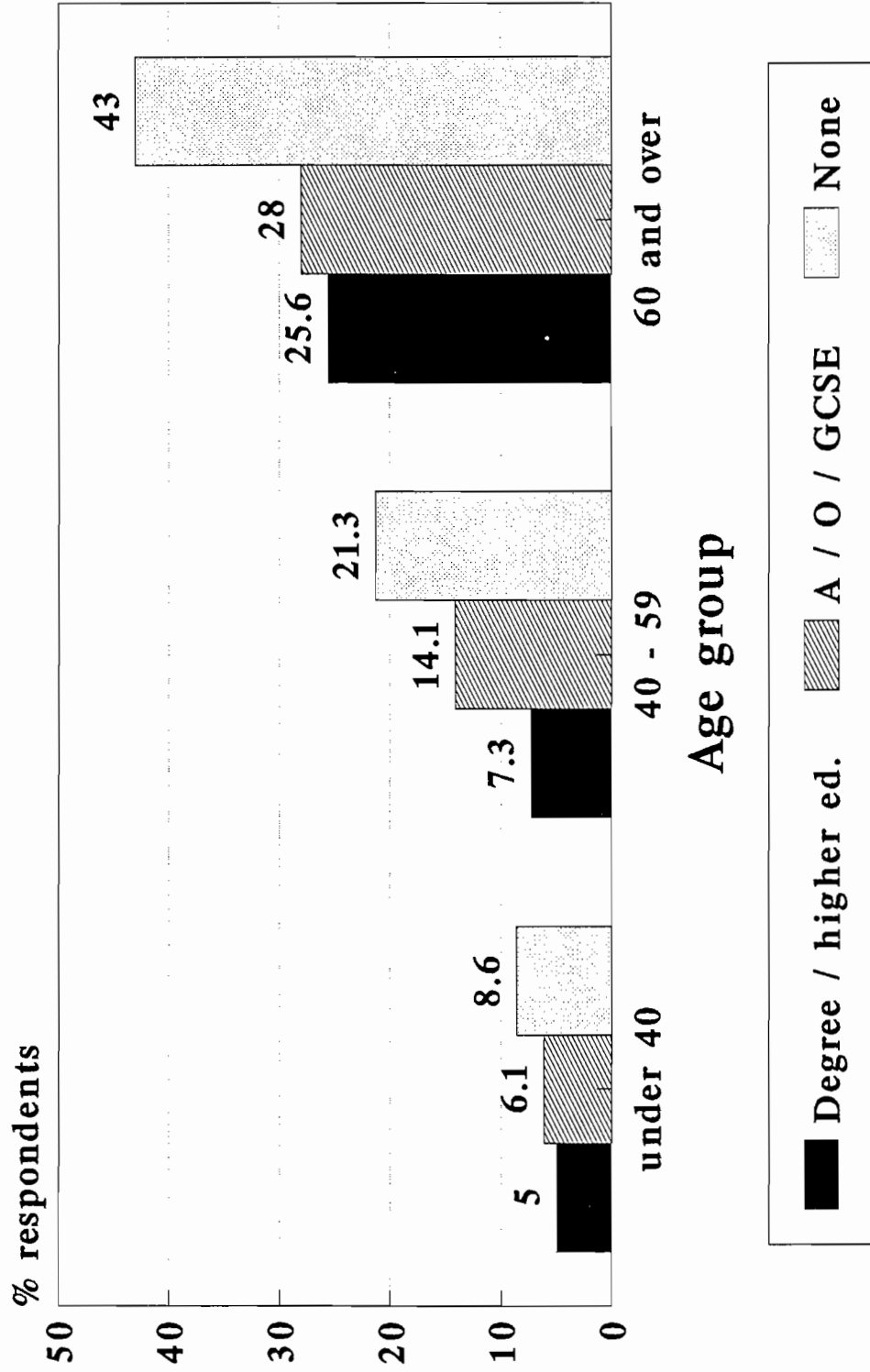
controlling for age

Figure 4.4(b)

Reported problems with selfcare
Distribution by level of education
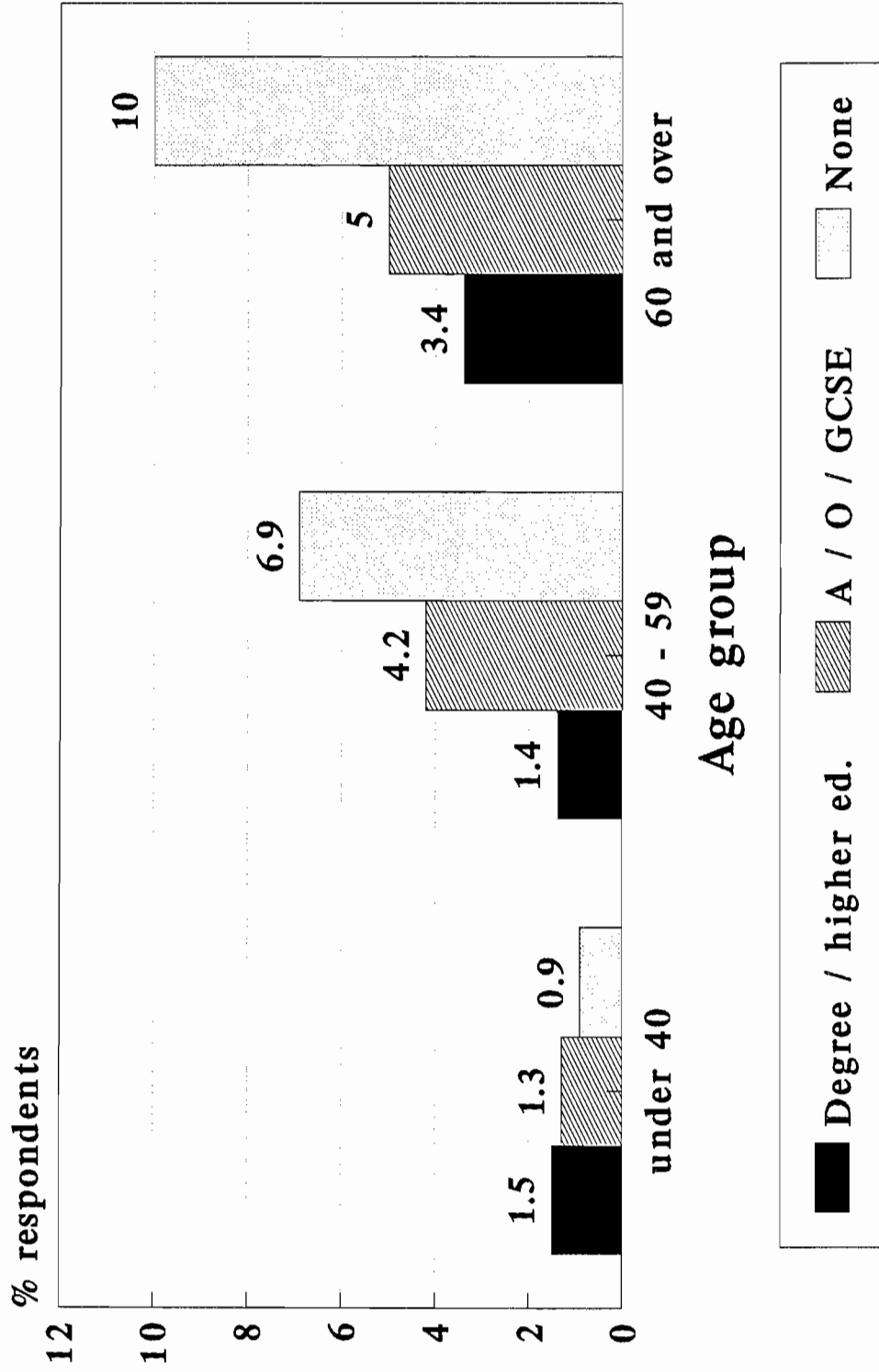
controlling for age

Figure 4.4(c)

Reported problems with usual activity
Distribution by level of education

% respondents

35
30
25
20
15
10
5
0

under 40   40 - 59   60 and over

Age group

4.4
8.5
10

8.3
14.6
21.1

17.9
24.5
31.5

■ Degree / higher ed.   ▨ A / O / GCSE   ☐ None
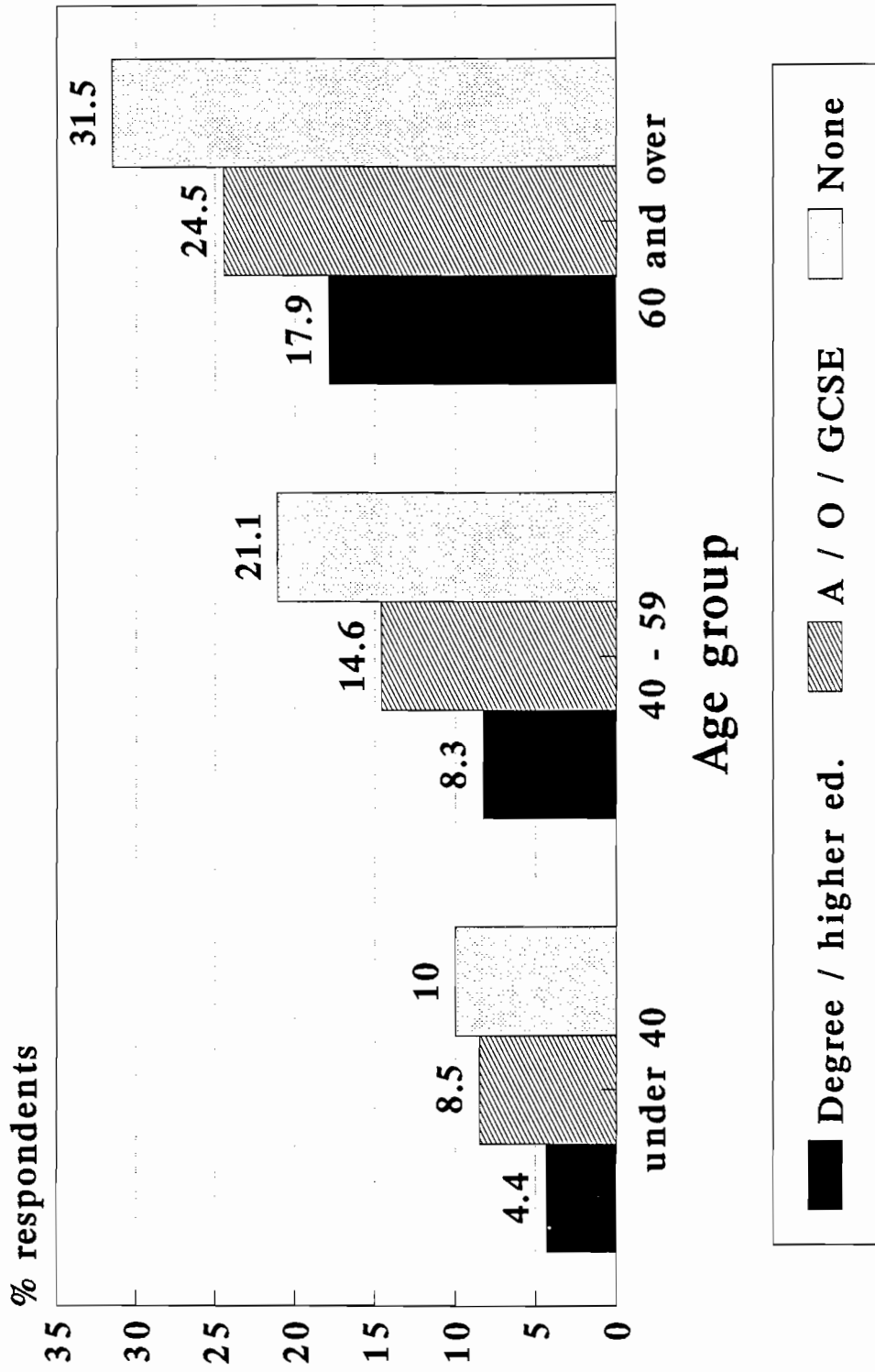
controlling for age

Figure 4.4(d)

Reported problems with pain
Distribution by level of education

% respondents

Age group

Degree / higher ed.   A / O / GCSE   None
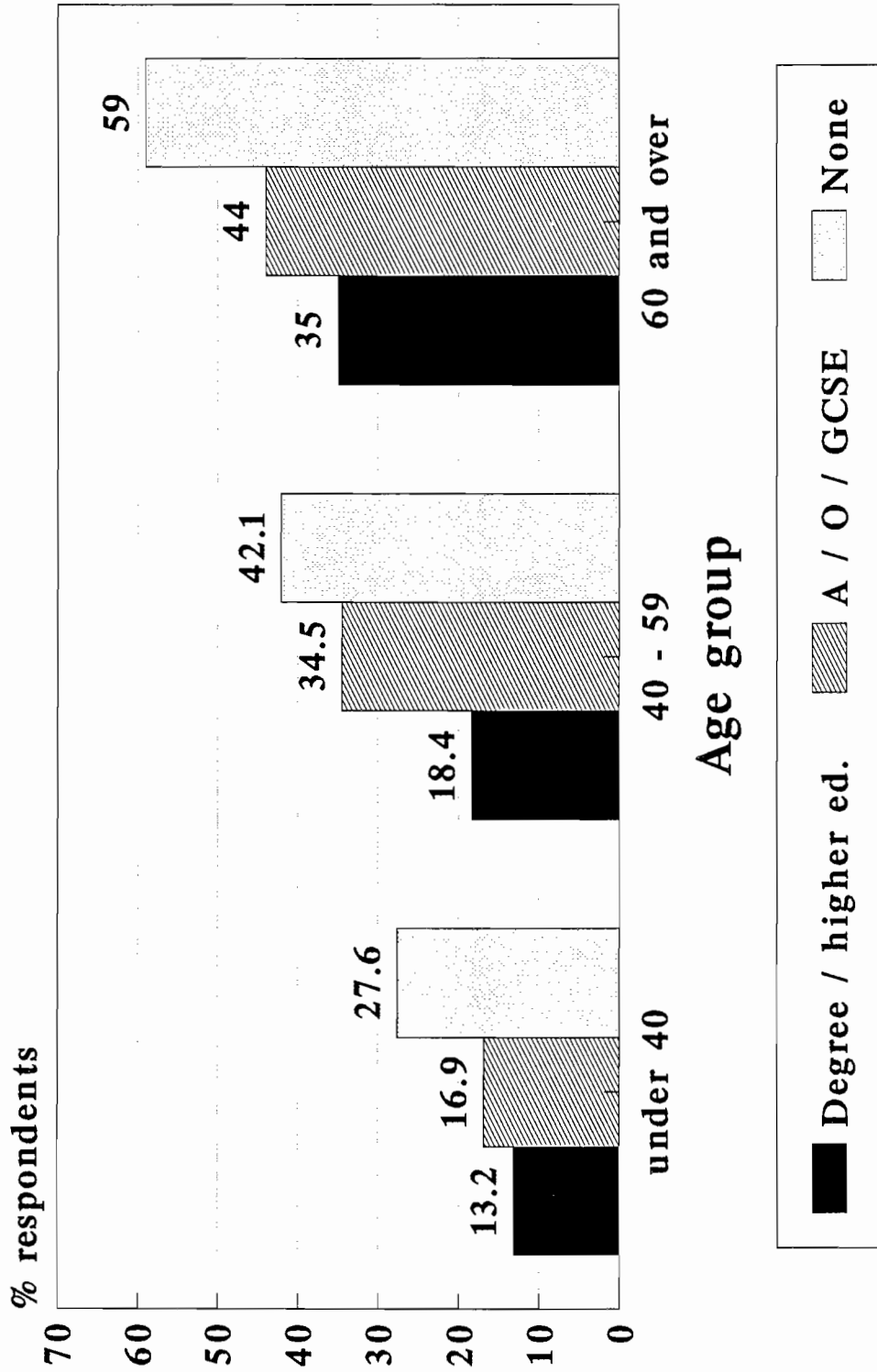
controlling for age

Figure 4.4(e)

Reported problems with mood
Distribution by level of education
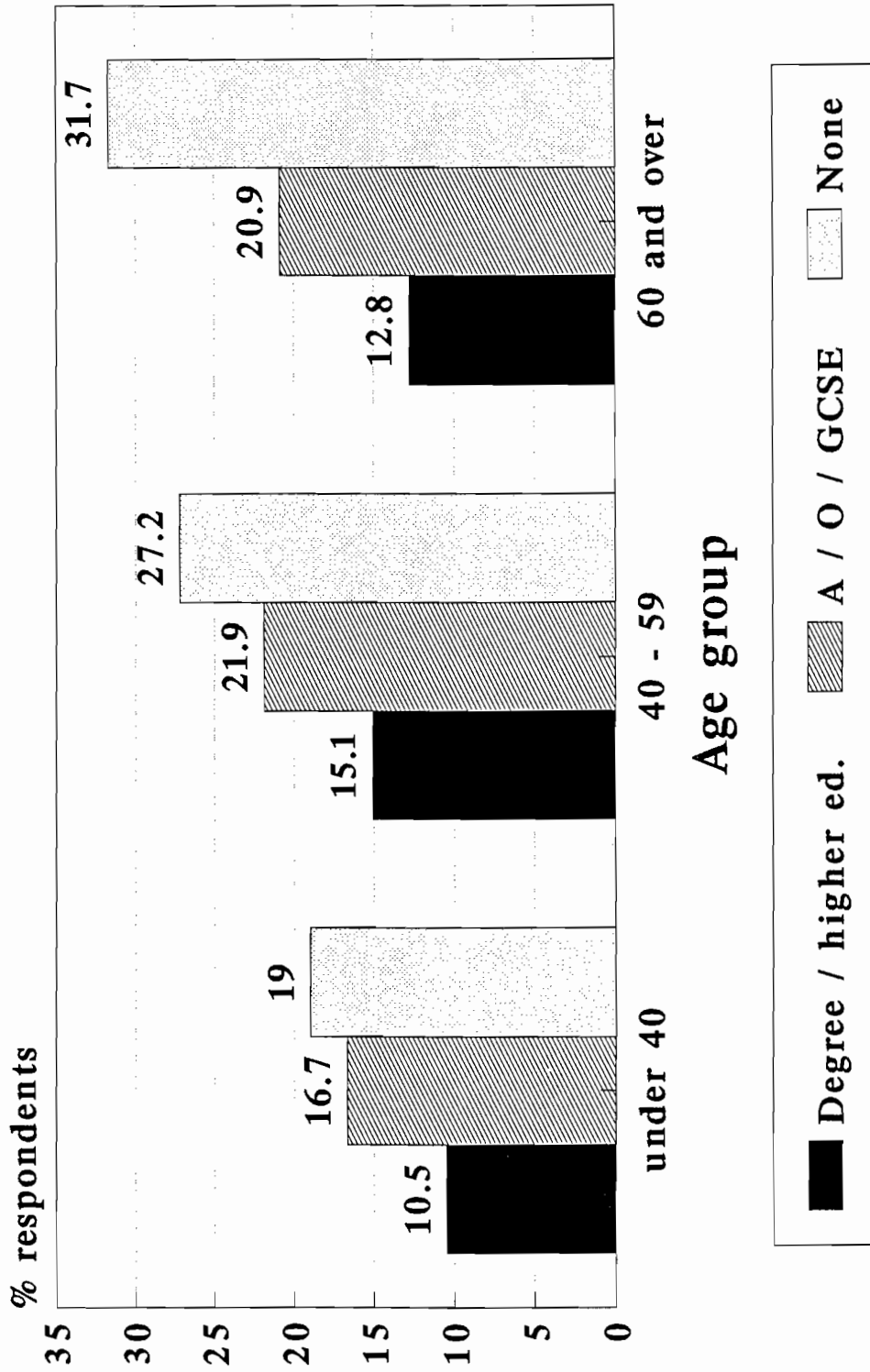
controlling for age

Figure 4.5(a)

Reported problems on EuroQoL dimensions
Variation by Regional Health Authority

Health Authority

■ Mobility

% reporting problem

Northern
Yorkshire
Trent
East Anglia
NW Thames
NE Thames
SE Thames
SW Thames
Wessex
Oxford
South Western
West Midlands
Mersey
North Western
Wales
Scotland
All Regions
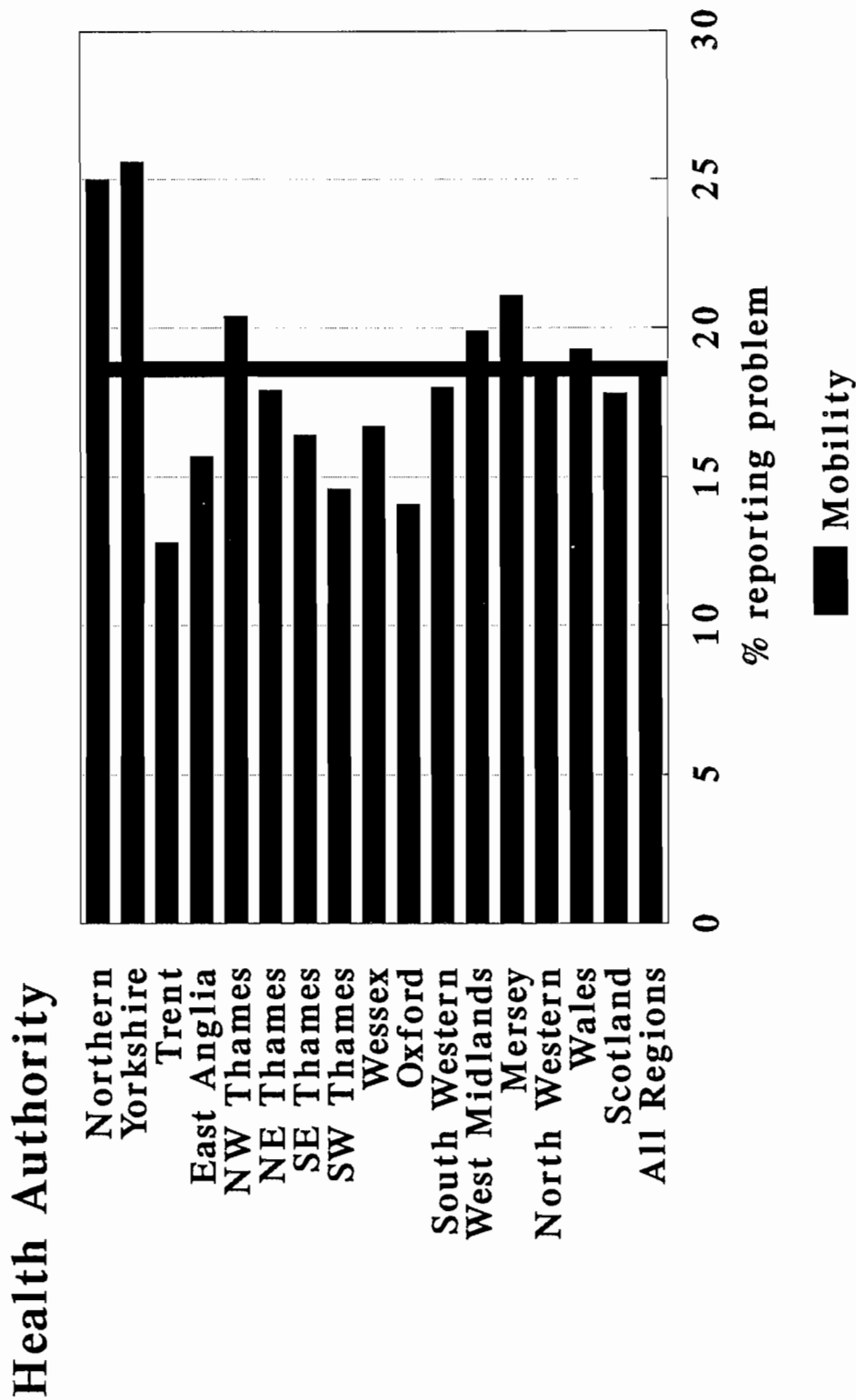
Figure 4.5(b)

Reported problems on EuroQoL dimensions
Variation by Regional Health Authority
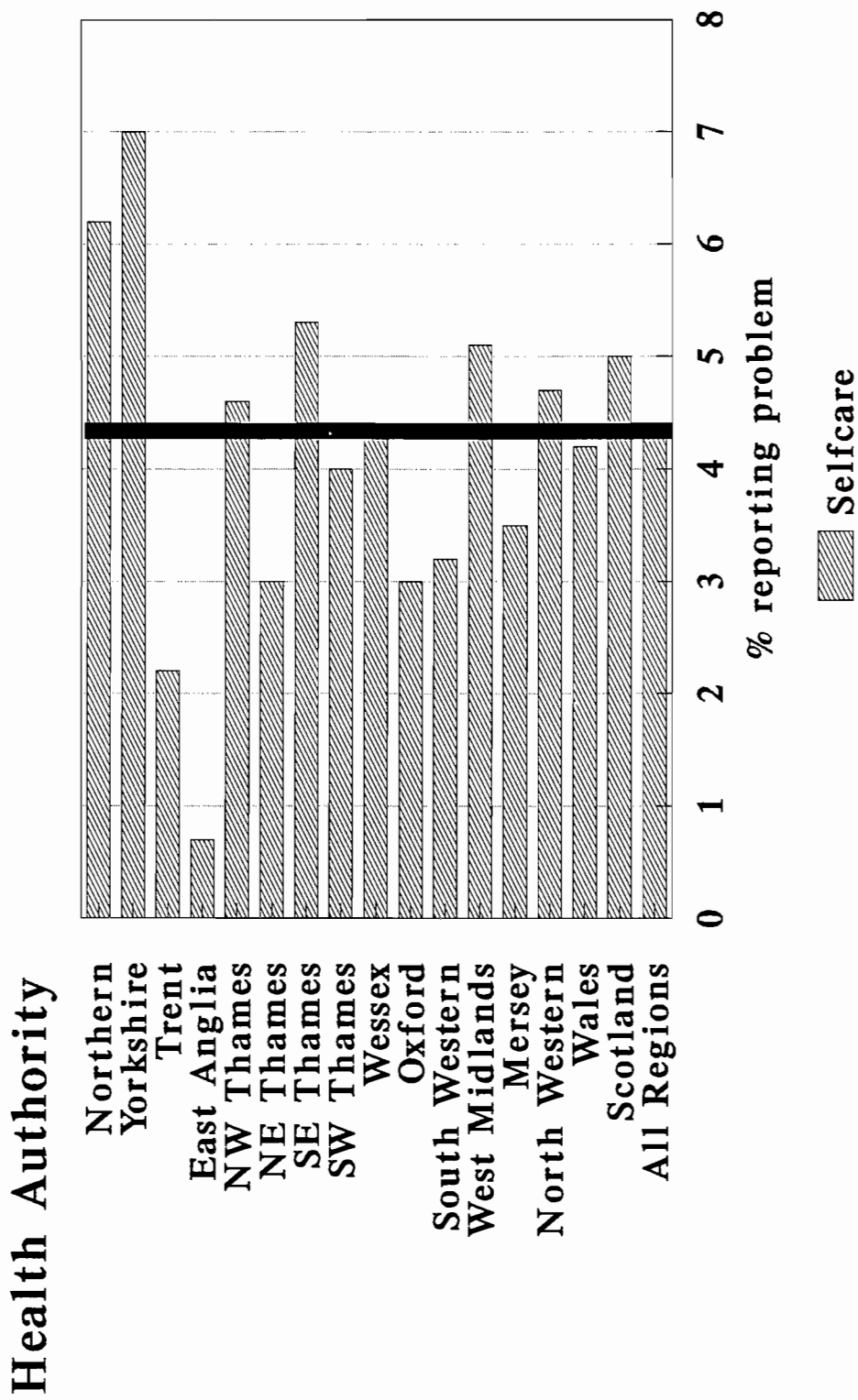
Health Authority

Figure 4.5(c)

Reported problems on EuroQoL dimensions
Variation by Regional Health Authority
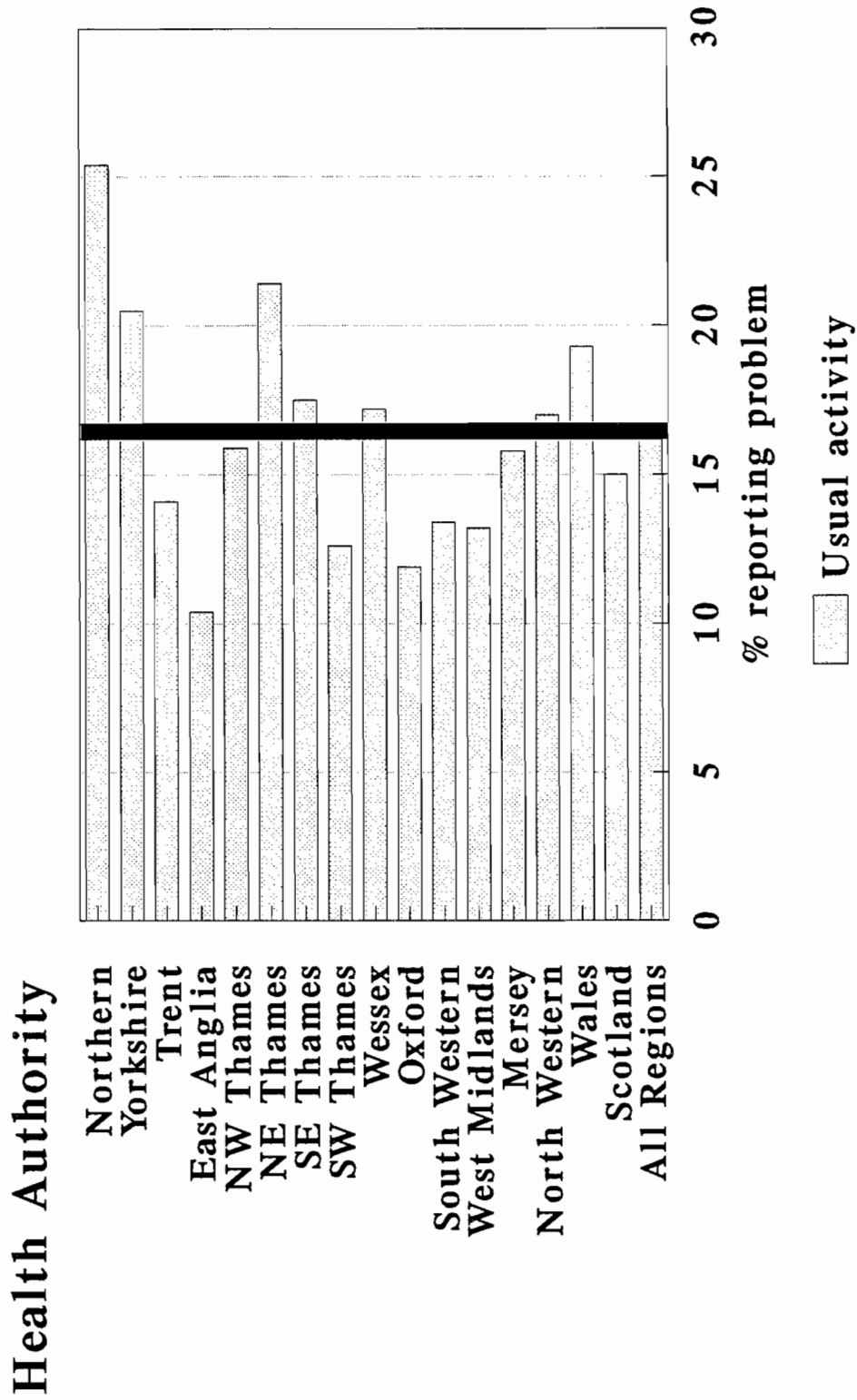
Health Authority

Figure 4.5(d)

Reported problems on EuroQoL dimensions
Variation by Regional Health Authority
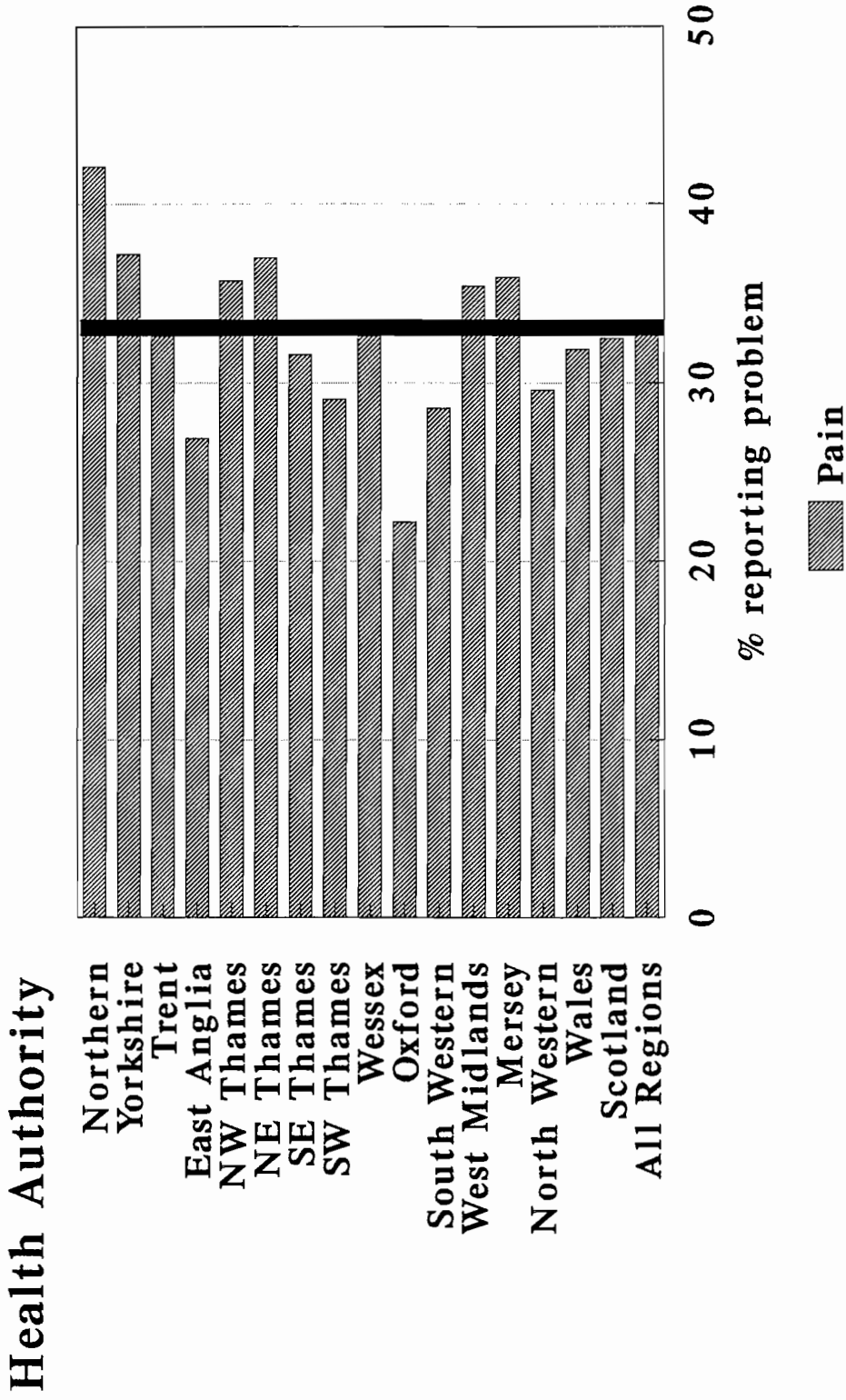
Figure 4.5(e)

Reported problems on EuroQoL dimensions
Variation by Regional Health Authority

Health Authority
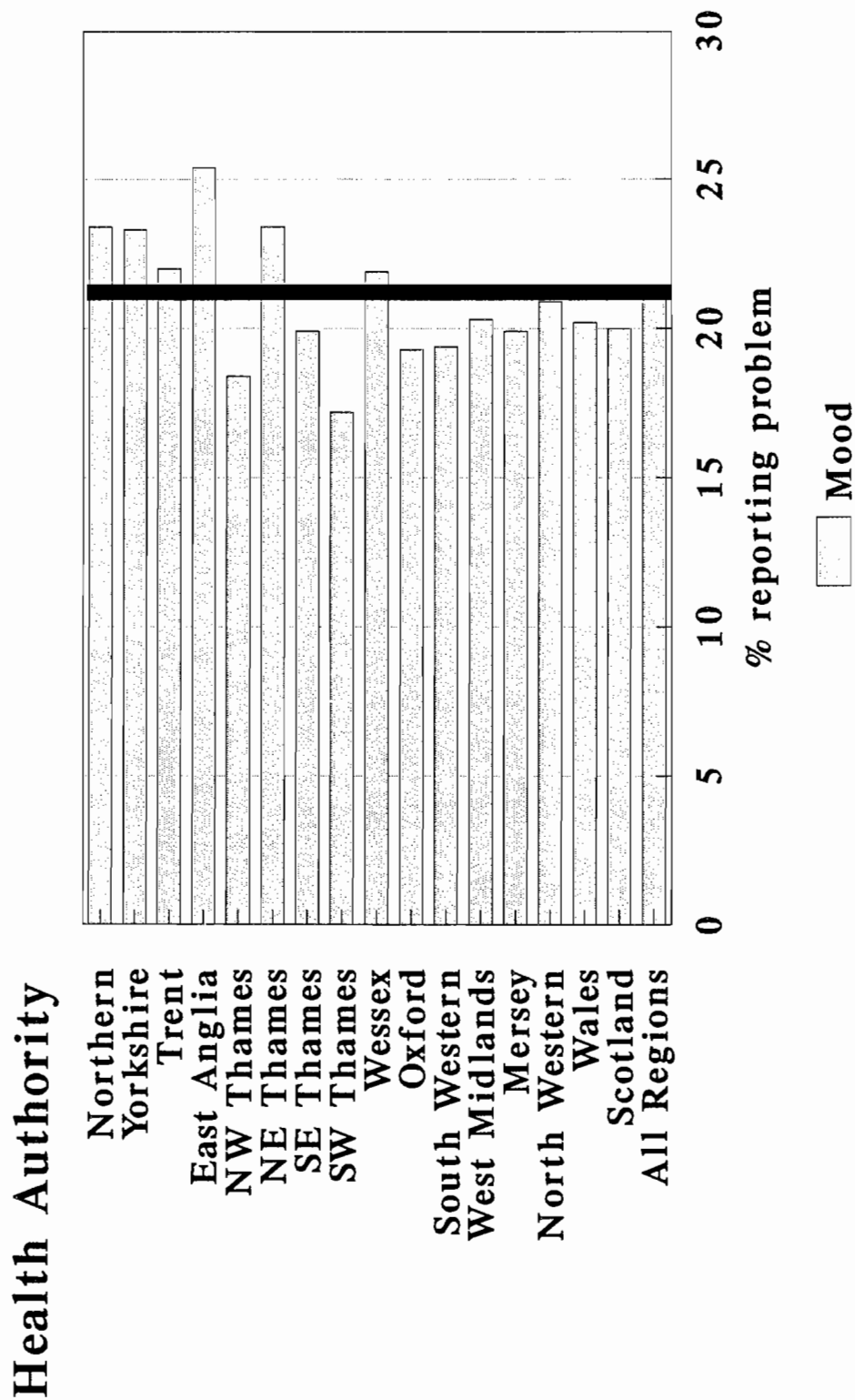
Figure 4.6(a)

Reported problems on EuroQoL dimensions
Variation by Standard Economic Region
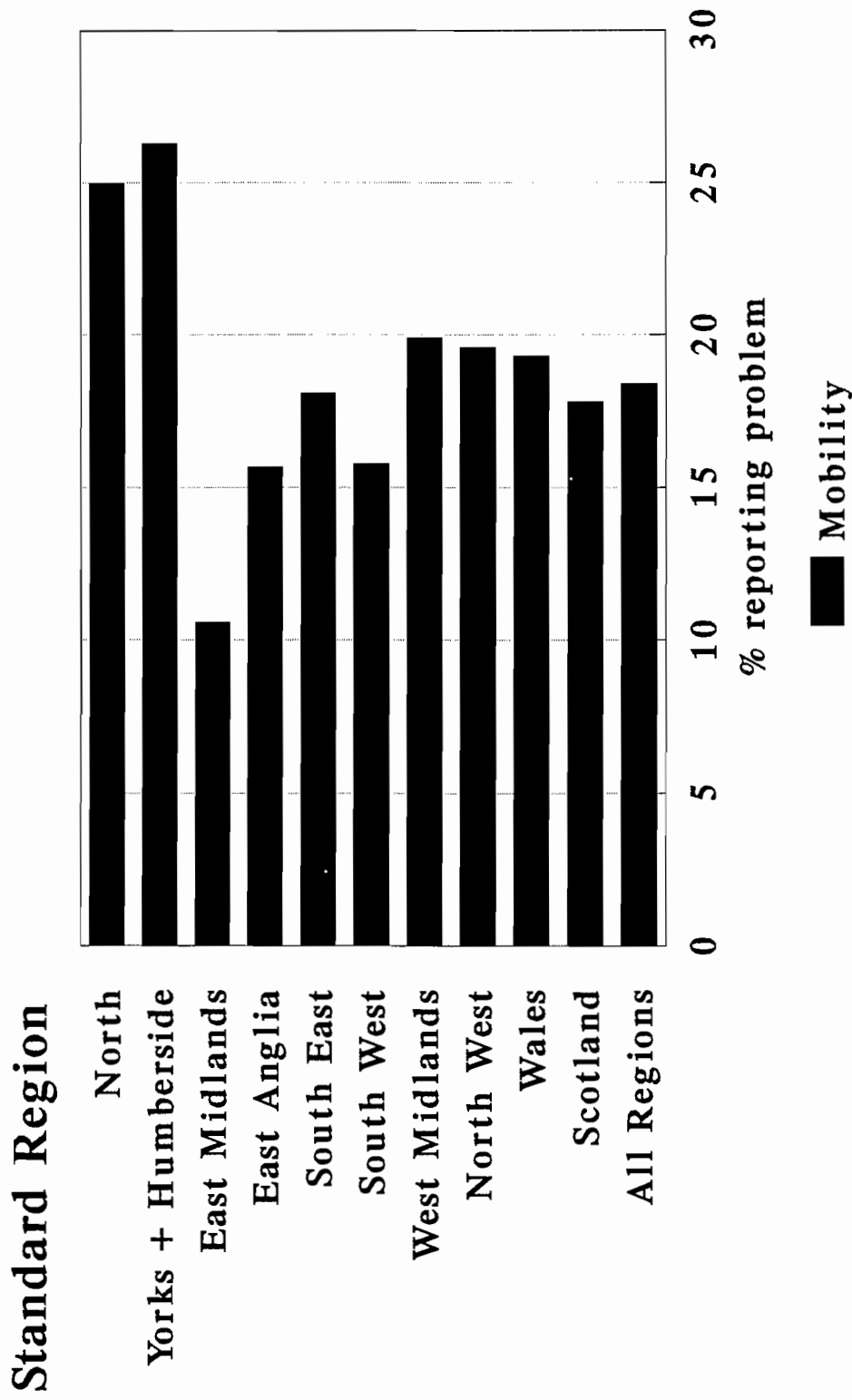
Figure 4.6(b)

Reported problems on EuroQoL dimensions
Variation by Standard Economic Region

Standard Region

North
Yorks + Humberside
East Midlands
East Anglia
South East
South West
West Midlands
North West
Wales
Scotland
All Regions

% reporting problem

Selfcare
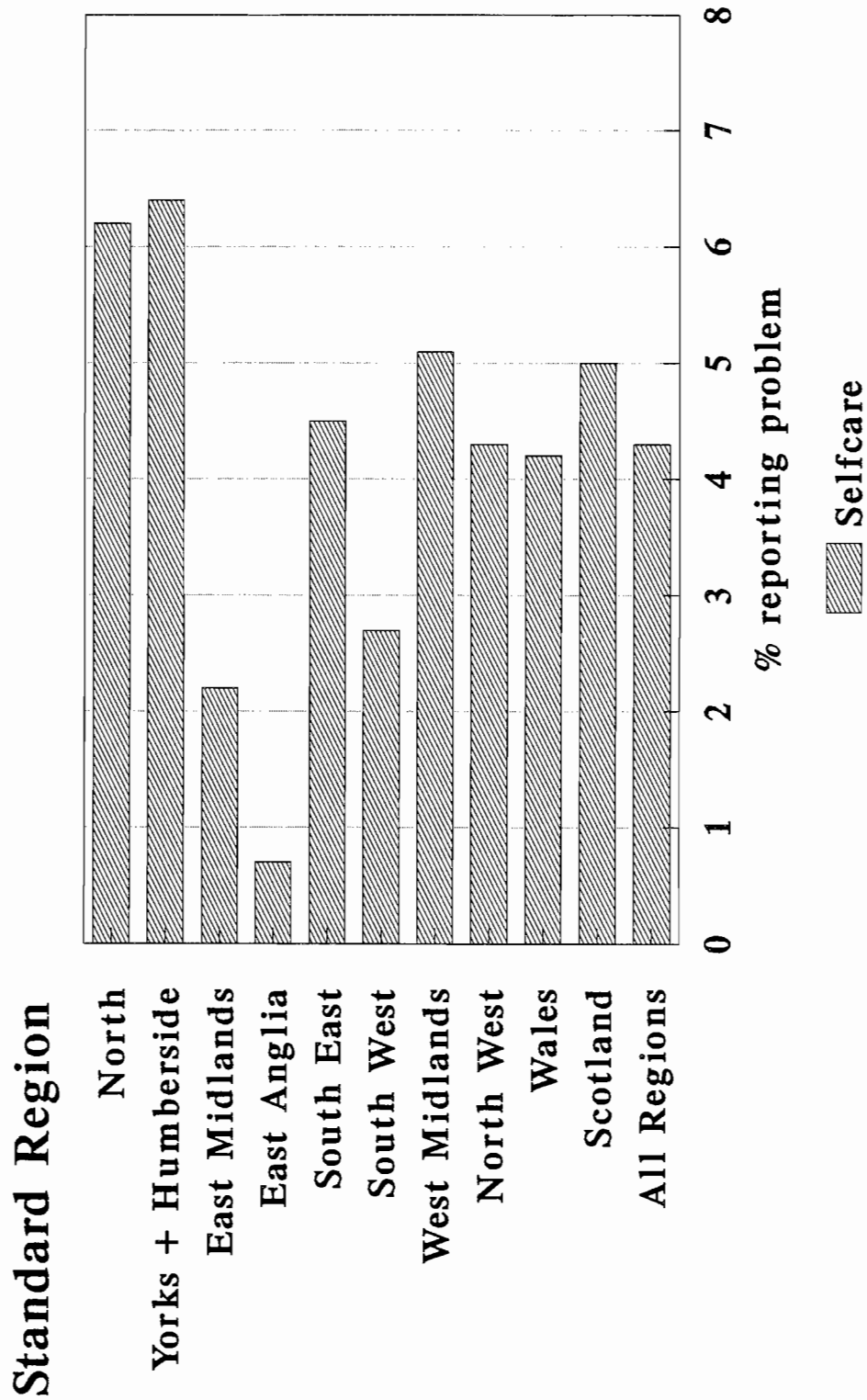
Figure 4.6(c)

Reported problems on EuroQoL dimensions
Variation by Standard Economic Region

Standard Region

% reporting problem

☐ Usual activity
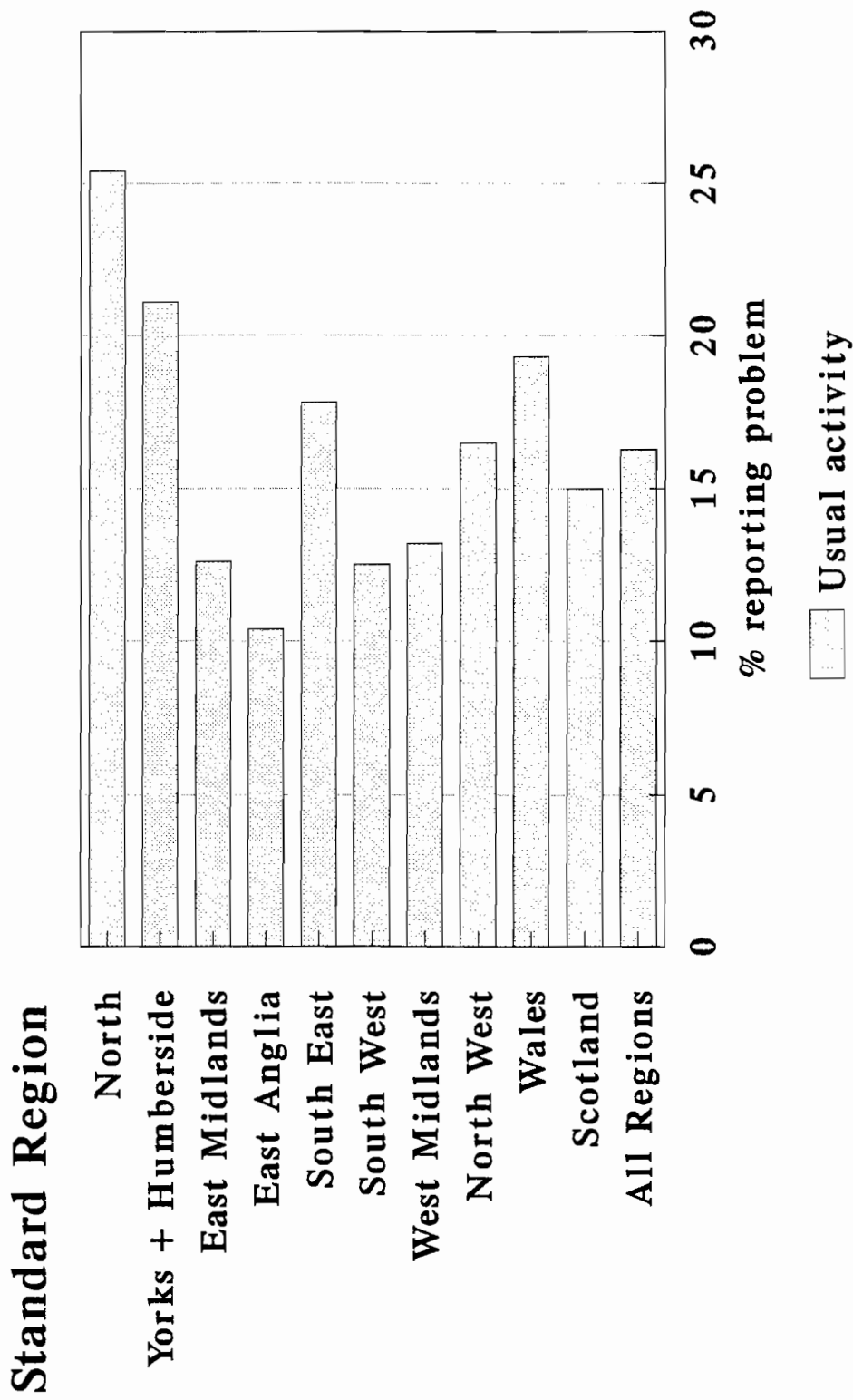
Figure 4.6(d)

Reported problems on EuroQoL dimensions
Variation by Standard Economic Region
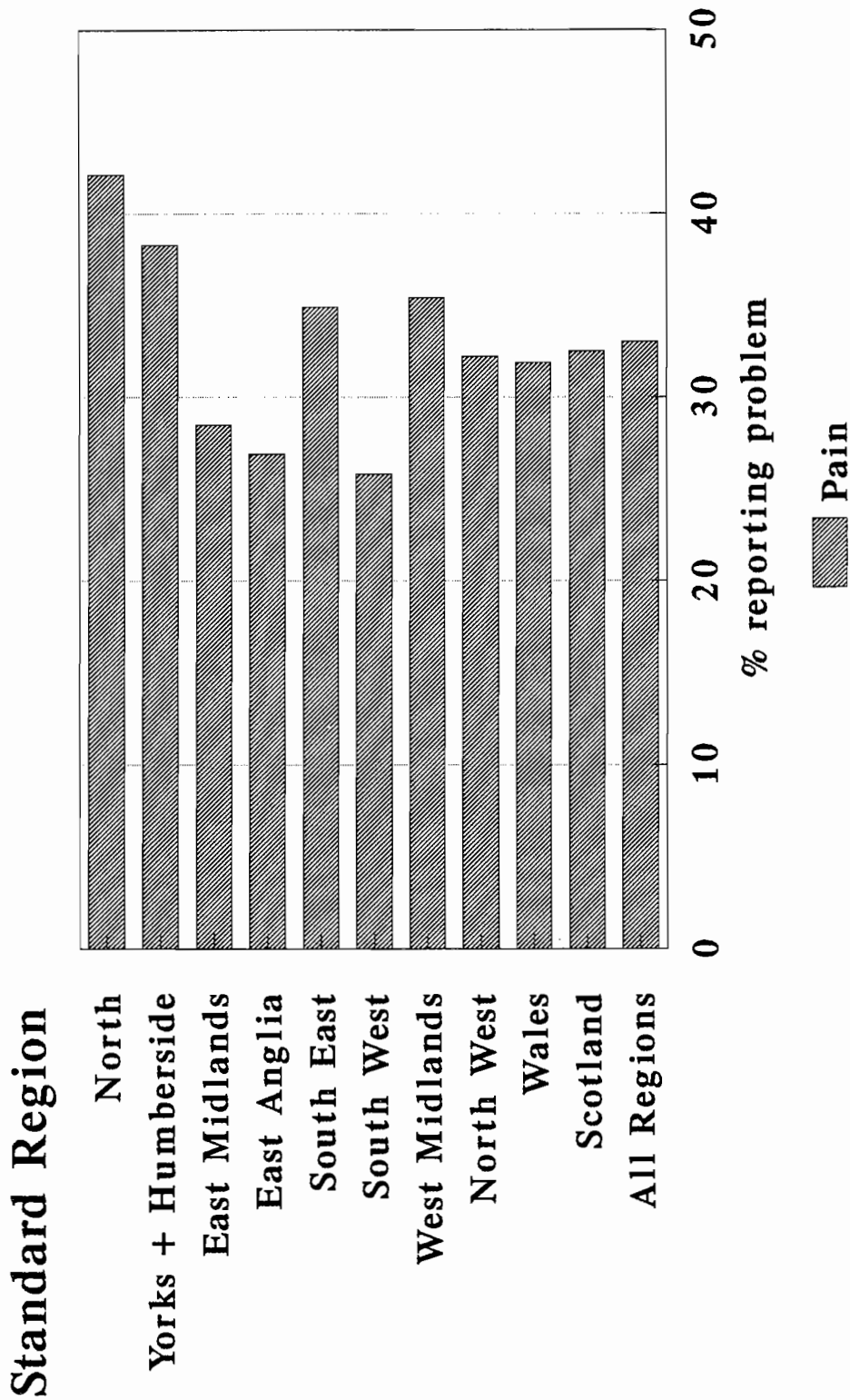
Standard Region

Figure 4.6(e)

Reported problems on EuroQoL dimensions
Variation by Standard Economic Region

Standard Region

North
Yorks + Humberside
East Midlands
East Anglia
South East
South West
West Midlands
North West
Wales
Scotland
All Regions

% reporting problem

0   5   10   15   20   25   30

☐ Mood
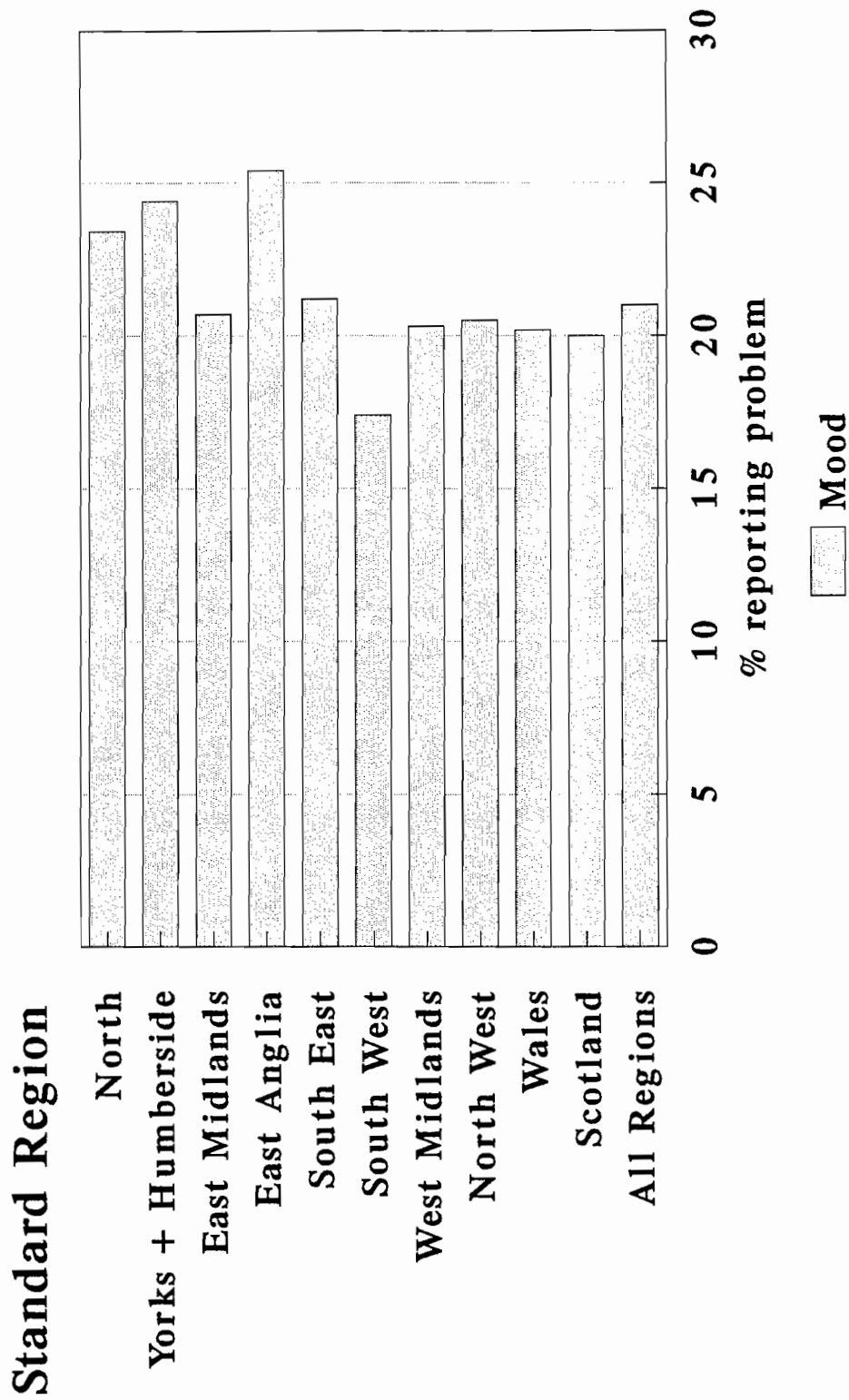
Figure 4.7

Self-rated health status
by age group

Mean VAS

Age group	Mean VAS
18 to 24	86.5
25 to 34	86.8
35 to 44	86.5
45 to 54	82
55 to 64	79.7
65 to 74	77.3
75 +	73.8
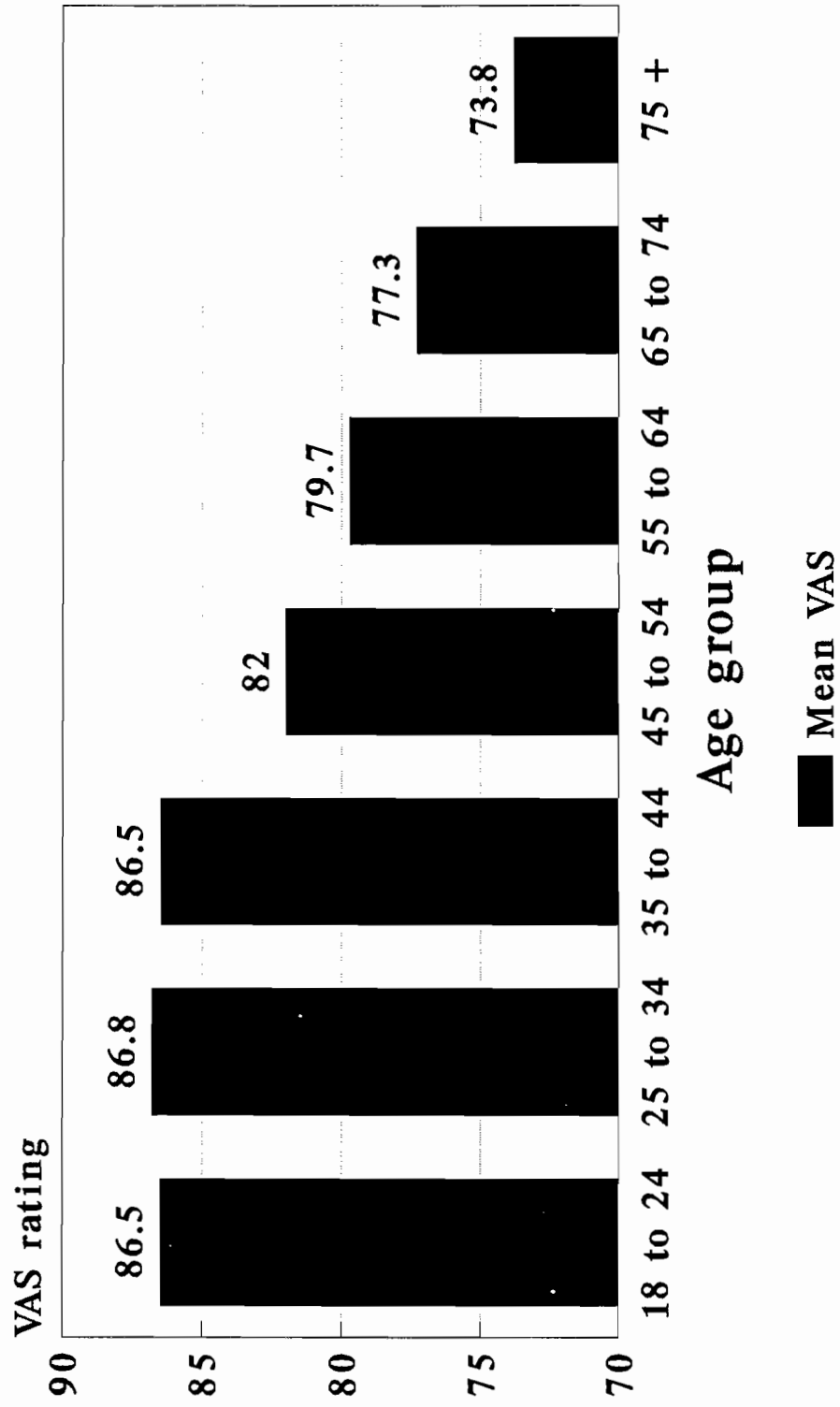
Figure 4.8

Self-rated health status
mean values by sex

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 +
Male	87.15	86.87	86.81	81.56	78.99	78.19	72.94
Female	86	86.82	86.35	82.42	80.26	76.55	74.2

Age group

Male   Female
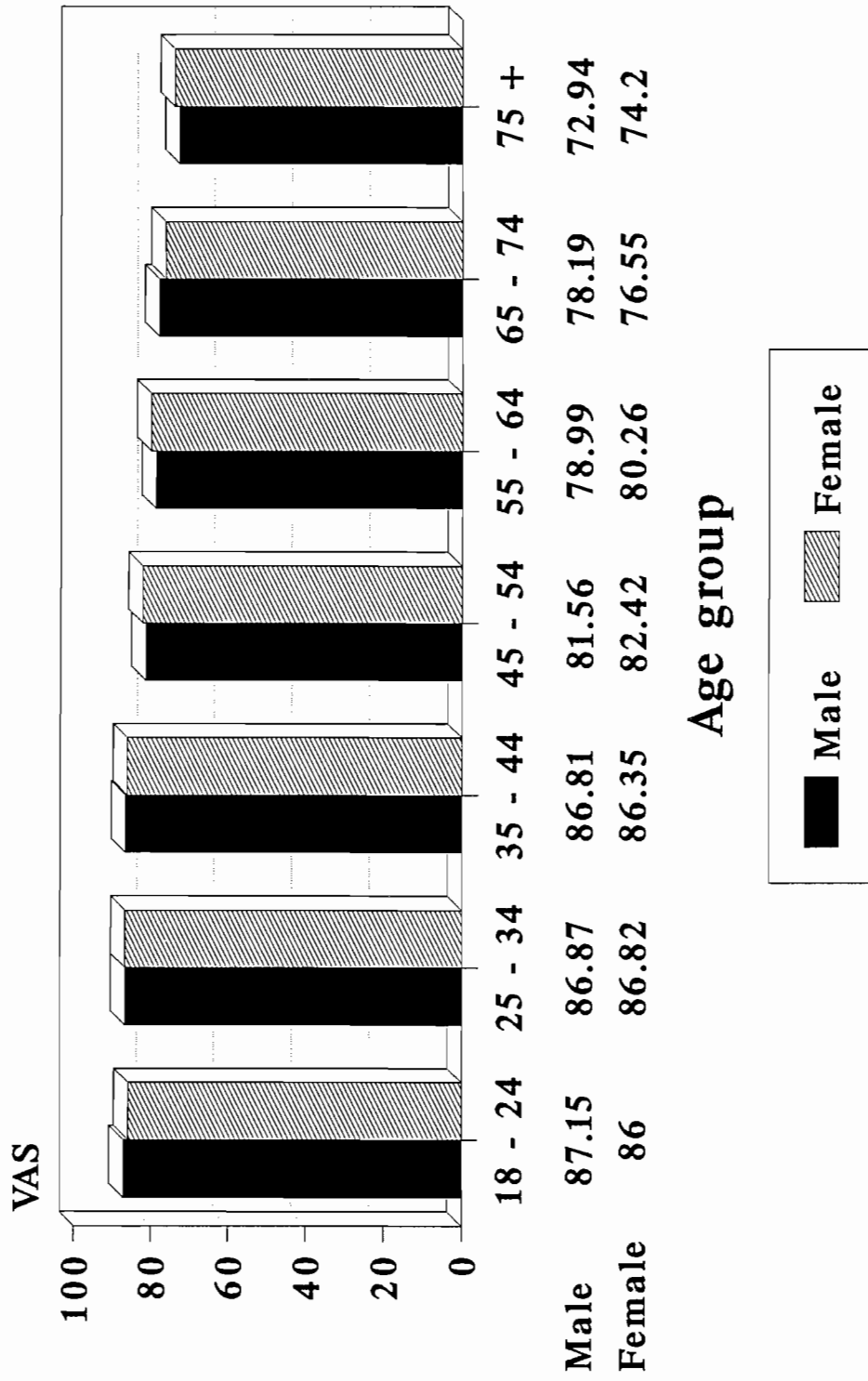
controlling for age

Figure 4.9

Self-rated health status
mean values by social class
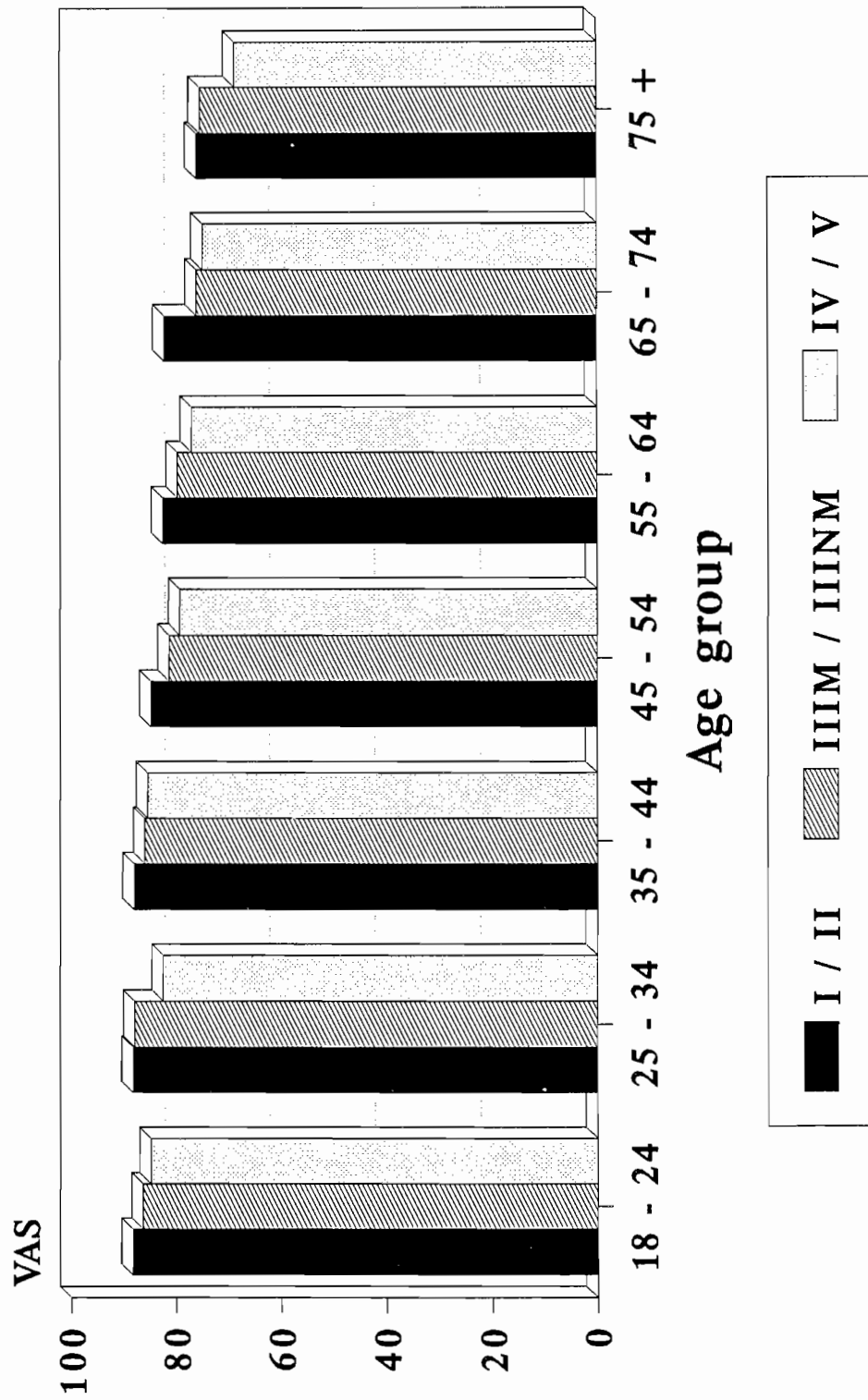
controlling for age

Figure 4.10

Self-rated health status
mean values by level of education

VAS

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 +
degree / higher	87.7	88.5	88.8	86	86.7	82.8	81.3
A / O / GCSE	87.7	87.5	86.7	83.1	80	80	75.9
none	78.4	81	84	78.6	77.5	75.1	72.3

Age group

degree / higher   A / O / GCSE   none

controlling for age

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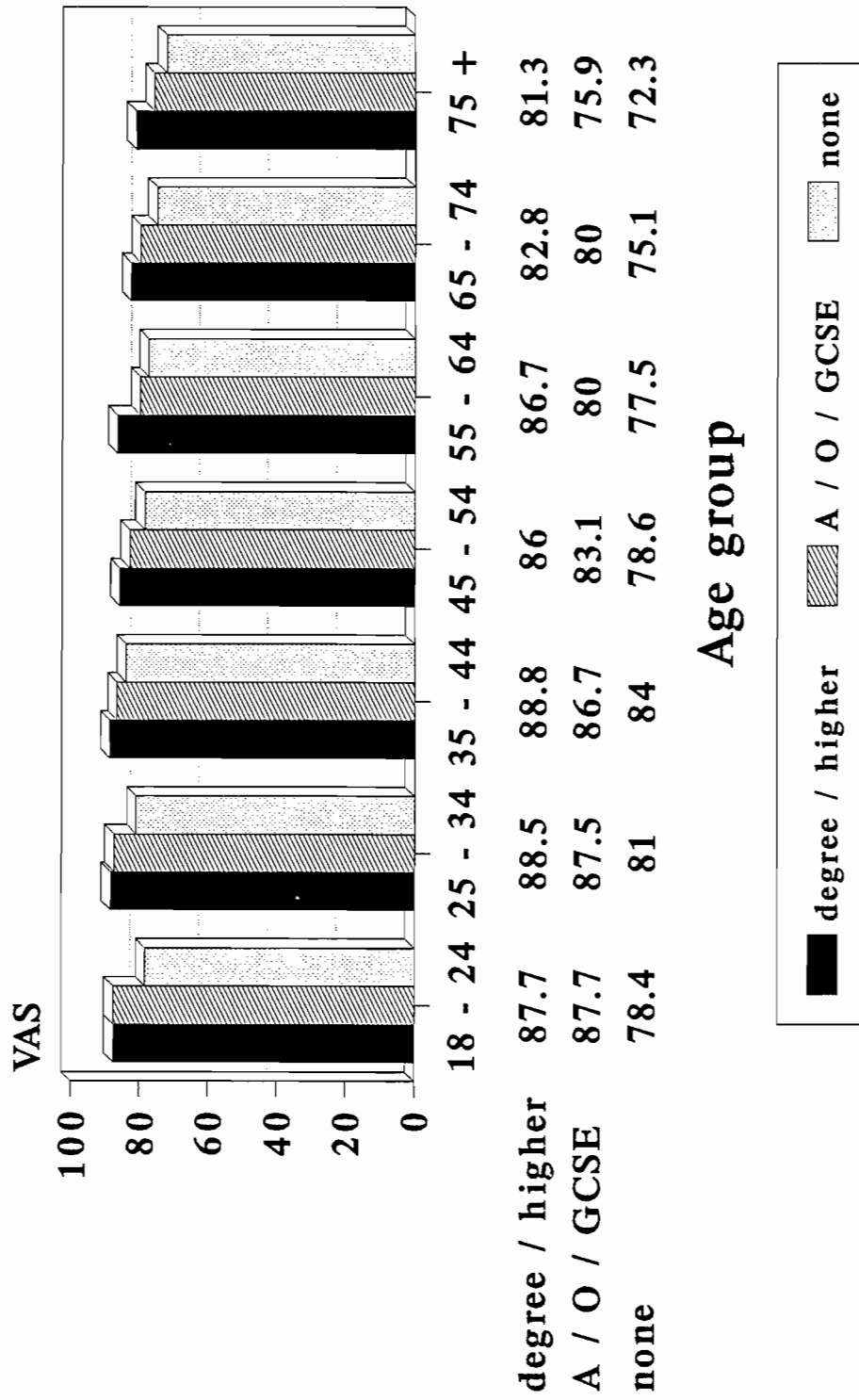
Figure 4.11

Self-rated health status
mean values by housing tenure

VAS

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 +
own / mortgaged	88.6	89.1	87.7	83.5	83.1	80.2	79
rented	83.8	82.1	82.7	77.4	72.3	72.2	68.7

Age group

■ own / mortgaged   ▨ rented
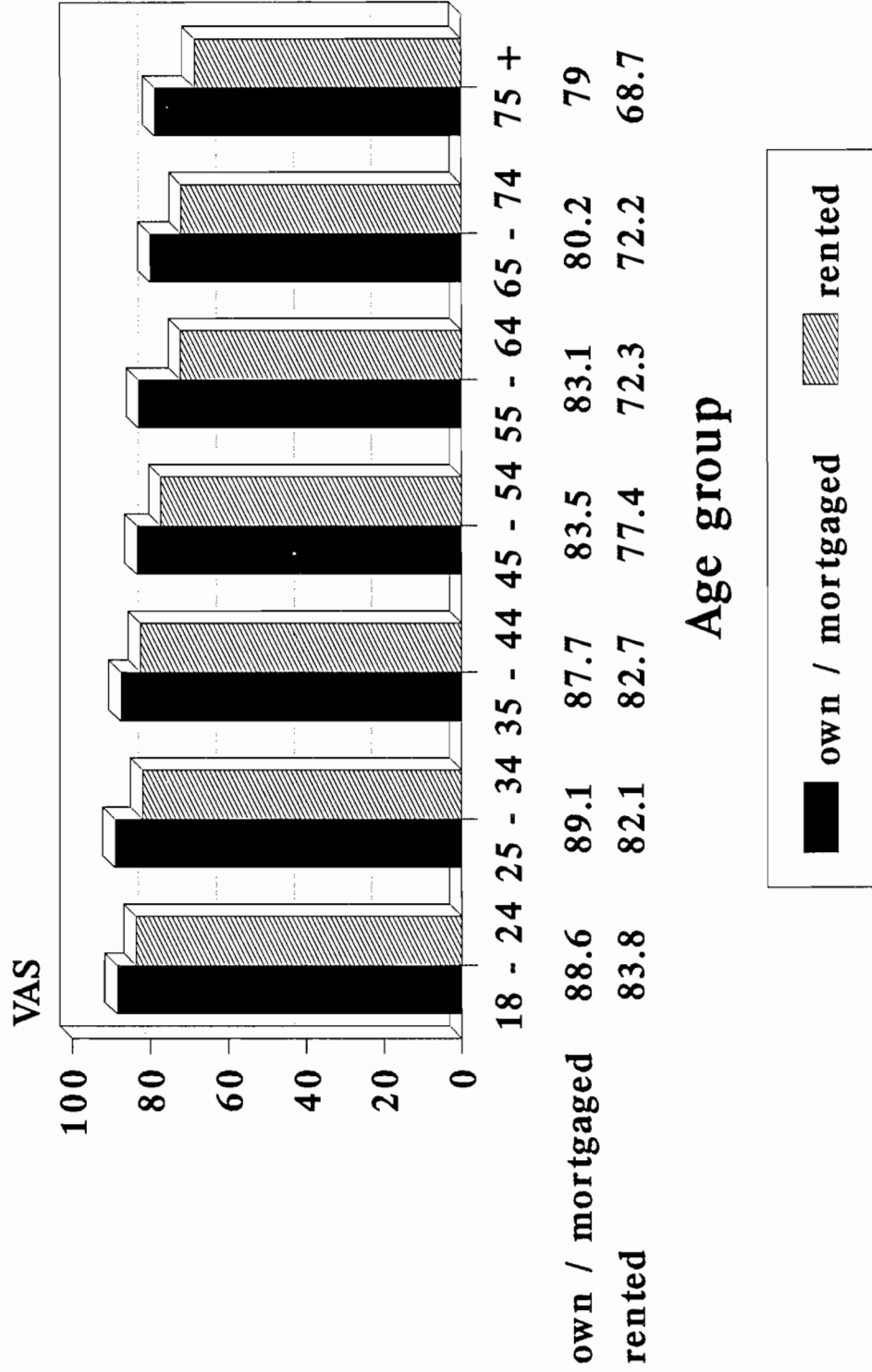
controlling for age

Figure 4.12

Self-rated health status
Variation by Regional Health Authority
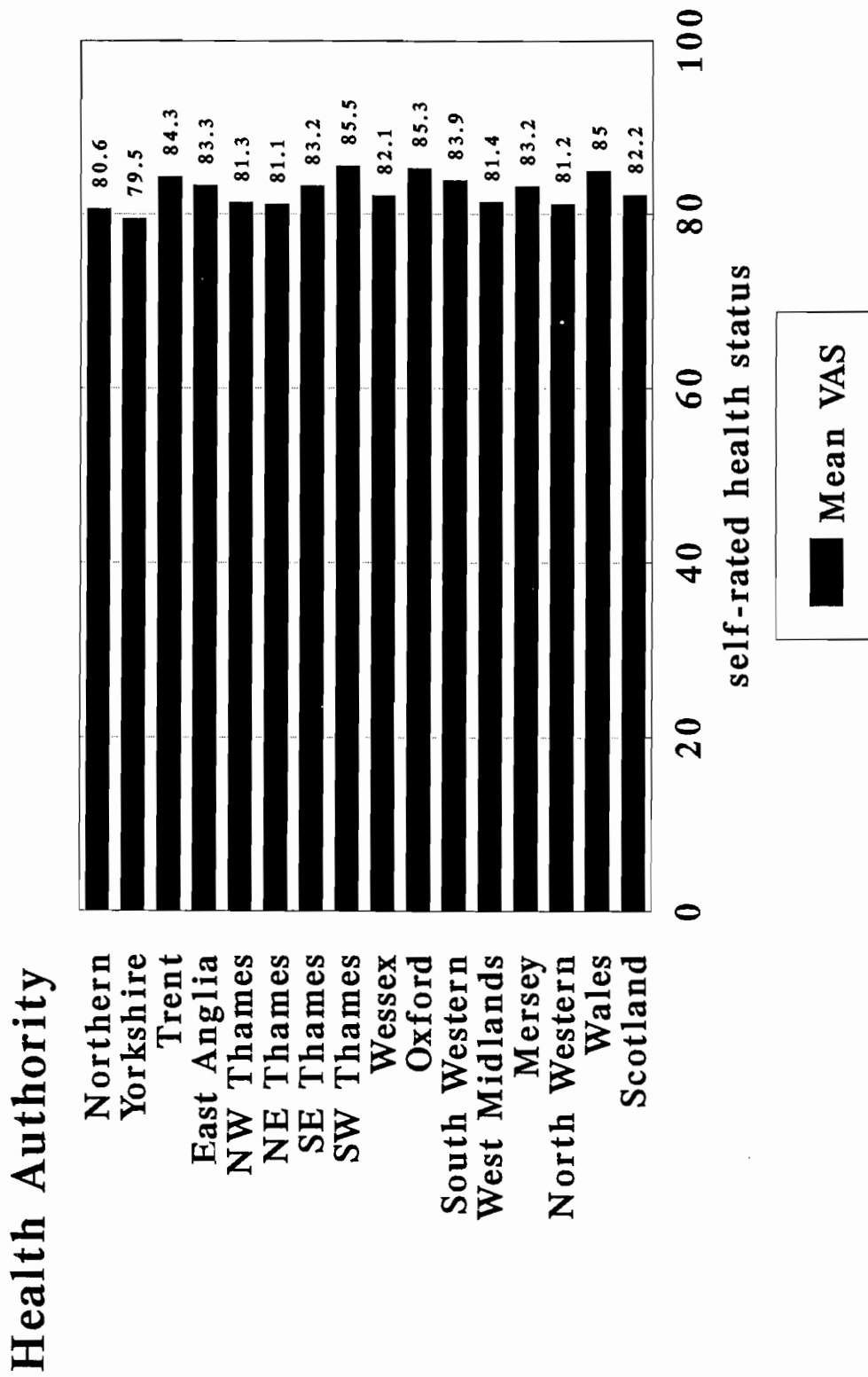
Figure 4.13

Self-rated health status
Variation by Standard Economic Region

Standard Economic Region
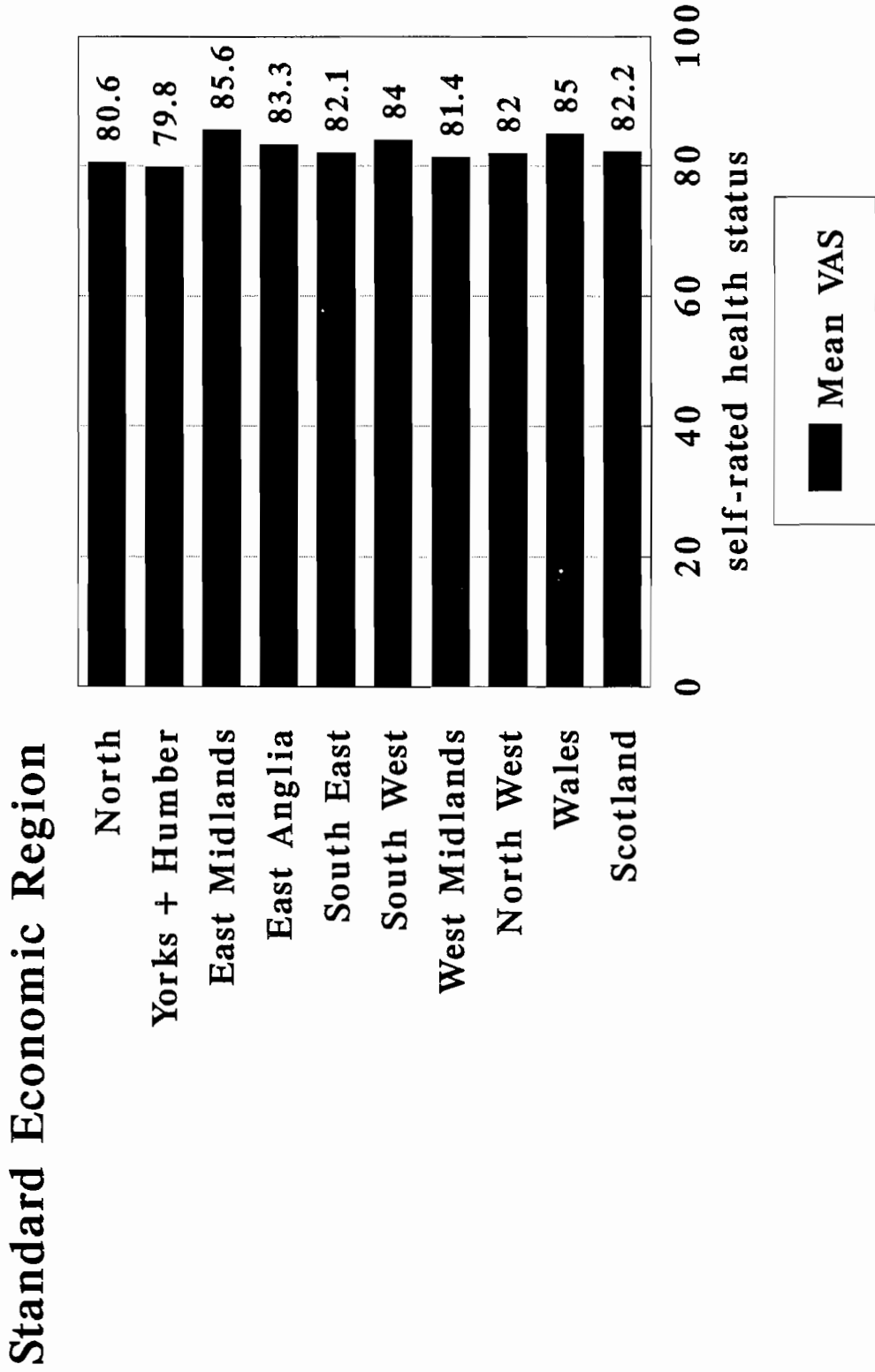
Figure 4.14

Self-rated health status
respondents with/without problems

VAS rating

	18 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75 +
No problems	90.3	90.6	90.1	90	89.8	87.3	85.9
Some problem(s)	75.1	76.7	79.4	71.8	71.5	70.6	69.1

Age group

■ No problems   ▨ Some problem(s)

by age group

CHAPTER 5   **THE RANKING EXERCISE**
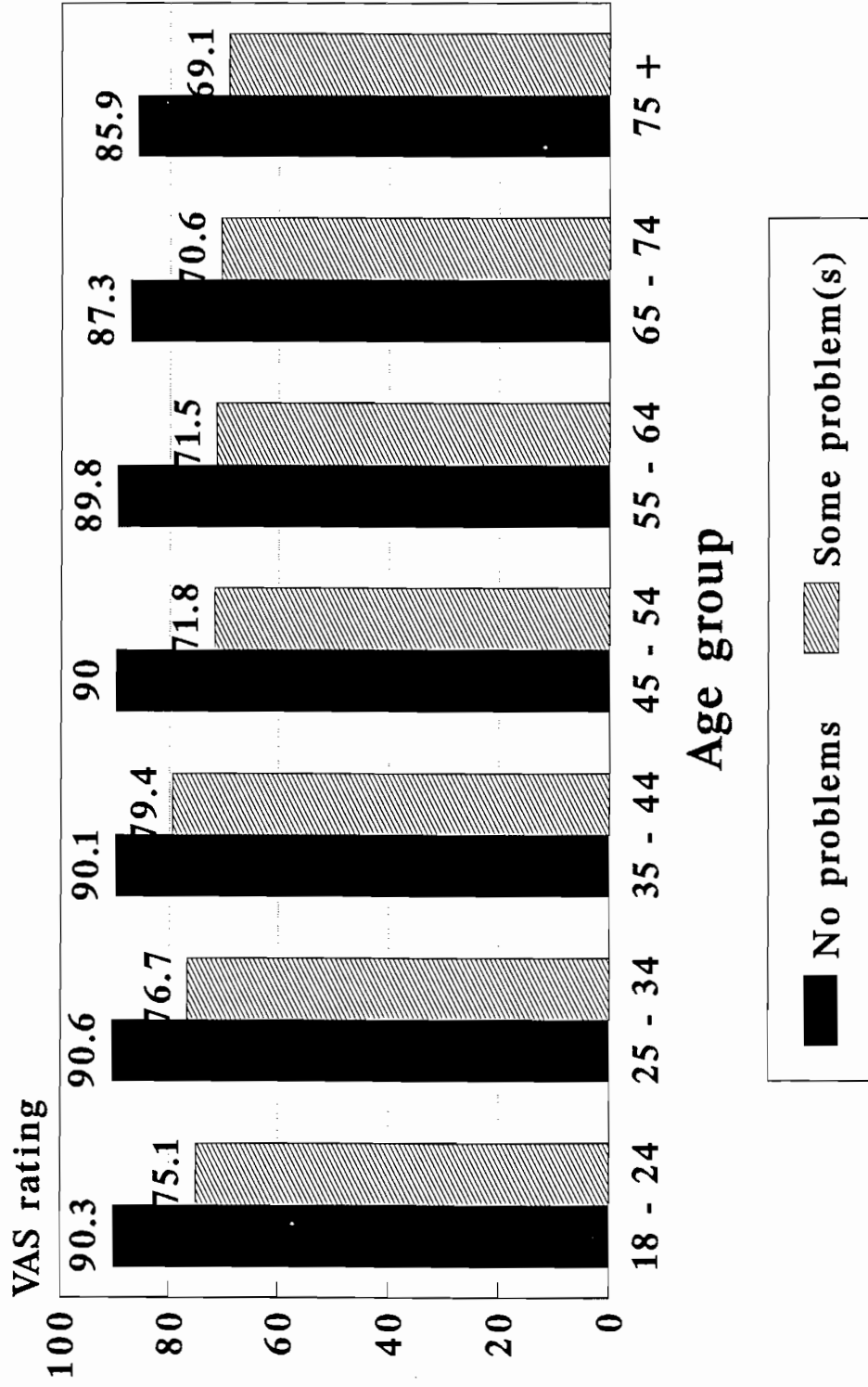
This chapter reports on the analysis of the ranks of 45 EuroQoL health states, based on data from 3325 respondents identified in Chapter 3 and shown in Table 3.3.

5.1   The Nature of the Data

Each respondent was asked to rank a set of 15 EuroQoL health states randomly selected from the master set of 45 states[1]. Although the structure of the randomisation process ensured that 4 states were ranked by all respondents, the remaining 11 states were always different for each respondent. In effect since each respondent ranked a 'unique' set of states, their rank order has to be interpreted with care since it constitutes a partial ranking of the full set and may be heavily influenced by the choice of states presented.

In both cases the data resist analysis at the level of the individual respondent, since each set of states is distinct from every other. It is only in aggregate that the information content can be processed.

Individual rankings have been analysed in 2 ways

(a)   as categorical data – in which the rank of each state was taken as equivalent to the category given to that state had all states been rated on a 15–point scale.

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[1] For details of the selection process see section 1.3

(b)   as preference data – which contain the ordinal structure of <u>pairwise comparisons</u>

The analysis of the categorical data is reported in section 5.2, and sub–group analysis for this data set follows in section 5.3. The analysis of the pairwise comparisons data, is given in section 5.4.

5.2   The Overall Rankings

The rank given to each state varied between 1 and 15, with ranks increasing in value as severity increased. Given that the number of states was greater than the number of ranks, the use of the median to represent the average rank produced a somewhat confused result with many states sharing the same average rank. The mean rank for each state, however, was typically different for each state, and these are given in Table 5.1.

The mean ranks if treated as scores, require transformation in order to enable comparison with scales produced from the VAS and TTO data, as follows:

$$V_j' = \frac{V_j - V_{11111}}{V_{dead} - V_{11111}}$$

where V_{11111} V_{dead} are the mean ranks for the 11111 state and death respectively, and where V_j' is the resulting transformed score on a 0–1 scale corresponding to the mean rank V_j.

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The decrement in score resulting from a single move from level 1 to level 2 on any dimension was roughly the same (around 0.15). The score for unconscious was positive but close to zero. There was only one state (33333) which had a negative score indicating a state worse than death.

5.3 Differences in Mean Ranks for Different Subgroups

Since the ranking data can only be meaningfully analysed in aggregate form, the comparison of results from different subgroups is based on mean ranks. Spearman's rank correlation coefficient was computed for variables which were divided into two subgroups, and Kendall's coefficient of concordance was calculated for variables divided into three or more subgroups.

Mean ranks were computed for the following variables:

Age
Sex
Social class
Employment status
Educational qualifications
Home ownership
Experience of illness – in self
                     – in others
Smoking behaviour

Mean ranks were not signifcantly different for any of the subgroups.

5.4 Paired Comparisons Modelling

A description of Thurstone's comparative judgement model and the computational process

required to generate scale values, is given in Annexe 5A. The goodness of fit statistic indicated that the Thurstone model was reasonably successful in fitting the ranking data.

The raw scores produced by this model, in this instance ranged from +2.7 to −2.4, and summed to 0. In order to convert these to a 0–1 format a transformation similar to that applied to the mean ranks was used. The raw and transformed scale values for the 45 states are given in Table 5.2. The standard deviations for 11111 and the 3 most severe states were much higher than those for all other states. This is a function of the high probability that these states will dominate (or be dominated by) any other state in a paired comparisons.

The decrement in scale value resulting from a move from 11111 to a single level 2 on any dimension ranged from 0.19 (for pain) to 0.23 (for mobility). Unconscious yielded a positive score close to zero, and there was a single state (33333) with a negative score.

The paired comparisons scale and that based on the mean ranks (given in Table 5.1) proved to be highly correlated (Spearmans rho = 0.995), with most states being ranked identically on the two scales. This result is shown graphically in Figure 5.1, where it can be seen that the paired comparisons scale values were systematically lower than those produced from the mean ranks. The value for state 33333 was some 4 times lower on the paired comparisons scale.

Analysis of paired comparisons scales based on the same background variables as listed in section 5.3 was carried out, again using Spearmans rank correlation and Kendalls coefficient of concordance. Once again no statistically significant differences were detected in subgroup

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scales.

5.5   Summary

1.   Using the mean rank given to each state, a transformed score was computed which yielded a logically consistent set of valuations in which only one state (33333) is rated worse than being dead.

2.   Using Thurstone's Comparative Judgement Model, which derives from the ranked data all the implied paired comparisons, it is also possible to generate a set of group valuations, and this proved to be very similar to the one derived from the mean ranks.

3.   Neither of these sets of valuations varied significantly with any of the background variables.

Table 5.1   Mean ranks for all respondents (n = 3325)

State	Dimensions	Mean score	Transformed score
AP	1 1 1 1 1	1.04	1.000
SP	1 1 1 2 1	2.65	0.868
CW	1 1 1 1 2	2.671	0.866
CG	1 1 2 1 1	2.674	0.866
WQ	2 1 1 1 1	2.83	0.853
PK	1 2 1 1 1	2.87	0.850
ZT	1 1 1 2 2	4.12	0.747
FH	1 2 2 1 1	4.13	0.746
DH	1 2 1 2 1	4.33	0.729
TR	2 2 1 2 1	5.02	0.673
SL	2 2 1 1 2	5.03	0.672
WZ	2 1 2 2 2	5.47	0.636
FD	1 2 2 2 2	5.62	0.623
VJ	2 2 1 2 2	5.82	0.607
ZK	1 1 3 1 2	5.87	0.603
IW	1 1 1 1 3	6	0.592
GZ	3 1 3 1 2	6.32	0.566
RX	2 2 2 2 2	6.38	0.561
LC	1 1 1 3 1	6.76	0.530
QD	1 3 2 1 2	6.96	0.513
KV	1 2 2 2 3	7.47	0.471
OM	1 3 3 1 1	7.66	0.456
EN	2 1 2 3 2	7.94	0.433
MV	1 1 1 3 3	8.4	0.395
PB	3 1 2 3 1	8.41	0.394
BU	3 2 2 2 1	8.54	0.383
YG	2 1 1 3 3	8.8	0.362
BX	2 3 3 2 1	8.9	0.354
NS	2 2 3 3 1	8.99	0.346
JL	2 2 2 3 2	9.41	0.312
YM	2 3 2 3 2	9.71	0.287
GJ	3 3 2 1 2	9.73	0.285
XC	2 3 3 1 3	9.95	0.267
QY	2 2 2 3 3	10.11	0.254
MG	3 2 2 3 2	10.41	0.229
EQ	1 3 3 3 2	10.42	0.229
RF	3 2 3 1 3	10.43	0.228
JY	3 2 2 2 3	10.52	0.220
NA	3 3 3 2 1	10.83	0.195
KA	2 2 2 1 2	10.87	0.192
HL	3 1 3 2 3	11.61	0.131
HB	3 3 3 2 3	11.96	0.102
UN	unconscious	13.01	0.016
DE	death	13.2	0.000
XT	3 3 3 3 3	13.71	−0.042

Table 5.2   Paired comparisons scale

Rank	EuroQoL	raw score	standardised score	standard deviation
1	11111	2.7032	1.0000	0.5891
2	11121	1.8761	0.8075	0.1542
3	11112	1.8043	0.7908	0.1628
4	11211	1.7598	0.7804	0.1656
5	21111	1.6972	0.7658	0.1535
6	12111	1.6954	0.7654	0.1469
7	12211	1.4338	0.7045	0.1141
8	12121	1.3116	0.6761	0.1168
9	11122	1.2892	0.6709	0.1293
10	22121	0.9751	0.5978	0.1059
11	22112	0.9191	0.5847	0.1082
12	12222	0.8207	0.5618	0.1008
13	21222	0.7224	0.5389	0.1048
14	22122	0.6932	0.5321	0.1064
15	11312	0.5906	0.5083	0.1112
16	11113	0.4780	0.4821	0.1286
17	22222	0.4534	0.4763	0.0976
18	31312	0.3911	0.4618	0.1015
19	13212	0.2277	0.4238	0.1080
20	11131	0.2083	0.4193	0.1241
21	12223	0.0123	0.3737	0.1059
22	13311	−0.0613	0.3565	0.1149
23	21232	−0.1935	0.3258	0.1094
24	31231	−0.3712	0.2844	0.1151
25	32211	−0.3792	0.2825	0.1133
26	11133	−0.4129	0.2747	0.1237
27	23321	−0.4569	0.2645	0.1087
28	21133	−0.5801	0.2358	0.1191
29	22323	−0.5959	0.2321	0.1147
30	22331	−0.6039	0.2302	0.1134
31	23232	−0.7271	0.2016	0.1154
32	33212	−0.7771	0.1899	0.1138
33	23313	−0.8741	0.1673	0.1188
34	22233	−0.8789	0.1662	0.1260
35	13332	−0.9822	0.1422	0.1321
36	32232	−1.0185	0.1337	0.1228
37	32223	−1.0438	0.1279	0.1257
38	33321	−1.1061	0.1133	0.1370
39	32313	−1.1501	0.1031	0.1244
40	22212	−1.1664	0.0993	0.1424
41	31323	−1.4548	0.0322	0.1518
42	33323	−1.5275	0.0153	0.1763
43	uncon	−1.5528	0.0094	0.2241
44	death	−1.5931	0.0000	0.2083
45	33333	−2.3669	−0.1801	0.2288

Figure 5.1

Comparison of scales
Mean rank / paired comparison

Paired comparisons

Mean rank

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n = 3325

ANNEXE 5A   THURSTONE'S COMPARATIVE JUDGEMENT MODEL
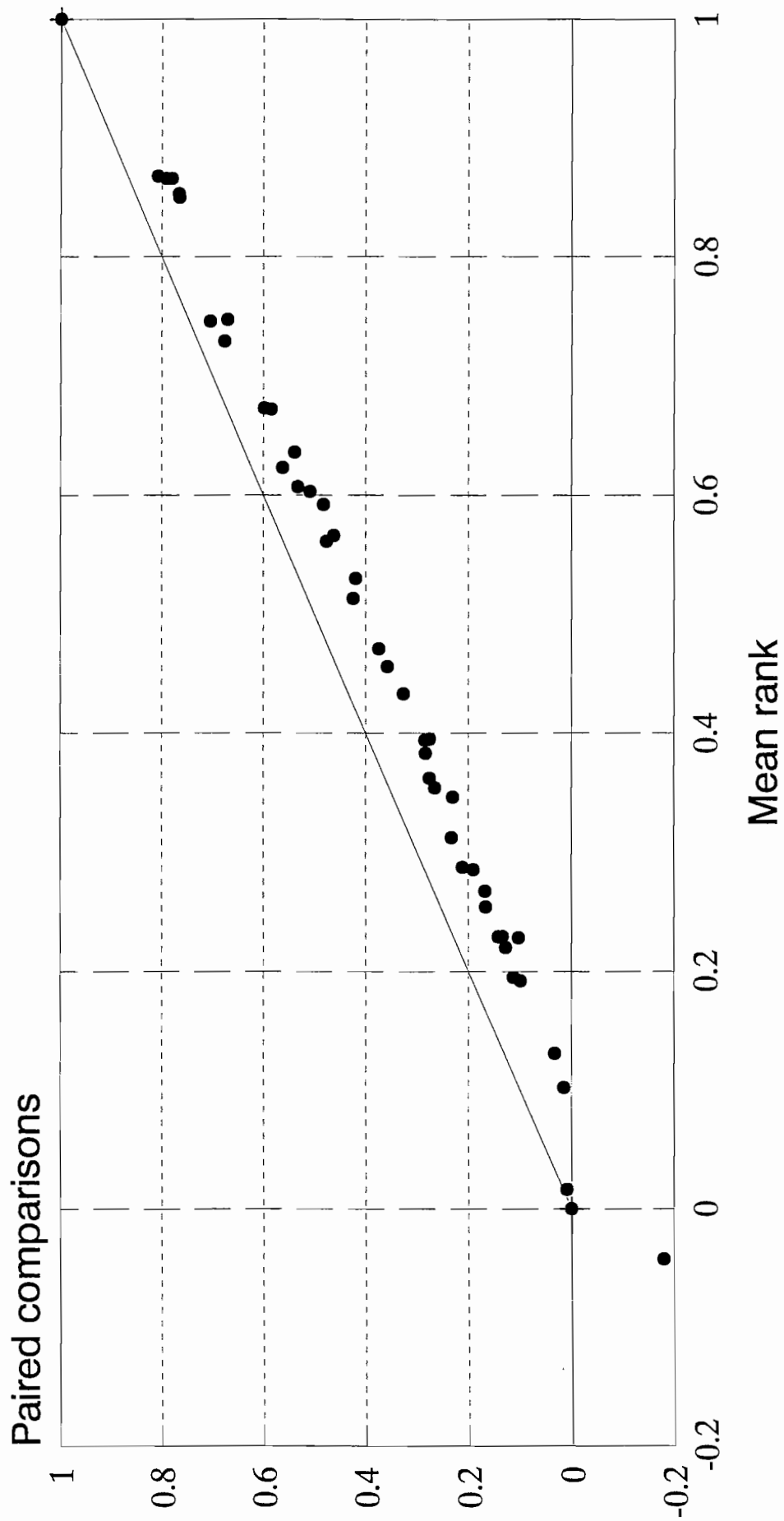
Background

The concept of just noticeable differences (jnd) has a long history in the field of psychology (Fechner, 1860). In experimental situations subjects are repeatedly forced to choose between two stimuli of varying magnitudes. Typically these would be physical stimuli such as light or sound. Given a standard stimulus (say a light of fixed intensity), a subject would be asked to compare it with a second stimulus, and to indicate which of the two was greater. The magnitude of the second stimulus was then varied until the subject was unable to detect a difference between the two stimuli. Given a random order of presentation, the probability of a subject indicating that one stimulus was greater than the other is functionally related to the difference between the pair in terms of their physical magnitude. If the two stimuli are of equal intensity, then the probability of either being designated as greater than its pair will be equal (p=0.5). The probability that the more intense stimulus will be so chosen will be greater than 0.5 (and that the lower intensity stimulus will be chosen has a probability of less than 0.5). Where there is no confusion and one stimulus always dominates the other, then probabilities are 1 and 0 respectively.

Thurstone's model

During the late 1920s the work of Thurstone extended this general approach to a representation of judgements made concerning non-physical continua such as the seriousness of crime (Thurstone, 1929). In his model, the separation of stimuli is represented on an underlying psychological continuum on which the distances between pairs of stimuli is a function of the probability of one stimulus being selected as having a degree of intensity greater than that of its pair. Although psychologist typically refer to stimuli, in the present context it will be more natural to refer to health states, and to characterise the underlying psychological attribute as 'severity'.

Thurstone's law of comparative judgement (Thurstone, 1928) is based on the concept that the assessment of any stimulus (in this case health states) with respect to a specific attribute (severity) can be represented by a theoretical distribution of points located along the psychological continuum. This distribution is termed the *discriminal process*, and is assumed to be normal. The scale value of a state is given by the the mean of the discriminal process.

In repeated judgements a state will sometimes be regarded as more, and sometimes as less severe, than any other state with which it is compared. The probability that the state X is located between points a and b on the severity continuum is given by the corresponding proportion of the area under the distribution curve, as shown

X

a   b
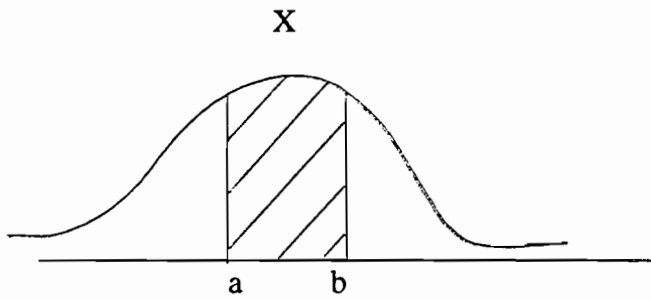
Given two health states, X and Y, each with its own associated discriminal process, then when judgements about their relative severity are made (as in paired comparisons procedures), the severity of each state is drawn from its corresponding hypothesised distribution.

X   Y

x_1 $y_2\ x_2$ y_1
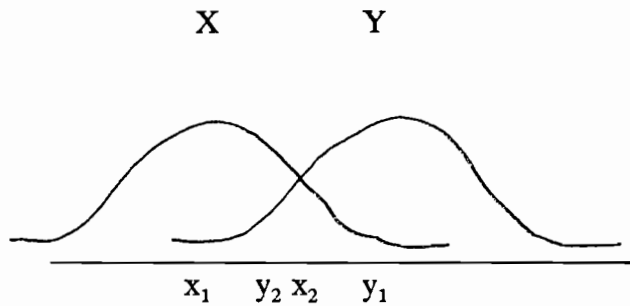
increasing severity ==>

In this example the first comparison of states X and Y is represented by x_1 and y_1, corresponding to a judgement that Y>X. Similarly x_2 and y_2 represent a second comparison between the states.

Thurstone postulated a model (the law of comparative judgement) based on the mechanisms described above, and which produced a theoretical framework which could be used to estimate scale values for subjective continua – such as health state severity. The full model is given by the following equation

$$v_x - v_y = z_{xy} \cdot (\sigma_x^2 + \sigma_y^2 - 2r_{xy}.\sigma_x.\sigma_y)^{1/2}$$

where

> $v_x - v_y$ is the difference in scale values for states X and Y
> z_{xy} is the normal deviate corresponding to the proportion of times that state X is judged more severe than state Y
> σ_x and σ_y are the discriminal dispersions of states X and Y
> r_{xy} is the correlation between the two discriminal dispersions

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A number of simplifying assumptions are made (for example that all σ are equal) in order to allow the full model to be solved.

Computing scale values

The computational steps involved in deriving scale values are quite straightforward. Firstly, a frequency matrix F_{ij} is constructed, in which the ij[th] element indicates the number of occasions on which state i is judged to be more severe than state j. Table 5A.1 presents the full F-matrix constructed using the ranking data from 3325 respondents. Frequencies for each state occupies 4 lines. The final figure on the last line gives the total number of times that each state was presented for ranking. For example, state 32211 was ranked higher than state 11111 (i.e. more severe than 11111) on 838 occasions. It was ranked by a total of 840 respondents. Similarly, state 23321 was ranked worse than death by 68 out of a total of 829 respondents.

The frequencies held in the F-matrix are then converted into proportions, by dividing each F_{ij} by the row total (indicating the number of respondents ranking the ith state). Table 5A.2 presents an extract from the P-matrix corresponding to the frequencies shown in Table 5A.1. The p values for states 32211 / 1111 and 23321 / death are .998 and .083 respectively. Finally, the P-matrix is converted to unit normal values (z-scores), an extract of which is given in Table 5A.3. The p-values for these pairs of states now become z-scores of 2.823 and -1.388 respectively. Extreme values of p (equal to 1 or 0) are flagged as missing values since the equivalent z-scores would be infinity.

Scale values for each state are given by the mean value of the column total, calculated using all valid elements in the Z-matrix.

In order to convert the scale values to a standard 0-1 format the scores as follows

$$S_j' = \frac{S_{11111} - S_j}{S_{11111} - S_{dead}}$$

where S_{11111} and S_{dead} are the scale values for the 11111 state and death respectively, and where S_j' is the resulting transformed score on a 0-1 scale corresponding to scale value for state j. The raw and transformed scores are given in Table 5A.4

The standard deviation (σ_j) can be calculated from the Z-matrix using an algorithm described by Edwards (1957). These too, are derived from the valid elements in each column of the matrix. The data in the P-matrix reveal a high probability that the state 11111 will be judged less severe than all other states. Hence the $P_{1,j}$ vector, showing the p-values for remaining 44 states, contains very low values. The corresponding elements in the Z-matrix are very high, representing the extreme of the normal distribution. The computation of the standard deviations is based upon column totals, so that states with very high/low probabilites (and hence z-scores), will tend to produce high standard deviations. This is the case for 11111, unconscious, death and 33333. Although there is a U-shaped distribution of values for the standard deviation, most other states have values which are reasonably similar — in line with the model assumption adopted.

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Testing the goodness-of-fit

A goodness-of-fit statistic can calculated by reversing the computational process. Taking the raw scores for each state, it is possible to calculate the difference between states – in terms of their z-scores. This difference can be transformed to determine the *expected probability* that one state will be judged to be more severe than another; an extract is given in Table 5A.5. The difference between these expected probabilities and those observed in the raw data can be computed for all pairs of states and yields an average discrepancy – used as a goodness-of-fit measure. In this instance the value of 0.054 is close to the limit reported in other studies.

References

Edwards (1957) Techniques of attitude scale construction. Prentice-Hall, New Jersey.

Fechner G T (1860) Elements of psychophysics. Reprinted 1966 by Holt, Rinehart and Winston.

Thurstone L L (1927) A law of comparative judgement. Psychological Review, 34, 273–286.

Table 5A.1 Frequency matrix

```
           11111 32211 23321 11211 11112 death 12121 21232 13332 12222 12211 33212

           31312 33323 31323 11113 22323 32223 22212 12223 11131 32232 11133 33321

           22331 13311 31231 12111 13212 22233 32313 22222 22112 11121 22121 uncon

           22122 21111 21222 23313 33333 21133 23232 11312 11122 total
```

EuroQoL
state

```
11111    0     2     3    14    23     2     7     3     3     2     1     1
         3     2     1     3     1     2     0     4     6     1     1     2
         3     2     3     8     4     1     2     1     4    19     2     5
         5    12     4     1     4     0     0     5     9  3325

32211   838     0   117   328   323    78   205    95    65   126   208    31
        182     9    11   172    99    27     9   105   136    21   116    12
         65    96    83   332   115    94    19   158   197   335   212    69
        148   331   197    83    15    91    79   193   180   840

23321   826   102     0   325   322    68   237   134    29   207   202    41
        184     7    13   167    60    28    17   152   154    29   107    13
         75   161   106   338   188    44    24   184   202   327   194    73
        194   322   194    35     8   109    50   172   193   829

11211  1323     5     8     0   181     6    25     4     3    17    23     4
         10     5     4  · 38     4     4     3     8    11     2     3     2
          4     7     5   128    11     3     4    10    16   156    16    11
         17   149    15     2     5     9     3    19    54  1338

11112  1298     8     7   150     0     7    50     6     3    11    78     1
          8     0     1    12     0     2     2     5    19     1     8     4
          6     5     8   112     4     3     1     8    17   190    26     9
         11   148     8     3     3     2     2    11    31  1322

death  3322   762   760  1332  1314     0   825   764   686   824   831   726
        791   595   631   781   732   671   649   778   765   671   753   675
        720   780   760  1323   786   710   705   826   831  1328   832  2078
        809  1324   805   720  1795   733   723   803   825  3325

12121   823     8     3   295   290     6     0     9     3    20    89     1
         13     3     2    41     3     1     2    11    16     1     5     3
          3    10     4   303    18     3     2    11    31   320    32     9
         28   265    23     3     3     5     1    22    80   831

21232   826    58    86   329   347    65   195     0    21   147   200    49
        152    18    13   176    60    27     9    80   174    20    87    29
         27    87    46   316   107    30    25   127   204   325   208    62
        132   316   177    47     2    49    28   172   189   830

13332   816   134   120   326   317   133   196   184     0   201   198    93
        205    26    34   175    94    61    83   210   173    85   165    49
        161   187   167   322   173    91    79   183   201   325   216   128
        187   333   186    90    13   168   113   208   186   820
```

12222	834	8	9	321	308	12	196	15	5	0	190	6
	42	1	2	71	6	4	4	10	54	3	19	6
	7	16	5	319	26	3	2	24	151	329	153	14
	71	317	93	7	1	11	5	55	181	836		
12211	833	3	3	291	268	4	65	9	2	19	0	0
	10	1	0	31	5	2	2	3	16	3	7	3
	2	8	3	300	7	3	1	13	20	270	29	5
	18	286	13	0	0	1	2	14	78	835		
33212	832	177	86	342	328	107	194	165	65	195	207	0
	172	5	14	180	102	52	47	179	156	62	135	28
	117	175	163	321	178	72	56	181	210	337	208	94
	192	327	216	68	15	128	85	186	208	834		
31312	811	19	15	312	282	24	131	50	6	172	151	8
	0	3	6	86	15	12	7	64	67	9	31	5
	9	37	25	327	94	18	4	126	114	327	111	28
	145	333	110	10	1	20	11	122	135	815		
33323	846	209	135	353	332	253	224	191	128	194	209	153
	227	0	102	189	155	144	169	203	182	103	187	136
	204	208	190	323	209	133	189	226	190	339	232	231
	206	338	200	157	42	190	139	208	203	848		
31323	833	198	153	334	349	204	211	198	112	229	209	124
	203	44	0	221	139	118	153	191	203	141	158	101
	178	216	178	326	189	119	172	214	193	329	227	181
	205	322	185	133	34	166	136	213	212	835		
11113	824	42	31	277	313	47	102	46	22	118	114	33
	71	8	12	0	8	6	15	36	59	18	13	20
	24	60	22	296	50	10	9	120	116	336	107	50
	138	281	92	15	6	13	26	73	120	828		
22323	825	105	85	335	328	95	210	146	34	180	233	58
	187	8	17	189	0	27	43	172	153	37	133	35
	120	147	156	327	195	61	47	185	197	325	203	81
	198	328	207	50	8	121	57	190	202	827		
32223	825	182	122	330	319	156	189	145	84	220	207	95
	203	17	25	213	116	0	83	187	185	80	133	69
	145	180	184	325	206	88	87	208	203	339	191	132
	198	328	214	96	13	146	100	183	216	827		
22212	831	135	193	344	311	181	214	144	133	161	208	165
	213	48	41	187	188	115	0	131	213	155	188	98
	132	131	136	337	135	152	94	163	226	341	197	165
	135	318	191	166	16	171	145	180	184	831		
12223	824	45	61	343	332	50	195	57	22	142	193	48
	141	3	11	168	22	15	14	0	122	31	39	21
	42	68	32	326	102	10	4	118	197	323	192	46
	131	293	189	21	2	33	32	151	225	829		

```
11131   813    65    65   304   341    55   122    24    10   143   122    58
         77    14     6    98    42    30    11    80     0    14    10    36
         24    82    57   295   105    22    28   138   130   323   124    68
        140   296    91    33     5    18    25    97   144   820

32232   830   181   122   315   321   159   206   170    80   183   187   103
        186    19    19   188   104    73    67   182   203     0   149    53
        167   171   152   348   189    85    98   205   216   324   205   141
        198   345   197    75    13   139   126   202   225   831

11133   833   100    93   345   326    82   155   134    53   196   165    89
        134    31    25   134    70    53    41   148   138    53     0    56
         93   118   107   318   141    42    38   180   122   319   126    81
        182   327   136    68     9    34    79   128   143   835

33321   834   182   147   338   331   161   200   190   100   232   181   124
        189    20    40   193   114   102    71   180   165    95   177     0
        164   203   182   339   200   104   130   198   224   326   182   134
        186   329   205   109    22   167    89   217   206   836

22331   820    85   124   313   302   102   201   112    43   139   214    91
        197    17    12   167    91    50    16   100   176    53   128    48
          0    94   106   331   128    59    35   142   180   321   196   100
        137   358   202    72     6   103    97   188   217   823

13311   822    50    36   310   332    45   201    66    14   150   205    32
        161     6    10   153    52    29    12    92   101    33    81    15
         39     0    53   308   105    38    16   122   184   326   172    51
        126   327   151    23    10    73    41   185   190   825

31231   825    70   100   319   329    68   173    94    37   138   206    72
        168    11    13   177    55    39    28   122   158    52    98    43
         69    99     0   324   105    42    17   119   188   319   185    69
        147   327   217    44     4    90    54   196   208   829

12111  1317     7     1   218   197     3    36     7     3    11    34     1
         12     0     2    36     3     4     3    11    20     4    11     0
          3     7    12     0    10     4     1    12    10   195    21    11
         16   191    23     3     2     6     1    29    66  1326

13212   821    39    26   324   328    39   193    47    17   141   195    13
        116     4     6   150    36     9     7    45   135    18    45     4
         23    43    34   317     0    25     5    99   175   303   177    42
        103   328   169    12     3    38    16   141   180   826

22233   833   132   118   337   340   124   205   195    51   197   205    80
        184    23    43   196   100    48    64   197   185    55   177    50
        142   170   122   322   171     0    79   224   216   321   207   122
        189   333   199    81    20   163    76   180   213   834

32313   840   138   151   341   320   138   209   138   127   133   196   144
        186    15    58   220   157   128    60   152   173   114   162    91
        131   124   121   339   145   142     0   163   197   346   224   125
        152   328   220   135    17   173   175   203   204   843
```

```
22222  841    12    18   326   326    17   205    27    11   116   210    15
        77     4     3    80    11     4     3    36    62    10    34     8
         6    38    17   340    51     7     4     0   181   341   177    14
       110   304   164     9     3    20     5    97   238   843

22112  840     7    12   338   312    12   120    22     8    72   128     5
        26     2     1    68     6     4     0    33    28     3    18     3
         6    29    17   303    29     4     1    19     0   319    77     9
        43   323    44     6     3     5     4    32   124   844

11121 1314     4     1   175   167     4    20     4     2    11    62     3
        10     2     1    24     0     1     2     4    12     1     4     1
         3    12     7   124    15     2     1    10    28     0    11     7
        12   161    10     2     3     4     2    22    27  1333

22121  839    10     3   318   303    10   119    17     8    75   137     1
        19     3     2    48     4     3     2    24    32     5    12     1
         8    28    18   328    31     3     1    24    98   324     0    12
        42   309    45     9     1    14     3    40   121   842

uncon 3320   771   756  1326  1313  1247   822   767   691   821   830   739
       787   617   653   778   746   695   666   783   751   690   754   702
       723   773   760  1315   784   712   718   829   835  1325   830     0
       803  1315   808   736  1862   740   722   804   819  3325

22122  817    14    13   314   328    13   173    16    11    85   187     7
        51     3     1    80     5     3     2    23    53    12    24     8
         6    18    13   285    43     9     5    25   173   301   150    20
         0   343   103     6     5     8    10    83   187   823

21111 1319     5     6   180   176     7    55     4     4    27    54     0
         7     3     2    40     3     0     0    12    16     0     9     2
         2    13     4   160     9     3     2     8    21   163    26    16
        16     0    12     3     4     5     0    25    82  1331

21222  822    17    12   322   330    21   130    18     5   103   146     4
        33     5     3    47    13     0     1    23    43     6    15    11
        12    32     9   306    59     5     9    28   101   310    96    19
        97   316     0     6     3    10     0    56   156   827

23313  831   142   100   309   324   111   194   162    62   212   215    84
       193    15    28   200    94    59    62   167   167    65   141    45
       112   167   173   333   187    84    63   199   210   352   201    95
       221   330   195     0    13   121    64   220   204   832

33333 3320   825   821  1333  1319  1530   828   828   807   835   834   818
       814   806   801   821   818   814   814   827   815   817   826   813
       817   814   825  1324   823   814   826   839   841  1329   841  1462
       818  1327   824   818     0   825   813   828   828  3325

21133  832   108   104   362   304    99   165   142    51   205   130    86
       123    28    38   128    73    69    31   163   149    63   121    50
        98   158   127   335   146    45    56   190   148   300   142    92
       210   336   135    67     8     0    78   136   141   833
```

```
23232   823   123   116   325   326    99   198   174    35   198   224    68
        186    21    10   158   103    44    26   167   176    47   127    44
        117   155   144   326   200    54    64   210   211   331   211   101
        199   328   210    61     9   125     0   194   200   823

11312   824    37    19   312   323    26   130    24     5   147   125     5
         36     5     4    75    11     8     3    41    41     8    13     7
         13    38    17   300    62    13     4   118   108   318   115    26
        134   301   113    11     2    18    11     0   144   830

11122   821     8     6   294   301     6    60     2     3    14    74     5
          6     0     0    17     0     2     2     7    12     3     5     2
          4    12     9   253    11     0     3    11    24   291    33    12
         17   263    13     1     2     4     4    19     0   831
```

Table 5A.2   Extract from P- matrix

```
11111 0.000 0.002 0.004 0.011 0.018 0.001 0.009 0.004 0.004 0.002 0.002 0.002
      0.004 0.002 0.002 0.004 0.002 0.002 0.000 0.005 0.008 0.001 0.002 0.002
      0.004 0.003 0.004 0.006 0.005 0.001 0.003 0.002 0.005 0.014 0.003 0.002
      0.007 0.009 0.005 0.001 0.001 0.001 0.000 0.007 0.011

32211 0.998 0.000 0.534 0.984 0.976 0.093 0.960 0.620 0.327 0.937 0.983 0.151
      0.903 0.041 0.053 0.802 0.485 0.129 0.063 0.699 0.676 0.106 0.537 0.064
      0.434 0.656 0.542 0.979 0.745 0.416 0.123 0.927 0.966 0.988 0.955 0.082
      0.914 0.985 0.921 0.369 0.018 0.457 0.391 0.839 0.957

23321 0.996 0.466 0.000 0.976 0.979 0.083 0.985 0.609 0.197 0.956 0.985 0.324
      0.925 0.052 0.078 0.843 0.414 0.187 0.081 0.714 0.703 0.194 0.535 0.081
      0.377 0.816 0.514 0.996 0.877 0.272 0.137 0.909 0.942 0.997 0.985 0.088
      0.935 0.982 0.942 0.261 0.010 0.512 0.302 0.898 0.970

11211 0.989 0.016 0.024 0.000 0.547 0.004 0.078 0.012 0.009 0.050 0.075 0.012
      0.031 0.015 0.012 0.122 0.012 0.013 0.009 0.023 0.036 0.006 0.009 0.006
      0.014 0.024 0.017 0.370 0.034 0.009 0.013 0.030 0.045 0.471 0.049 0.009
      0.051 0.453 0.045 0.006 0.004 0.024 0.011 0.057 0.155

11112 0.982 0.024 0.021 0.453 0.000 0.006 0.147 0.018 0.009 0.034 0.225 0.005
      0.029 0.000 0.003 0.037 0.000 0.006 0.006 0.016 0.053 0.003 0.024 0.012
      0.019 0.016 0.025 0.362 0.012 0.009 0.005 0.024 0.052 0.532 0.079 0.007
      0.034 0.457 0.025 0.009 0.002 0.007 0.006 0.033 0.093

death 0.999 0.907 0.917 0.996 0.994 0.000 0.993 0.921 0.837 0.986 0.995 0.871
      0.971 0.702 0.756 0.943 0.885 0.811 0.782 0.939 0.933 0.808 0.902 0.807
      0.875 0.945 0.917 0.998 0.952 0.851 0.836 0.980 0.985 0.997 0.988 0.625
      0.984 0.995 0.974 0.866 0.540 0.881 0.879 0.968 0.993
.......................................................................
.......................................................................
.......................................................................

11312 0.993 0.161 0.102 0.943 0.967 0.032 0.855 0.124 0.026 0.727 0.899 0.026
      0.228 0.023 0.021 0.507 0.057 0.044 0.019 0.215 0.297 0.040 0.095 0.033
      0.067 0.172 0.082 0.912 0.306 0.067 0.019 0.549 0.771 0.934 0.740 0.031
      0.618 0.923 0.669 0.050 0.002 0.117 0.054 0.000 0.881

11122 0.989 0.043 0.030 0.845 0.907 0.007 0.429 0.013 0.016 0.074 0.487 0.023
      0.046 0.000 0.000 0.124 0.000 0.009 0.011 0.032 0.080 0.013 0.037 0.010
      0.020 0.062 0.044 0.792 0.060 0.000 0.017 0.046 0.164 0.915 0.216 0.014
      0.083 0.762 0.079 0.005 0.003 0.028 0.020 0.119 0.000
```

Column
totals
```
      43.81 18.21 17.92 40.0  40.08  4.32 35.38 20.70 11.22 30.86 36.30 14.10
      26.45  4.93  6.21 28.12 15.63 10.81  8.54 22.75 24.90 11.40 17.98  9.62
      16.12 21.91 18.45 39.25 25.02 12.65 10.03 27.39 32.32 40.09 32.34  4.36
      29.85 39.49 30.36 13.15  1.53 16.27 14.32 28.60 36.33
```

checksum # 1 = 990.0001

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Table 5A.3 Extract from Z-matrix

```
11111 0.00 -2.82 -2.69 -2.30 -2.10 -3.17 -2.37 -2.64 -2.63 -2.82 -2.91 -2.91      -2.63 -2.83
-2.91 -2.63 -2.91 -2.82  0.00 -2.55 -2.41 -3.04 -2.91 -2.82         -2.68 -2.75 -2.63 -2.49
-2.55 -3.04 -2.75 -2.92 -2.60 -2.19 -2.75 -2.97            -2.47 -2.37 -2.55 -3.04 -3.00 -3.24
0.00 -2.48 -2.28

32211 2.82  0.00  0.09  2.13  1.98 -1.32  1.75  0.31 -0.45  1.53  2.13 -1.03      1.30 -1.74
-1.62  0.85 -0.04 -1.13 -1.53  0.52  0.46 -1.25  0.09 -1.52         -0.17  0.40  0.11  2.04
0.66 -0.21 -1.16  1.45  1.82  2.26  1.70 -1.39            1.36  2.17  1.41 -0.33 -2.10 -0.11 -0.28
0.99  1.72

23321 2.69 -0.09  0.00  1.98  2.03 -1.39  2.18  0.27 -0.85  1.71  2.18 -0.46      1.44 -1.62
-1.42  1.01 -0.22 -0.89 -1.40  0.56  0.53 -0.86  0.09 -1.40         -0.31  0.90  0.04  2.62
1.16 -0.61 -1.09  1.33  1.57  2.74  2.17 -1.35            1.52  2.09  1.57 -0.64 -2.34  0.03 -0.52
1.27  1.88

11211 2.30 -2.13 -1.98  0.00  0.12 -2.61 -1.42 -2.26 -2.36 -1.64 -1.44 -2.27      -1.87 -2.16
-2.26 -1.17 -2.26 -2.21 -2.38 -2.00 -1.80 -2.50 -2.38 -2.52         -2.19 -1.99 -2.12 -0.33 -
1.82 -2.37 -2.23 -1.89 -1.69 -0.07 -1.65 -2.38            -1.63 -0.12 -1.70 -2.49 -2.68 -1.97 -2.30
-1.58 -1.01

11112 2.10 -1.98 -2.03 -0.12  0.00 -2.53 -1.05 -2.08 -2.35 -1.82 -0.75 -2.61      -1.89  0.00
-2.76 -1.79  0.00 -2.50 -2.49 -2.14 -1.62 -2.74 -1.98 -2.26         -2.07 -2.14 -1.96 -0.35
-2.26 -2.38 -2.60 -1.98 -1.63  0.08 -1.41 -2.47            -1.83 -0.11 -1.96 -2.36 -2.84 -2.48
-2.51 -1.84 -1.32

death 3.17  1.32  1.39  2.61  2.53  0.00  2.45  1.41  0.98  2.19  2.59  1.13      1.89  0.53
0.69  1.58  1.20  0.88  0.78  1.55  1.50  0.87  1.29  0.87          1.15  1.60  1.39  2.84  1.67
1.04  0.98  2.05  2.18  2.71  2.26  0.32            2.14  2.56  1.94  1.11  0.10  1.18  1.17  1.85
2.45

................................................................
................................................................
................................................................

11312 2.48 -0.99 -1.27  1.58  1.84 -1.85  1.06 -1.15 -1.95  0.60  1.28 -1.94      -0.75 -1.99
-2.04  0.02 -1.58 -1.70 -2.08 -0.79 -0.53 -1.75 -1.31 -1.83         -1.50 -0.95 -1.39  1.35
-0.51 -1.50 -2.07  0.12  0.74  1.51  0.64 -1.86            0.30  1.43  0.44 -1.65 -2.82 -1.19
-1.61  0.00  1.18

11122 2.28 -1.72 -1.88  1.01  1.32 -2.45 -0.18  2.23 -2.15 -1.45 -0.03 -1.99      -1.69  0.00
0.00 -1.16  0.00 -2.36 -2.30 -1.85 -1.41 -2.22 -1.79 -2.34         -2.05 -1.54 -1.71  0.81 -1.56
0.00 -2.13 -1.69 -0.98  1.37 -0.79 -2.19            -1.38  0.71 -1.41 -2.59 -2.75 -1.92 -2.06 -1.18
0.00
```

Column
totals
```
    113.54 -16.69 -20.10 77.43 75.78-70.10 57.71 -8.51-43.22 36.11 61.66-33.42
     17.21  62.63 -61.10 21.03-25.03-44.88-47.82  0.54  9.16-44.81-18.17-47.56
    -26.57  -2.70 -16.33 71.21 10.02-37.79-50.60 19.95 39.52 82.55 42.91-68.32
     30.50  69.59  31.06-38.46-104.14-25.53-30.54 25.99 51.57
```

        checksum # 2 .. total z-scores =   0.00

Table 5A.4 Raw and transformed scores

rank	EuroQoL state	raw score	standardised score	standard deviation
1	11111	2.7032	1.0000	0.5891
2	11121	1.8761	0.8075	0.1542
3	11112	1.8043	0.7908	0.1628
4	11211	1.7598	0.7804	0.1656
5	21111	1.6972	0.7658	0.1535
6	12111	1.6954	0.7654	0.1469
7	12211	1.4338	0.7045	0.1141
8	12121	1.3116	0.6761	0.1168
9	11122	1.2892	0.6709	0.1293
10	22121	0.9751	0.5978	0.1059
11	22112	0.9191	0.5847	0.1082
12	12222	0.8207	0.5618	0.1008
13	21222	0.7224	0.5389	0.1048
14	22122	0.6932	0.5321	0.1064
15	11312	0.5906	0.5083	0.1112
16	11113	0.4780	0.4821	0.1286
17	22222	0.4534	0.4763	0.0976
18	31312	0.3911	0.4618	0.1015
19	13212	0.2277	0.4238	0.1080
20	11131	0.2083	0.4193	0.1241
21	12223	0.0123	0.3737	0.1059
22	13311	-0.0613	0.3565	0.1149
23	21232	-0.1935	0.3258	0.1094
24	31231	-0.3712	0.2844	0.1151
25	32211	-0.3792	0.2825	0.1133
26	11133	-0.4129	0.2747	0.1237
27	23321	-0.4569	0.2645	0.1087
28	21133	-0.5801	0.2358	0.1191
29	22323	-0.5959	0.2321	0.1147
30	22331	-0.6039	0.2302	0.1134
31	23232	-0.7271	0.2016	0.1154
32	33212	-0.7771	0.1899	0.1138
33	23313	-0.8741	0.1673	0.1188
34	22233	-0.8789	0.1662	0.1260
35	13332	-0.9822	0.1422	0.1321
36	32232	-1.0185	0.1337	0.1228
37	32223	-1.0438	0.1279	0.1257
38	33321	-1.1061	0.1133	0.1370
39	32313	-1.1501	0.1031	0.1244
40	22212	-1.1664	0.0993	0.1424
41	31323	-1.4548	0.0322	0.1518
42	33323	-1.5275	0.0153	0.1763
43	uncon	-1.5528	0.0094	0.2241
44	death	-1.5931	0.0000	0.2083
45	33333	-2.3669	-0.1801	0.2288

Table 5A.5 Expected probabilities

11111 0.000 0.001 0.001 0.173 0.184 0.000 0.082 0.002 0.000 0.030 0.102 0.000
      0.010 0.000 0.000 0.013 0.000 0.000 0.000 0.004 0.006 0.000 0.001 0.000
      0.000 0.003 0.001 0.157 0.007 0.000 0.000 0.012 0.037 0.204 0.042 0.000
      0.022 0.157 0.024 0.000 0.000 0.001 0.000 0.017 0.079

32211 0.999 0.000 0.469 0.984 0.986 0.112 0.955 0.574 0.273 0.885 0.965 0.345
      0.779 0.125 0.141 0.804 0.414 0.253 0.216 0.652 0.722 0.261 0.487 0.234
      0.411 0.625 0.503 0.981 0.728 0.309 0.220 0.797 0.903 0.988 0.912 0.120
      0.858 0.981 0.865 0.310 0.023 0.420 0.364 0.834 0.952

23321 0.999 0.531 0.000 0.987 0.988 0.128 0.962 0.604 0.300 0.899 0.971 0.374
      0.802 0.142 0.159 0.825 0.445 0.279 0.239 0.681 0.747 0.287 0.518 0.258
      0.442 0.654 0.534 0.984 0.753 0.337 0.244 0.819 0.916 0.990 0.924 0.137
      0.875 0.984 0.881 0.338 0.028 0.451 0.393 0.853 0.960

11211 0.827 0.016 0.013 0.000 0.518 0.000 0.327 0.025 0.003 0.174 0.372 0.006
      0.086 0.001 0.001 0.100 0.009 0.003 0.002 0.040 0.060 0.003 0.015 0.002
      0.009 0.034 0.017 0.474 0.063 0.004 0.002 0.096 0.200 0.546 0.216 0.000
      0.143 0.475 0.150 0.004 0.000 0.010 0.006 0.121 0.319

11112 0.816 0.014 0.012 0.482 0.000 0.000 0.311 0.023 0.003 0.163 0.356 0.005
      0.079 0.000 0.001 0.092 0.008 0.002 0.001 0.037 0.055 0.002 0.013 0.002
      0.008 0.031 0.015 0.457 0.057 0.004 0.002 0.088 0.188 0.529 0.203 0.000
      0.133 0.457 0.140 0.004 0.000 0.009 0.006 0.112 0.303

death 1.000 0.888 0.872 1.000 1.000 0.000 0.998 0.919 0.729 0.992 0.999 0.793
      0.976 0.526 0.555 0.981 0.841 0.709 0.665 0.946 0.964 0.717 0.881 0.687
      0.839 0.937 0.889 0.999 0.966 0.762 0.671 0.980 0.994 1.000 0.995 0.516
      0.989 0.999 0.990 0.764 0.220 0.844 0.807 0.986 0.998
....
....
....

11312 0.983 0.166 0.147 0.879 0.888 0.014 0.765 0.216 0.058 0.591 0.800 0.086
      0.421 0.017 0.020 0.455 0.118 0.051 0.039 0.282 0.351 0.054 0.158 0.045
      0.116 0.257 0.168 0.865 0.358 0.071 0.041 0.445 0.629 0.901 0.650 0.016
      0.541 0.866 0.552 0.071 0.002 0.121 0.094 0.000 0.758

11122 0.921 0.048 0.040 0.681 0.697 0.002 0.509 0.069 0.012 0.320 0.558 0.019
      0.185 0.002 0.003 0.209 0.030 0.010 0.007 0.101 0.140 0.011 0.044 0.008
      0.029 0.088 0.048 0.658 0.144 0.015 0.007 0.202 0.356 0.721 0.377 0.002
      0.276 0.658 0.285 0.015 0.000 0.031 0.022 0.242 0.000

      average discrepancy =   0.054

CHAPTER 6   THE VISUAL ANALOGUE SCALE (VAS) SCORES

This chapter presents the analysis of VAS scores for 43 health states based on data from the 3288 respondents described in 3.4.2.

6.1   Adjusted Scores

Each respondent rated 15 health states on a VAS with endpoints of 100 ('best imaginable health state') and 0 ('worst imaginable health state'). The medians and means of these raw scores are shown in Table 6.1. In order to compare scores from different respondents, these 'raw' scores have been adjusted relative to two states that all respondents rated: the state 11111 (full health) and death. The following formula has been used:

$$V_x = \frac{S_{(x)} - S_{(Death)}}{S_{(11111)} - S_{(Death)}}$$

Where V_x = Adjusted score for health state x

               $S_{(x)}$ = raw score given to state x

               $S_{(Death)}$ = raw score given to 'immediate death'

               $S_{(11111)}$ = raw score given to state 11111

Thus the state 11111 and 'Immediate Death' will always have adjusted scores of 1.0 and 0.0 respectively. Adjusted scores for the remaining states will either be greater than zero (if they are considered better than death) or less than zero (if they are considered worse than death).

6.2   Distribution of Adjusted VAS Scores

Table 6.2 shows that the median scores for states ranged from 1.00 (state 11111) to 0.00 (state 33333 and Death) and no state had a negative median score. There were no violations of logical consistency in the ranking of states according to median values.

Mean adjusted scores for the health states ranged from 1.00 (state 11111) through 0.00 (Death) to −0.13 (state 33333) and there were 3 states rated worse than death. There was a general trend for the standard deviations to increase as severity of state worsens. There were no violations of logical consistency in the ranking of states according to mean values.

Kolmogorov-Smirnov tests indicated that the distribution of scores for each state was significantly different from a normal one (p<0.001 for all states).

6.3   Differences in Median VAS Scores Between Sub-Groups

6.3.1   The independent effect of different variables

Since the distribution of median scores for every state was non-normal, non-parametric Mann-Whitney tests have been used.

Social class

For 34 of the 43 states (79%) social class had a significant effect and in every case the median score for respondents in social classes III–V was higher than that for respondents in social classes I and II (see Table 6.3). 22 of the differences were significant at p<0.01 or less. The trend was more noticeable as severity of state worsened.

Educational qualifications

For 31 of the 43 states (72%) education had a significant effect and in every case the median score for respondents with intermediate or no educational qualifications was higher than that for respondents with degree qualifications (Table 6.4). All but 7 of the differences were significant at p<0.01 or less. The trend was more noticeable as severity of state worsened.

Home ownership

This had a significant effect for 13 of 43 states (30%) and in every case the median score for respondents who rent their own home (from local authority, housing association or privately) was higher than that for respondents who own their own home (outright or with a mortgage), see Table 6.5. All but 3 of the differences were significant at p<0.01 or less.

Illness in others

This had a significant effect for 8 of 43 states (19%) at the p<0.01 level or less. In all cases

the median score for respondents without experience of illness in others was higher than that for respondents with this experience.

Self–described and self–rated health state: Combining these two variables, current health state had a significant effect for 6 of 43 states (14%) at p<0.01. In 5 cases, the median score for respondents not in 11111 or with a self–rating <75 was higher than that for respondents in the 11111 or with a self–rating >95.

Other factors

Other factors of age, sex, smoking, marital status, employment status, work experience of looking after ill people, or reported experience of serious illness in self had little significant effect on health state VAS valuations. Geographical location (defined either by standard economic region or by regional health authority) also had no significant effect on VAS valuations.

Graphs of VAS score by increasing age (divided into 7 categories) further suggest that scores were not significantly affected by age (see figures in Annexe 7B).

Conclusions

1.   The respondents who tended to give higher median scores to health states:

        –   were in lower social classes (III–V)

–   had lower educational attainment (not degree)

–   rented their home

The results for these 3 factors appear to be quite robust in that the trend was the same in all cases and most of the differences reached a significance level of $p < 0.01$.

2.   There was more limited evidence that higher median scores were also given by respondents who:

–   were currently in dysfunctional health state (not 11111)

–   rated their own current health <75

The states involved covered a range of severity.

3.   Two factors, of experience of illness in self and in others (Yes/No responses to 'Have you yourself ever had a serious illness' and 'Has anybody close to you ever had a serious illness?'), had an opposite effect to that of current self-rating, although either few states were involved or most differences were significant only at $p < 0.05$. The general trend here was that the median scores from respondents reporting such experience of illness tended to be lower than that from respondents not reporting this experience. Furthermore, for experience of illness in others, 12 of the 19 states with significant effects were among the 18 most severe states.

Regarding personal experience of serious illness (N=1031), 62.4% of respondents

reported that the illness was either still continuing or had stopped within the previous 5 years. The median duration of illness was 1-2 years.

4. 'Unconscious' appeared to be perceived differently from the other states. It was also the state with by far the most number of significant differences between sub-groups. It was the only state to be given a significantly higher median score by respondents aged under 60 ($p<0.001$) and was one of 2 states to be given a significantly higher median score by respondents in the 11111 state (although $p<0.05$). Tables 6.3 to 6.5 show that it was given a higher median score by respondents in lower social classes, with low education and home renters, but it was also given a higher median score by respondents who:

    -   were single c.f. separated/divorced/widowed ($p<0.01$)
    -   were smokers ($p<0.01$)
    -   had no experience of illness in others ($p<0.001$)
    -   were in paid work c.f. retired ($p<0.001$)

6.3.2   Interactions between variables

The factors of age, social class, education and home ownership were all significantly related with each other by Chi square tests (all $p<0.001$).

Respondents aged 60 years and over were more likely to be in social classes III-V ($p<0.001$) than respondents aged under 60. Because people in social classes III-V were themselves

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more likely not to have degree qualifications (p<0.001) and not to be home owners (p<0.001), the test was repeated after adjusting for social class: respondents aged 60 years and over were still more likely to be without degree qualifications (p<0.001) but only those in social classes III–V (and not those in I–II) were more likely to rent their homes (p<0.001).

6.3.3 Controlling for variables

To control for social class and education in turn Kruskal–Wallis tests were conducted. The results mirrored those of the Mann–Whitney tests and confirmed that both social class and education have significant effects on the valuations given to most (and in particular the severe) states, where higher median scores were generated by respondents in social classes III–V and respondents without degree level education.

6.4 Rank Ordering of States in VAS and Ranking Tasks

A comparison of the rank ordering of states in Tables 5.2 and 6.1 shows that the ranking and VAS exercises produced an almost identical rank ordering of states at the group level. 41 of the 43 states had a rank order on the VAS that was within one place of their rank order using Thurstone's model. The 2 other states, 22331 and 32313, both had a rank order on the VAS that was 2 places higher than the rank order using Thurstone's model. This similarity between methods was reflected in a Kendall's W (measuring the degree of concordance between the two sets of ranking) of 0.9989. A value of 1.000 would signify complete agreement.

To compare rank orderings fron the ranking and VAS exercises at the individual level, a

Spearman's rank correlation coefficient was calculated for each respondent. Figure 6.1 shows that about 90% of respondents had a correlation coefficient that was over 0.9 (one–fifth had a correlation coefficient equal to 1.0) indicating a very high degree of agreement between the rankings from the two methods. This was reinforced by a median correlation coefficient of 0.99 (IQR=0.96–0.99) and a mean of 0.96 (SD=0.09).

6.5   Comparison of VAS and Thurstone Ratings

Figure 6.2 plots median VAS scores against scores derived from Thurstone modelling of the ranking data (Table 5.2). The two sets of values were very similar with most states lying on or close to the 45° line. State 33333 stood out from the others, with a median VAS value of 0.00 but a Thurstone rating of −0.19.

6.6   Summary

1.   There were no violations of logical consistency in the ranking of states according to either median or mean adjusted VAS scores. No state had a negative median score.

2.   Higher median VAS scores were related particularly to lower social class and lower educational attainment. Non–home ownership had a smaller effect. There was more limited evidence that higher median scores were related to current dysfunctional health state.

3.   'Unconscious' may have been perceived differently from the other health states. Its

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median score was significantly higher for the following subgroups: age under 60 years, not separated/divorced or widowed, in paid work and with no experience of illness in others.

4.   The ranking and VAS exercises produced almost identical rank ordering of states and extremely similar scores for states.

Table 6.1   **Raw VAS Scores**

	Number of Observations	Median (IQR)	Mean (S.D.)
11111	3288	100 (100–100)	98.7 (4.8)
11112	1308	87.0 (75–95)	82.4 (15.2)
11121	1320	85.0 (75–94)	82.8 (13.6)
11211	1322	85.0 (75–92)	82.2 (14.0)
21111	1307	85.0 (75–90)	81.4 (14.2)
12111	1310	85.0 (75–90)	80.7 (14.5)
12211	828	75.0 (63–80)	71.3 (15.1)
11122	814	75.0 (60–80)	70.8 (15.0)
12121	831	75.0 (60–80)	70.0 (15.9)
22121	832	65.0 (50–75)	63.1 (17.0)
22112	825	65.0 (50–75)	63.3 (17.2)
21222	815	60.0 (50–75)	58.8 (17.7)
12222	827	60.0 (50–71)	58.1 (17.6)
22122	814	57.0 (49–70)	57.2 (17.6)
11312	824	55.0 (45–70)	55.9 (19.5)
11113	818	55.0 (40–75)	55.0 (22.7)
21312	802	51.0 (40–65)	52.0 (17.8)
22222	834	50.0 (41–65)	52.3 (17.3)
13212	818	50.0 (35–60)	48.3 (18.6)
11131	806	50.0 (30–67)	48.4 (22.9)
13311	809	45.0 (30–56)	43.8 (19.5)
12223	817	41.0 (30–55)	43.0 (19.7)
21232	822	38.0 (25–50)	39.0 (19.2)
32211	817	35.0 (20–50)	36.3 (19.5)
11133	823	35.0 (20–50)	36.9 (21.2)
21323	822	35.0 (25–50)	35.9 (18.3)
23321	823	30.0 (21–45)	33.4 (17.2)
22331	819	30.0 (19–45)	31.7 (17.9)
21133	826	30.0 (15–46)	32.7 (19.9)
22323	816	28.0 (15–40)	30.2 (17.8)
33212	829	25.0 (15–40)	28.3 (16.7)
23232	808	25.0 (15–40)	28.3 (16.7)
23313	823	25.0 (15–35)	26.5 (14.5)
22233	825	24.0 (13–35)	25.6 (17.1)
32232	820	20.0 (10–30)	23.4 (15.9)
13332	805	20.0 (10–32)	23.9 (16.6)
32313	833	20.0 (10–30)	23.5 (15.6)
32223	825	20.0 (10–30)	22.8 (15.5)
33321	813	20.0 (10–30)	22.0 (15.6)
32331	816	18.0 (10–30)	20.6 (14.4)
33232	823	14.0 (7–25)	16.2 (12.7)
33323	838	10.0 (5–20)	13.9 (12.4)
uncon	3286	5.0 (0–10)	9.3 (15.1)
33333	3278	2.0 (0–8)	5.6 (9.1)
death	3288	0.0 (0–10)	8.5 (15.7)

Table 6.2   Adjusted VAS Scores

	Number of Observations	Median (IQR)	Mean (S.D.)
11111	3288	1.00 (–)	1.00 (–)
11112	1308	0.87 (0.75–0.94)	0.81 (0.23)
11121	1320	0.86 (0.75–0.94)	0.81 (0.21)
11211	1322	0.85 (0.75–0.92)	0.81 (0.21)
21111	1307	0.85 (0.74–0.91)	0.79 (0.24)
12111	1310	0.84 (0.75–0.90)	0.79 (0.18)
12211	828	0.73 (0.60–0.80)	0.68 (0.23)
11122	814	0.72 (0.57–0.80)	0.66 (0.40)
12121	831	0.71 (0.56–0.80)	0.66 (0.23)
22121	832	0.64 (0.49–0.75)	0.57 (0.35)
22112	825	0.63 (0.48–0.75)	0.59 (0.29)
21222	815	0.56 (0.43–0.71)	0.51 (0.50)
12222	827	0.55 (0.43–0.70)	0.52 (0.38)
22122	814	0.53 (0.40–0.70)	0.50 (0.44)
11312	824	0.53 (0.38–0.69)	0.50 (0.35)
11113	818	0.51 (0.35–0.72)	0.47 (0.47)
21312	802	0.50 (0.35–0.63)	0.43 (0.53)
22222	834	0.50 (0.35–0.61)	0.45 (0.37)
13212	818	0.45 (0.30–0.60)	0.40 (0.46)
11131	806	0.45 (0.25–0.65)	0.39 (0.53)
13311	809	0.40 (0.24–0.55)	0.34 (0.59)
12223	817	0.37 (0.22–0.53)	0.32 (0.52)
21232	822	0.33 (0.19–0.50)	0.31 (0.34)
32211	817	0.30 (0.15–0.46)	0.28 (0.38)
11133	823	0.30 (0.14–0.49)	0.25 (0.55)
21323	822	0.30 (0.15–0.45)	0.21 (0.85)
23321	823	0.26 (0.15–0.41)	0.24 (0.38)
22331	819	0.25 (0.12–0.40)	0.16 (0.68)
21133	826	0.25 (0.10–0.43)	0.19 (0.81)
22323	816	0.25 (0.11–0.38)	0.13 (0.97)
33212	829	0.22 (0.10–0.35)	0.14 (0.64)
23232	808	0.21 (0.10–0.35)	0.18 (0.44)
23313	823	0.20 (0.08–0.32)	0.13 (0.65)
22233	825	0.17 (0.07–0.31)	0.12 (0.64)
32232	820	0.17 (0.05–0.28)	0.06 (0.77)
13332	805	0.16 (0.05–0.30)	0.11 (0.57)
32313	833	0.16 (0.06–0.29)	0.11 (0.51)
32223	825	0.15 (0.05–0.27)	0.10 (0.56)
33321	813	0.15 (0.05–0.25)	0.08 (0.60)
32331	816	0.13 (0.03–0.25)	0.03 (0.98)
33232	823	0.10 (0.00–0.20)	0.01 (0.71)
33323	838	0.07 (–0.02–0.16)	–0.03 (0.04)
uncon	3286	0.01 (–0.02–0.05)	–0.04 (0.52)
33333	3278	0.00 (–0.08–0.05)	–0.13 (0.90)
death	3288	0.00 (–)	0.00 (–)

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Table 6.3   Adjusted VAS Scores by Social Class

All figures are medians and Interquartile ranges.
100 respondents omitted due to missing 'social class' data

	SOCIAL CLASS		
	I, II (n=947)	IIIN/M, IV, V (n=2241)	
11111	1.00 (–)	1.00 (–)	
11112	0.85 (0.75–0.93)	0.87 (0.75–0.94)	
11121	0.85 (0.75–0.92)	0.87 (0.75–0.94)	*
11211	0.84 (0.75–0.92)	0.87 (0.75–0.92)	
21111	0.84 (0.72–0.90)	0.85 (0.75–0.92)	*
12111	0.84 (0.74–0.90)	0.85 (0.75–0.90)	
12211	0.72 (0.60–0.79)	0.73 (0.60–0.80)	
11122	0.70 (0.51–0.79)	0.74 (0.60–0.81)	**
12121	0.70 (0.52–0.80)	0.71 (0.56–0.80)	
22121	0.60 (0.44–0.73)	0.65 (0.50–0.75)	**
22112	0.60 (0.45–0.74)	0.64 (0.50–0.75)	*
21222	0.53 (0.39–0.69)	0.58 (0.44–0.73)	*
12222	0.51 (0.40–0.67)	0.56 (0.44–0.70)	*
22122	0.53 (0.44–0.69)	0.53 (0.40–0.70)	
11312	0.49 (0.34–0.67)	0.55 (0.40–0.70)	**
11113	0.46 (0.28–0.67)	0.54 (0.35–0.75)	***
21312	0.46 (0.30–0.59)	0.50 (0.35–0.65)	**
22222	0.48 (0.31–0.55)	0.50 (0.38–0.62)	**
13212	0.45 (0.25–0.58)	0.45 (0.30–0.60)	
11131	0.38 (0.17–0.55)	0.48 (0.25–0.67)	***
13311	0.36 (0.24–0.50)	0.40 (0.24–0.56)	
12223	0.31 (0.17–0.47)	0.40 (0.25–0.56)	***
21232	0.30 (0.15–0.47)	0.35 (0.20–0.50)	*
32211	0.27 (0.11–0.44)	0.30 (0.15–0.48)	*
11133	0.28 (0.10–0.45)	0.32 (0.15–0.50)	*
21323	0.25 (0.09–0.38)	0.32 (0.18–0.48)	***
23321	0.25 (0.12–0.39)	0.29 (0.16–0.42)	**
22331	0.24 (0.07–0.35)	0.25 (0.14–0.40)	*
21133	0.20 (0.05–0.36)	0.26 (0.11–0.45)	***
22323	0.20 (0.06–0.33)	0.25 (0.13–0.40)	***
33212	0.20 (0.07–0.30)	0.24 (0.10–0.36)	*
23232	0.18 (0.05–0.35)	0.23 (0.11–0.37)	***
23313	0.17 (0.05–0.30)	0.21 (0.10–0.33)	*
22233	0.13 (0.03–0.25)	0.20 (0.10–0.35)	***
32232	0.11 (0.00–0.24)	0.18 (0.06–0.29)	***
13332	0.13 (0.03–0.25)	0.19 (0.05–0.31)	***

Table 6.3 Continued....

	SOCIAL CLASS		
	I, II (n=947)	IIIN/M, IV, V (n=2241)	
32313	0.12 (0.02–0.25)	0.19 (0.07–0.30)	***
32223	0.14 (0.03–0.25)	0.17 (0.06–0.28)	*
33321	0.15 (0.04–0.25)	0.15 (0.05–0.25)	
32331	0.10(−0.02–0.20)	0.15 (0.05–0.25)	***
33232	0.05(−0.11–0.11)	0.11 (0.03–0.21)	***
33323	0.05(−0.08–0.13)	0.09 (0.00–0.17)	***
uncon	0.00(−0.04–0.05)	0.01(−0.01–0.05)	***
33333	0.00(−0.12–0.05)	0.01(−0.06–0.06)	***
death	0.00 (−)	0.00 (−)	

   * p<0.05
  ** p<0.01
*** p<0.001

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Table 6.4   Adjusted VAS Scores by Education

All figures are medians and Interquartile ranges.
4 respondents omitted due to missing 'education' data

	EDUCATIONAL QUALIFICATIONS		
	Degree (n=661)	Intermediate/None (n=2623)	
11111	1.00 (–)	1.00 (–)	
11112	0.85 (0.70–0.92)	0.88 (0.77–0.94)	**
11121	0.85 (0.74–0.91)	0.87 (0.75–0.94)	**
11211	0.83 (0.75–0.90)	0.86 (0.75–0.93)	*
21111	0.84 (0.70–0.90)	0.85 (0.74–0.92)	*
12111	0.85 (0.75–0.90)	0.84 (0.75–0.90)	
12211	0.74 (0.59–0.78)	0.73 (0.60–0.80)	
11122	0.70 (0.51–0.79)	0.74 (0.59–0.81)	**
12121	0.70 (0.51–0.80)	0.71 (0.57–0.80)	
22121	0.59 (0.43–0.72)	0.65 (0.50–0.75)	**
22112	0.60 (0.44–0.75)	0.64 (0.50–0.75)	
21222	0.56 (0.39–0.69)	0.56 (0.44–0.72)	
12222	0.51 (0.40–0.66)	0.56 (0.44–0.71)	*
22122	0.50 (0.40–0.65)	0.55 (0.40–0.70)	
11312	0.50 (0.34–0.67)	0.55 (0.40–0.70)	*
11113	0.47 (0.28–0.65)	0.53 (0.35–0.74)	*
21312	0.44 (0.25–0.55)	0.50 (0.36–0.65)	***
22222	0.48 (0.30–0.55)	0.50 (0.37–0.61)	*
13212	0.42 (0.24–0.55)	0.45 (0.30–0.60)	
11131	0.41 (0.21–0.60)	0.46 (0.25–0.65)	
13311	0.35 (0.21–0.50)	0.40 (0.25–0.55)	
12223	0.30 (0.17–0.47)	0.39 (0.24–0.55)	***
21232	0.25 (0.11–0.44)	0.35 (0.20–0.50)	***
32211	0.31 (0.12–0.45)	0.30 (0.15–0.47)	
11133	0.23 (0.06–0.42)	0.32 (0.15–0.50)	***
21323	0.24 (0.11–0.38)	0.32 (0.17–0.46)	***
23321	0.23 (0.09–0.35)	0.29 (0.17–0.42)	***
22331	0.20 (0.06–0.33)	0.26 (0.14–0.40)	***
21133	0.20 (0.06–0.33)	0.27 (0.11–0.45)	***
22323	0.21 (0.06–0.32)	0.25 (0.12–0.40)	**
33212	0.17 (0.07–0.30)	0.24 (0.10–0.35)	*
23232	0.15 (0.07–0.32)	0.23 (0.10–0.37)	***
23313	0.15 (0.02–0.30)	0.20 (0.10–0.33)	**
22233	0.13 (0.02–0.25)	0.19 (0.09–0.34)	***
32232	0.10(–0.03–0.21)	0.19 (0.06–0.29)	***
13332	0.13 (0.01–0.25)	0.18 (0.05–0.30)	**

Table 6.4 Continued...

EDUCATIONAL QUALIFICATIONS

	Degree (n=661)	Intermediate/None (n=2623)	
32313	0.13 (0.01–0.25)	0.17 (0.07–0.30)	**
32223	0.15 (0.05–0.25)	0.16 (0.05–0.28)	
33321	0.16 (0.03–0.26)	0.15 (0.05–0.25)	
32331	0.10(−0.05–0.19)	0.15 (0.04–0.25)	***
33232	0.06(−0.06–0.12)	0.10 (0.02–0.21)	***
33323	0.03(−0.06–0.11)	0.09 (0.00–0.17)	***
uncon	0.00(−0.03–0.05)	0.01(−0.01–0.05)	***
33333	0.00(−0.12–0.05)	0.00(−0.06–0.06)	***
death	0.00 (−)	0.00 (−)	

   * $p<0.05$
  ** $p<0.01$
 *** $p<0.001$

Table 6.5   Adjusted VAS Scores by Home Ownership
All figures are medians and Interquartile ranges.
47 respondents omitted due to missing 'home ownership' data

HOME OWNERSHIP

	OWN/MORTGAGE (n=2163)	RENT (n=1078)	
11111	1.00 (–)	1.00 (–)	
11112	0.87 (0.75–0.94)	0.86 (0.75–0.94)	
11121	0.86 (0.75–0.93)	0.86 (0.75–0.94)	
11211	0.85 (0.75–0.92)	0.85 (0.75–0.92)	
21111	0.85 (0.74–0.91)	0.85 (0.73–0.93)	
12111	0.85 (0.75–0.90)	0.83 (0.74–0.90)	
12211	0.73 (0.59–0.80)	0.72 (0.60–0.80)	
11122	0.72 (0.57–0.80)	0.74 (0.58–0.82)	
12121	0.70 (0.55–0.80)	0.72 (0.55–0.80)	
22121	0.61 (0.48–0.75)	0.65 (0.48–0.75)	
22112	0.62 (0.49–0.75)	0.61 (0.47–0.76)	
21222	0.55 (0.41–0.70)	0.60 (0.46–0.75)	**
12222	0.55 (0.43–0.70)	0.56 (0.42–0.71)	
22122	0.53 (0.40–0.69)	0.53 (0.40–0.70)	
11312	0.51 (0.37–0.69)	0.55 (0.41–0.70)	
11113	0.50 (0.34–0.70)	0.53 (0.35–0.75)	
21312	0.49 (0.33–0.61)	0.50 (0.39–0.65)	**
22222	0.50 (0.35–0.60)	0.50 (0.35–0.63)	
13212	0.45 (0.29–0.58)	0.45 (0.30–0.60)	
11131	0.43 (0.20–0.63)	0.48 (0.31–0.67)	**
13311	0.40 (0.24–0.55)	0.40 (0.25–0.54)	
12223	0.35 (0.20–0.51)	0.39 (0.27–0.55)	*
21232	0.32 (0.18–0.49)	0.35 (0.19–0.50)	
32211	0.29 (0.15–0.45)	0.30 (0.14–0.48)	
11133	0.29 (0.12–0.48)	0.33 (0.16–0.50)	
21323	0.29 (0.15–0.45)	0.34 (0.18–0.47)	
23321	0.25 (0.15–0.40)	0.30 (0.17–0.42)	
22331	0.25 (0.11–0.39)	0.25 (0.14–0.41)	
21133	0.25 (0.10–0.41)	0.29 (0.13–0.46)	**
22323	0.24 (0.10–0.38)	0.25 (0.11–0.39)	
33212	0.20 (0.09–0.33)	0.25 (0.10–0.36)	
23232	0.20 (0.09–0.35)	0.23 (0.12–0.39)	*
23313	0.20 (0.07–0.30)	0.21 (0.10–0.35)	
22233	0.17 (0.06–0.31)	0.18 (0.09–0.33)	
32232	0.15 (0.04–0.26)	0.20 (0.07–0.30)	**
13332	0.15 (0.05–0.30)	0.18 (0.05–0.30)	
32313	0.17 (0.05–0.30)	0.15 (0.07–0.28)	
32223	0.15 (0.05–0.26)	0.18 (0.05–0.28)	
33321	0.13 (0.04–0.25)	0.16 (0.07–0.26)	*
32331	0.12 (0.02–0.22)	0.15 (0.06–0.30)	**
33232	0.08(−0.02–0.17)	0.12 (0.05–0.25)	***
33323	0.06(−0.03–0.15)	0.10 (0.00–0.20)	**
uncon	0.01(−0.02–0.05)	0.01(−0.01–0.05)	**
33333	0.00(−0.09–0.05)	0.01(−0.05–0.07)	***
death	0.00 (–)	0.00 (–)	

Figure 6.1

Rank order differences: Ranking and VAS

Distribution of Spearman correlations
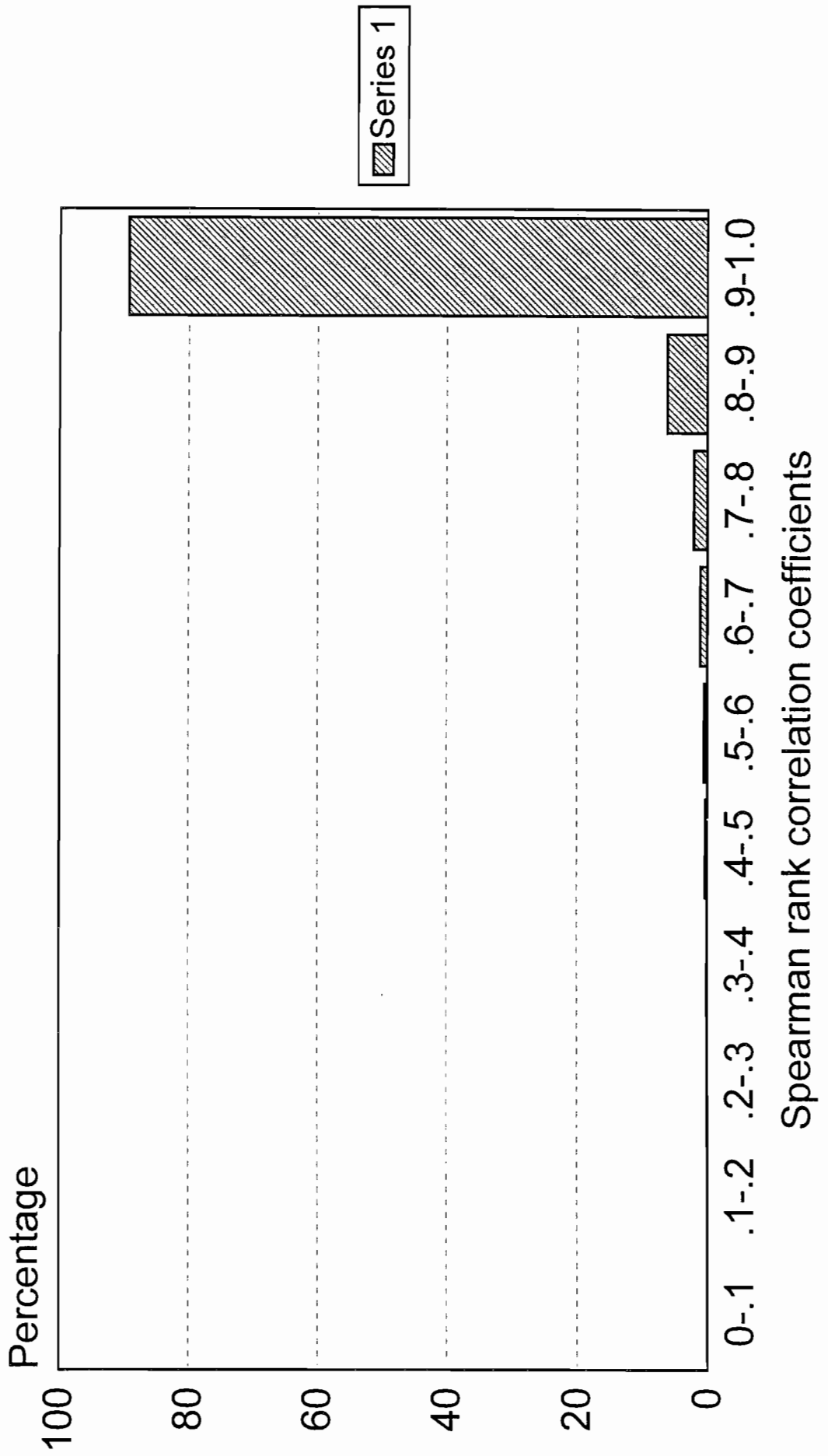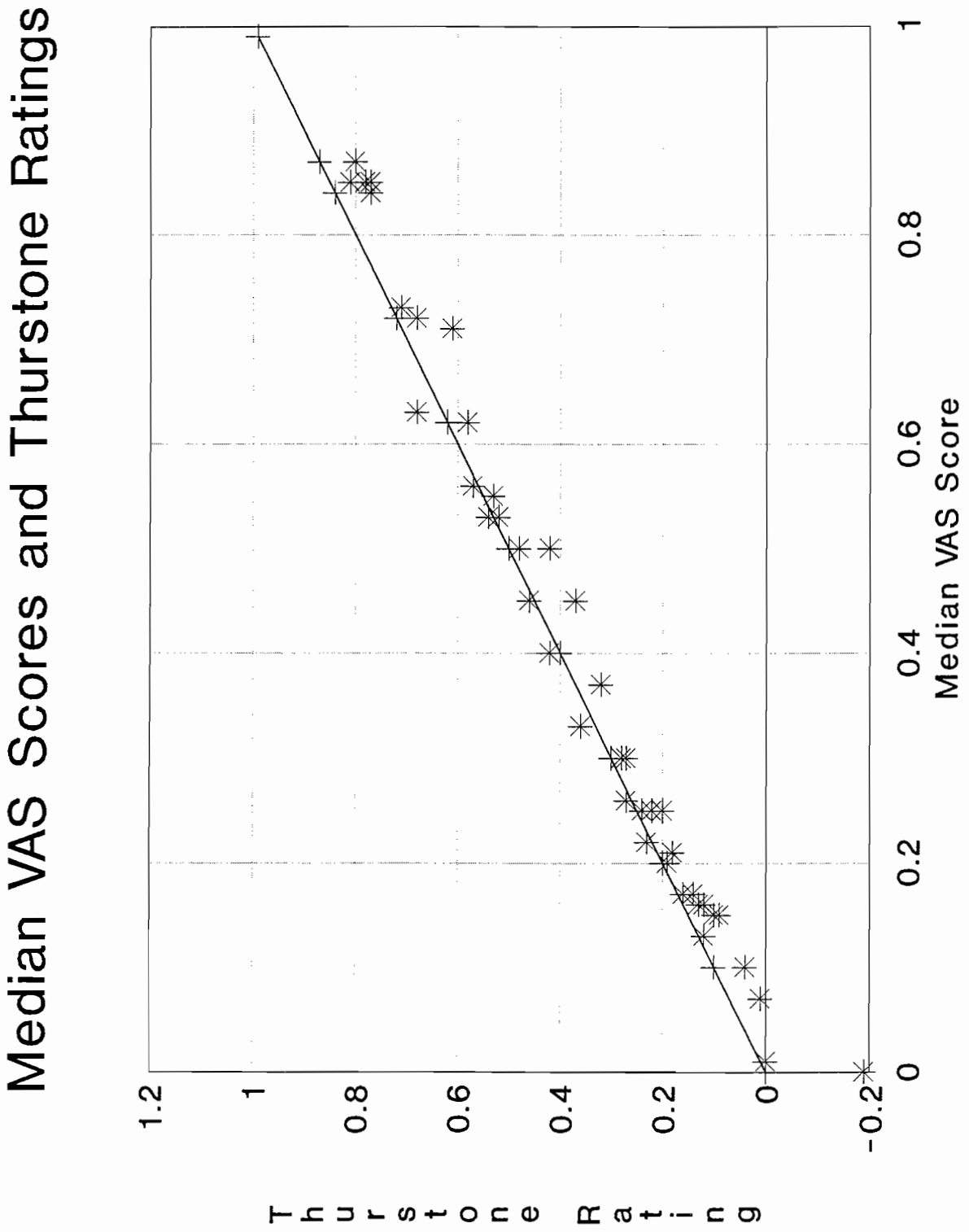
Median VAS Scores and Thurstone Ratings

CHAPTER 7   THE TIME TRADE-OFF SCORES

This chapter presents the analysis of TTO scores for 43 health states based on data from the 3337 respondents identified in Chapter 3, section 3.2.2.

7.1   Adjusted Scores

For states that are rated as better than dead there is no need for further adjustment of scores since the TTO method implicitly assigns a score of 1.0 to full health and 0.0 to death.

For states that are rated than worse than dead, the score is given by the formula; $-x/(10-x)$ where x is the number of years spent in full health. Negative scores in this study then range from $-0.25/(10-0.25) = -0.026$ to $-9.75/(10-9.75) = -39.00$. Table 7.1 shows the mean and median scores for all 43 states when scores are calculated in this way.

However, the difficulty with the scale for states rated as worse than dead is its nonlinearity. This is because it is essentially a variant of the constant sum method; the original method used for ratio scaling. Eyman (1967, Table 7) shows that the nonlinearity of the constant sum method reliably ($p < 0.05$) biases the observers' judgments. Poulton (1989) describes how responses can be corrected for any known nonlinearity. With regards to this study, the method is tantamount to treating responses to states rated as worse than dead as having interval (not ratio) scale properties, as is the case for states rated as better than dead. So these valuations have been transformed by a process that produces numbers that range from 1 to -1, so that the overall scores work within a range that has an equal distance from death

in both the positive and negative directions. This transformation is used elsewhere in the literature (see Patrick *et al* 1994) and addresses the concern of Torrance (1984 p. 1087) who states that "The asymmetry that positive values cannot exceed 1.0 whereas negative values can be arbitrarily large is troubling and lacking in face validity". The analysis that follows is based on these transformed scores.

7.2   Distribution of TTO Scores

Table 7.2 shows the transformed mean and median scores for all 43 states.

There were no violations of strong or weak consistency in the ranking of states according to mean scores. There was one violation of strong consistency in the median scores in that states 22122 and 22222 had the same score of 0.63, although the IQRs of these two states showed 22222 to be slightly worse.

According to mean scores, 17 states had a negative score (i.e. they were considered, on average, to be worse than death). There were 13 states with a negative median score, and a further 4 had median values of 0.0 (i.e. they were rated as bad as being dead).

Kolmogorov–Smirnov tests indicated that the distribution of scores for each state was non-normal. This was because for the 'best' and 'worst' states there were ceiling and floor effects respectively; this was highlighted by the fact that the medians were higher than the means for the best states and the means were higher than the medians for the worst states. For the 'intermediate' states, distributions were largely multi-modal. This may have been due to TTO

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choices being discrete rather than continuous and respondents may have expressed 'digit preference'.

7.3   Differences in Median TTO Scores Between Sub-Groups

Since the distribution of scores was non-normal, non-parametric Mann-Whitney U tests have been used. Because of the number of tests carried out, only differences that satisfy the $p<0.01$ level of statistical significance have been included.

7.3.1   The Independent Effect of Different Variables

Table 7.3 summarises the results from this analysis.

Age

The sample was split into three age groups; those aged under 40, those aged 40-59, and those aged 60 or over. The middle age group had significantly higher values than the young for 7 of the 'best' 14 states.

However, the most striking results emerged from comparisons involving the oldest age group. For 23 (21) of the 43 states this group of respondents had lower values than those aged 40-59 (under 40). These significant differences were almost exclusively confined to the more severe health states.

Sex

As a group, men gave higher valuations to 11 of the 19 most severe states. There were no significant differences between men and women for states less severe than 21232.

Marital Status

For 20 of the states, the group of married people had higher values than the group of separated, divorced or widowed people; 14 of these were associated with the 14 most severe states. In addition, married people had higher values than single people for 13 states; this time most significant differences were found at the less severe end of the spectrum.

Employment Status

Those in paid work gave higher valuations than those who were retired to 17 of the 20 most severe states.

Other Characteristics

Other background characteristics, such as smoking behaviour, experience of illness, current health state, level of educational attainment and social class, appeared not to influence the health state valuations elicited by the TTO method. The exception was for the state unconscious where the better educated and higher social classes gave significantly higher values than those without qualifications or those in social classes III, V or V. Geographical

location (as defined either by standard economic region or by regional health authority) did not appear to affect TTO valuations.

7.3.2 Interaction Between Variables

There were likely to be a number of background characteristics that are related to each other; most obviously, those aged 60 or over were more likely to be widowed and more likely to be retired. It was possible that some of these interactions may have been concealing the effect of one or more background characteristic that would otherwise be an important determinant of health state valuations. For example, the finding from the VAS that the lower social classes gave higher scores may have been masked by the fact that older people (who may be more likely to be in the lower social classes) gave lower scores.

Chi-square tests showed that proportionately more respondents aged 60 or over had no qualifications, were in social classes IV and V, were retired, and were separated, divorced, or widowed than respondents aged under 60 (all $p<0.001$).

To control for the effect of age, the same Mann-Whitney U tests were carried out on each of the three age groups separately. In the under 40s (40-59) age group, married respondents gave a significantly higher valuation than single respondents to 6 (2) of the 43 states. The group of married respondents had higher valuations than the separated, divorced or widowed group for 6 states that were spread across the range of severity. After controlling for age, the effect of employment status disappeared whilst education and social class were both still insignificant. However, their effect on the valuation of unconscious remained; those with

qualifications and in social classes I and II gave higher valuations than those with no qualifications and in social classes III, IV and V.

7.3.3 TTO Valuations and Age

It would appear from the previous analysis that age has a more powerful effect on TTO valuations than any other background characteristic and that others, such as social class, are insignificant. Table 7.4 shows the median values of the three broad age groups and confirms that respondents aged 60 or over had significantly lower valuations than other respondents, particularly for the more severe states. In addition, for some states, those in the 40–59 age group had higher values than those aged under 40. This suggests that TTO valuations may increase slowly with age and then fall sharply in later years.

In order to look at this possibility more closely, respondents were divided into more age groups; 18–24, 25–34, 35–44, 45–54, 55–64, 65–74 and 75 or over. Plots of the median scores for each state by each of these age groups are shown in Annexe 7A. Although there were some oddities, the general pattern (especially for the more severe states) was clear; slightly higher values as age increased, then a dramatic decline in values in the oldest two age groups.

This pattern is summarised in Table 7.5 which shows an overall index of health state scores for each age group relative to the youngest age group. The overall index was calculated as a weighted average of the indices for each state. For example, on average and irrespective of health state, respondents aged 45–54 gave values that were 8% higher than those given

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by respondents aged 18–25, whilst respondents aged 75 or over gave values that were 14% lower than those given by respondents aged 18–25. The two further indices were calculated separately for the 26 states that had positive means and for 17 states that had negative means. These indicated the greater downward bias 'old age' has on TTO valuations for the more severe states.

The figures in Annexe 7B show that age had nothing like the effect on VAS valuations that it had on TTO ones. For the sample of the states that are shown in Annexe 7B, the median VAS valuations of the different age groups were very similar.

7.3.4   'Extreme' TTO Valuations and sub–groups

Another way of looking at differences between sub–groups is to ask whether the most extreme TTO valuations are associated with particular groups of respondents. In this context, it is possible to think of responses which result in the highest or lowest possible valuations for a state as 'extreme' i.e. those which indicate an unwillingness to sacrifice any life expectancy in order to avoid a dysfunctional state of health and those that imply that the state is so bad that death is preferred to only six months in the health state followed by 9 and a half years in full health.

Table 7.6 shows the background characteristics that such responses are associated with. Both the responses showing an unwillingness to sacrifice any life expectancy and (to a greater extent) those that result in the lowest possible score were more likely to come from those who either described or valued their current health state as 'poor'. Those responses resulting in the

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lowest TTO valuation were also associated with women, those not married and those without any qualifications. However, the most significant difference was again associated with age where 46.7% of the lowest responses came from those aged 65 or over whilst only 23.2% of all responses came from this group. In addition, all of the other background characteristics (except sex) that were associated with very low valuations were significantly correlated to age.

7.3.5 Implications of the effect of age

It is unclear what may be causing the respondents aged over 60, as a group, to give significantly lower TTO valuations to health states (particularly more severe ones) than respondents aged under 60. One possible explanation is that as people's life expectancy shortens, they see less reason to tolerate suffering during their remaining years. However, we would expect this to show up in the VAS data too. An alternative explanation might be that it is an artefact of the TTO method. Respondents were asked to imagine that each state would last for 10 years without any change, after which they would die. If they did not believe that they actually had 10 years life expectancy, they might willingly give up these 'excess' life years, thereby depressing the apparent value attached to the more severe states. In the VAS data, the role of duration is less prominent, so it would not show up. Whatever their cause such differences are likely to have repercussions for modelling the data. Therefore, future analysis will be based on three data sets; one containing all respondents, one containing respondents aged 18–59, and one containing respondents aged 60 and over. The mean and median valuations for each of these data sets are shown in Table 7.7

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7.4   Differences Between Methods in the Ranking of States

7.4.1   Differences between rankings as per Thurstone's model and TTO

In comparing the ranking of states in Tables 5.2 and 7.1, it can be seen that, although the rankings were not identical, the majority of states had a ranking on the TTO that was similar to its ranking from Thurstone's model; for example, 42 of the 43 states had a ranking on the TTO that was within 4 places of its ranking on Thurstone's model. The exception was the state 11133 which had a higher ranking on the Thurstone model. Kendall's W was computed to compare the rankings implied by median TTO valuations and Thurstone's model and showed a very high degree of concordance (W=0.99, 0 signifies no agreement and 1 signifies complete agreement, p<0.001).

When the individual rankings from the ranking task are compared with the individual rank orderings emerging from the TTO task, it was found that the correlation was very high (Spearman's rank correlation coefficient had a mean of 0.78 and a SD of 0.17). The distribution of the coefficients across individuals is shown in Figure 7.1. The median correlation coefficient was .82 and the IQR .71 to .89.

7.4.2   Differences between rankings as per VAS and TTO

In comparing the ranking of states (as inferred from their median valuations) in Tables 6.1 and 7.1, it can be seen that, although the rankings were not identical, the majority of states had a ranking on the TTO that was similar to its ranking on the VAS; for example, 38 of the

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43 states had a ranking on the TTO that was within 3 places of its ranking on the VAS. The exceptions were the states 23313 and 33321, which had a higher ranking on the TTO, and 11112, 11133 and 32232, which had a higher ranking on the VAS. Kendall's W for a comparison of TTO and VAS rankings again indicated a high degree of concordance (W=0.99, p<0.001).

Comparing the individual rankings between those that emerged from VAS and those that emerged from TTO, again a very high correlation was found (Spearman's rank correlation coefficient had a mean across all individuals of .77 with a standard deviation of .17). The distribution of coefficients is shown in Figure 7.2. The median correlation coefficient was again .82 and the IQR .71 to .89.

7.5   Differences Between Methods in the Valuation of States

7.5.1   Differences between valuations as per Thurstone's model and TTO

Figure 7.3 plots scores from Thurstone's model against median TTO scores for 43 states. It appeared for the more severe states that TTO scores were much lower than those for Thurstone's model; 17 states were rated worse than death on the TTO whilst only one state (33333) had a negative Thustone rating. For the mild states, however, it appeared that TTO valuations were somewhat higher than Thurstone's ratings, giving rise to the S-shaped curve in Figure 7.3.

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Differences between valuations as per VAS and TTO

Figure 7.4 plots median VAS scores against median TTO scores for the 43 states. It was

shown in section 6.5 that the Thurstone Model and the VAS yielded very similar scores and

thus the results of a comparison of VAS and TTO will be similar to those of the comparison

between Thurstone ratings and TTO. Whilst 17 of the 43 states had median TTO scores that

implied they were as bad or worse than death, no state had a negative score on the VAS and

only 1 (state 33333) had a median value of 0.0. For the mildest group of states, it was the

TTO that yielded higher health state valuations than the VAS whilst for the group of

'intermediate' states the scores elicited by the two methods were broadly comparable.

At the individual level, the results of the sign test confirmed these findings; for the first 19

ranked states (as per the TTO) the number of respondents giving a higher score on the TTO

was significantly greater than the number of respondents giving a higher VAS score, for the

next 5 states there was no significant difference, and for the remaining states significantly

more respondents gave a higher score on the VAS than on the TTO.

However, the Wilcoxon matched–pairs signed–rank test showed that for 38 states (the

exceptions being 21111, 11122, 12121, 22112, 21222), the mean rank of the VAS was greater

than that of the TTO. This suggested for the mild states that, although the TTO value was

greater than the VAS one most of the time, when the VAS value was greater than the TTO

one, it was much greater.

7.6 Summary

1. The set of valuations emerging from the TTO task contained no logical inconsistencies, but far more states were rated worse than being dead than was the case with the VAS valuations.

2. There are some significant differences in valuations between men and women, and also according to marital status and employment status. But the background factor which has the most marked effect is age (which had no effect in the VAS data).

3. Looking at the age effect more closely it appears that respondents over the age of 60 give significantly lower values to the more severe states than do the rest of the population. One possible explanation is that as people's life expectancy shortens, they see less reason to tolerate suffering during their remaining years. However, we would expect this to show up in the VAS ratings too, and it does not. An alternative explanation might be that it is an artefact of the TTO method. If respondents do not believe that they have 10 years life expectancy, they might willingly give up these 'excess' years, thereby depressing the apparent value attached to the more severe states.

4. The relationship between the VAS valuations and the TTO valuations does not appear to be the power relationship found in earlier studies, but a "spreading" relationship, in which the TTO valuations are more extreme than the VAS ones at both ends of the valuation spectrum.

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Table 7.1 TTO Valuations (When scores range from 1 to –39.00)

State	N	Mean (SD)		Median (IQR)	
21111	1306	0.76	(1.99)	0.95	(0.83 – 1.00)
11211	1335	0.81	(1.56)	0.95	(0.83 – 1.00)
11121	1310	0.78	(1.62)	0.93	(0.80 – 1.00)
12111	1310	0.70	(2.06)	0.93	(0.80 – 1.00)
11112	1309	0.74	(1.66)	0.93	(0.75 – 1.00)
12211	828	0.51	(3.12)	0.90	(0.63 – 1.00)
12121	828	0.58	(2.43)	0.85	(0.60 – 1.00)
11122	816	0.38	(3.52)	0.83	(0.63 – 1.00)
22121	830	0.22	(3.59)	0.78	(0.50 – 0.93)
22112	840	0.33	(3.43)	0.74	(0.50 – 0.95)
11312	824	–0.10	(4.70)	0.68	(0.40 – 0.93)
21222	823	–0.01	(4.28)	0.65	(0.40 – 0.93)
12222	830	0.16	(3.27)	0.65	(0.38 – 0.93)
21312	811	–0.18	(4.63)	0.65	(0.33 – 0.93)
22122	809	–0.05	(4.32)	0.63	(0.39 – 0.93)
22222	834	–0.05	(4.21)	0.63	(0.35 – 0.88)
11113	823	–0.33	(4.24)	0.50	(0.00 – 0.88)
13212	820	–0.53	(5.18)	0.50	(0.04 – 0.78)
13311	810	–1.00	(6.26)	0.50	(0.00 – 0.75)
11131	812	–1.16	(5.98)	0.38	(–0.48 – 0.71)
12223	828	–1.03	(6.06)	0.35	(–0.38 – 0.63)
21323	819	–1.60	(7.04)	0.30	(–0.60 – 0.60)
23321	821	–2.07	(8.12)	0.30	(–0.70 – 0.63)
32211	833	–1.71	(7.20)	0.25	(–0.60 – 0.63)
21232	826	–2.15	(7.81)	0.13	(–0.91 – 0.55)
22323	812	–2.09	(7.70)	0.03	(–0.91 – 0.53)
33212	829	–2.67	(8.60)	0.00	(–1.00 – 0.48)
23313	830	–3.22	(9.46)	0.00	(–1.22 – 0.40)
22331	814	–2.30	(7.89)	0.00	(–1.11 – 0.50)
11133	829	–2.77	(8.51)	0.00	(–1.35 – 0.48)
21133	826	–2.93	(8.94)	–0.03	(–1.50 – 0.45)
23232	827	–3.07	(8.75)	–0.08	(–1.67 – 0.43)
33321	828	–3.21	(9.18)	–0.29	(–1.67 – 0.38)
32313	832	–3.33	(9.15)	–0.29	(–1.67 – 0.30)
22233	829	–3.24	(9.02)	–0.38	(–1.67 – 0.34)
32223	825	–3.81	(9.85)	–0.38	(–2.08 – 0.23)
13332	812	–3.46	(8.79)	–0.60	(–2.33 – 0.18)
32232	818	–4.11	(10.01)	–0.60	(–2.64 – 0.20)
32331	826	–4.82	(11.00)	–0.60	(–3.44 – 0.03)
Uncon	3294	–5.54	(11.42)	–0.60	(–4.71 – –0.03)
33232	824	–5.19	(11.42)	–0.74	(–3.00 – 0.00)
33323	833	–5.98	(11.90)	–0.91	(–4.71 – –0.03)
33333	3289	–8.95	(14.00)	–1.86	(–12.33 – –0.38)

Table 7.2   **TTO Valuations (When scores range from 1 to −1)**

State	N	Mean (SD)		Median (IQR)	
21111	1306	0.87	(0.24)	0.95	(0.83 – 1.00)
11211	1335	0.87	(0.23)	0.95	(0.83 – 1.00)
11121	1310	0.85	(0.25)	0.93	(0.80 – 1.00)
12111	1310	0.83	(0.30)	0.93	(0.80 – 1.00)
11112	1309	0.82	(0.29)	0.93	(0.75 – 1.00)
12211	828	0.76	(0.33)	0.90	(0.63 – 1.00)
12121	828	0.74	(0.32)	0.85	(0.60 – 1.00)
11122	816	0.72	(0.37)	0.83	(0.63 – 1.00)
22121	830	0.64	(0.42)	0.78	(0.50 – 0.93)
22112	840	0.66	(0.38)	0.74	(0.50 – 0.95)
11312	824	0.55	(0.47)	0.68	(0.40 – 0.93)
21222	823	0.55	(0.46)	0.65	(0.40 – 0.91)
12222	830	0.54	(0.47)	0.65	(0.38 – 0.93)
21312	811	0.51	(0.49)	0.65	(0.33 – 0.93)
22122	809	0.53	(0.47)	0.63	(0.39 – 0.93)
22222	834	0.50	(0.49)	0.63	(0.35 – 0.88)
11113	823	0.39	(0.56)	0.50	(0.00 – 0.88)
13212	820	0.38	(0.54)	0.50	(0.04 – 0.78)
13311	810	0.33	(0.56)	0.50	(0.00 – 0.75)
11131	812	0.20	(0.60)	0.38	(−0.33 – 0.72)
12223	828	0.21	(0.56)	0.35	(−0.28 – 0.63)
21323	819	0.15	(0.59)	0.30	(−0.38 – 0.60)
23321	821	0.14	(0.61)	0.30	(−0.41 – 0.63)
32211	833	0.14	(0.60)	0.25	(−0.38 – 0.63)
21232	826	0.06	(0.61)	0.13	(−0.48 – 0.55)
22323	812	0.04	(0.59)	0.03	(−0.48 – 0.53)
33212	829	−0.02	(0.60)	0.00	(−0.50 – 0.48)
23313	830	−0.07	(0.58)	0.00	(−0.55 – 0.40)
22331	814	−0.01	(0.60)	0.00	(−0.53 – 0.50)
11133	829	−0.05	(0.61)	0.00	(−0.58 – 0.48)
21133	826	−0.07	(0.59)	−0.03	(−0.60 – 0.45)
23232	827	−0.10	(0.59)	−0.08	(−0.63 – 0.43)
33321	828	−0.14	(0.57)	−0.23	(−0.63 – 0.38)
32313	832	−0.16	(0.57)	−0.23	(−0.63 – 0.30)
22233	829	−0.15	(0.57)	−0.28	(−0.63 – 0.34)
32223	825	−0.19	(0.56)	−0.28	(−0.68 – 0.23)
13332	812	−0.23	(0.55)	−0.38	(−0.70 – 0.18)
32232	818	−0.23	(0.57)	−0.38	(−0.73 – 0.20)
32331	826	−0.27	(0.55)	−0.38	(−0.78 – 0.03)
Uncon	3294	−0.41	(0.39)	−0.38	(−0.83 – −0.03)
33232	824	−0.33	(0.51)	−0.43	(−0.75 – 0.00)
33323	833	−0.39	(0.49)	−0.48	(−0.83 – −0.03)
33333	3289	−0.54	(0.41)	−0.65	(−0.93 – −0.28)

Table 7.3   Differences in Valuations by Sub-Group

State	Under 40 higher than 40-59?	40-59 higher than 60 or over?	Under 40 higher than 60 or over?	Men higher than women?	Married higher than sep, div, wid?	Married higher than single?	Working higher than retired?
21111	✓					✓	
11211							
11121	✓					✓	
12111	✓	✓				✓	
11112							
12211	✓	✓					
12121						✓	
11122							
22121	✓					✓	
22112						✓	
11312							
21222	✓					✓	
12222							
21312	✓					✓	
22122		✓			✓		
22222		✓				✓	
11113						✓	
13212							
13311		✓	✓		✓		
11131						✓	
12223							
21323							
23321		✓					
32211		✓	✓		✓		✓
21232		✓	✓	✓		✓	
22323		✓	✓		✓		✓
33212		✓	✓	✓	✓		✓
23313			✓				✓
22331			✓	✓			
11133			✓	✓	✓		
21133		✓	✓		✓		✓
23232		✓	✓		✓		✓
33321		✓	✓		✓		✓
32313		✓	✓		✓		✓
22233		✓	✓	✓	✓		✓
32223		✓	✓	✓	✓		✓
13332		✓	✓	✓	✓		✓
32232		✓	✓		✓		✓
32331		✓	✓		✓		✓
Uncon		✓	✓	✓	✓	✓	✓
33232		✓	✓	✓	✓		✓
33323		✓	✓	✓	✓		✓
33333		✓	✓	✓	✓		✓

Table 7.4 **Valuations by Age Group (Score range from 1 to –1)**

State	18–39 MEDIAN (IQR) n = 1348	40–59 MEDIAN (IQR) n = 995	60+ MEDIAN (IQR) n = 991
21111	0.93 (0.83 – 1.00)	0.98 (0.88 – 1.00)*	0.99 (0.83 – 1.00)
11211	0.93 (0.83 – 1.00)	0.95 (0.88 – 1.00)	0.95 (0.80 – 1.00)
11121	0.93 (0.78 – 1.00)	0.95 (0.83 – 1.00)*	0.95 (0.73 – 1.00)
12111	0.93 (0.80 – 1.00)	0.95 (0.88 – 1.00)*+	0.93 (0.68 – 1.00)
11112	0.93 (0.78 – 1.00)	0.95 (0.78 – 1.00)+	0.95 (0.68 – 1.00)
12211	0.88 (0.66 – 1.00)	0.93 (0.73 – 1.00)*	0.88 (0.53 – 1.00)
12121	0.83 (0.63 – 0.99)	0.89 (0.59 – 1.00)	0.88 (0.55 – 1.00)
11122	0.80 (0.58 – 0.98)	0.93 (0.70 – 1.00)	0.83 (0.58 – 1.00)
22121	0.73 (0.50 – 0.90)	0.80 (0.53 – 0.99)*	0.80 (0.48 – 1.00)
22112	0.73 (0.50 – 0.93)	0.80 (0.53 – 0.99)	0.73 (0.40 – 0.95)
11312	0.65 (0.43 – 0.88)	0.73 (0.43 – 0.93)	0.68 (0.31 – 0.93)
21222	0.63 (0.39 – 0.83)	0.69 (0.48 – 0.93)*	0.68 (0.39 – 0.93)
12222	0.65 (0.40 – 0.88)	0.70 (0.40 – 0.93)	0.60 (0.16 – 0.95)
21312	0.63 (0.31 – 0.83)	0.70 (0.40 – 0.93)*	0.63 (0.26 – 0.93)
22122	0.63 (0.41 – 0.86)	0.73 (0.48 – 0.93)	0.63 (0.06 – 0.93)
22222	0.60 (0.38 – 0.83)	0.68 (0.43 – 0.93)+	0.55 (0.03 – 0.89)
11113	0.53 (0.10 – 0.83)	0.58 (0.03 – 0.93)	0.45 (−0.00 – 0.83)
13212	0.50 (0.23 – 0.75)	0.53 (0.22 – 0.83)	0.48 (−0.28 – 0.83)
13311	0.50 (0.18 – 0.78)X	0.53 (0.08 – 0.78)+	0.38 (−0.36 – 0.68)
11131	0.30 (−0.34 – 0.64)	0.50 (−0.28 – 0.78)+	0.33 (−0.35 – 0.76)
12223	0.38 (−0.13 – 0.63)	0.38 (−0.20 – 0.73)	0.25 (−0.35 – 0.59)
21323	0.28 (−0.33 – 0.53)	0.38 (−0.30 – 0.68)	0.30 (−0.51 – 0.63)
23321	0.33 (−0.33 – 0.58)	0.40 (−0.33 – 0.74)+	0.03 (−0.50 – 0.58)
32211	0.30 (−0.28 – 0.63)X	0.35 (−0.28 – 0.73)+	0.00 (−0.58 – 0.48)
21232	0.18 (−0.45– 0.53)X	0.25 (−0.43 – 0.68)+	0.00 (−0.58 – 0.53)
22323	0.10 (−0.40– 0.50)X	0.23 (−0.38 – 0.63)+	−0.03 (−0.73 – 0.50)
33212	0.16 (−0.38– 0.50)X	0.03 (−0.48 – 0.58)+	−0.40 (−0.78 – 0.36)
23313	0.00 (−0.48– 0.40)X	−0.01 (−0.58 – 0.43)	−0.28 (−0.78 – 0.38)
22331	0.03 (−0.48 – 0.48)X	0.00 (−0.50 – 0.50)	−0.10 (−0.68 – 0.53)
11133	0.00 (−0.48 – 0.48)X	0.00 (−0.58 – 0.50)	−0.30 (−0.78 – 0.48)
21133	0.00 (−0.48 – 0.44)X	0.00 (−0.50 – 0.48)+	−0.28 (−0.76 – 0.40)
23232	0.00 (−0.48 – 0.45) X	0.00 (−0.60 – 0.50)+	−0.38 (−0.83 – 0.23)
33321	−0.09 (−0.50 – 0.38)X	−0.18 (−0.63 – 0.40)+	−0.38 (−0.77 – 0.23)
32313	−0.15 (−0.58 – 0.30)X	−0.03 (−0.50 – 0.43)+	−0.43 (−0.83 – 0.19)
22233	−0.18 (−0.53 – 0.33)X	−0.23 (−0.63 – 0.39)+	−0.36 (−0.78 – 0.26)
32223	−0.24 (−0.56 – 0.23)X	−0.04 (−0.63 – 0.43)+	−0.48 (−0.83 – 0.00)
13332	−0.28 (−0.63 – 0.23)X	−0.28 (−0.63 – 0.24)+	−0.48 (−0.83 – 0.00)
32232	−0.33 (−0.65 – 0.22)X	−0.25 (−0.63 – 0.34)+	−0.50 (−0.83 – −0.01)
32331	−0.28 (−0.68 – 0.18)X	−0.33 (−0.68 – 0.20)+	−0.58 (−0.85 – −0.03)
Uncon	−0.28 (−0.58 – −0.03)X	−0.38 (−0.78 – −0.03)+	−0.59 (−0.93 – −0.23)
33232	−0.35 (−0.68 – 0.03)X	−0.43 (−0.73 – 0.00)+	−0.60 (−0.88 – −0.03)
33323	−0.33 (−0.68 – 0.00)X	−0.48 (−0.78 – −0.03)+	−0.73 (−0.93 – −0.28)
33333	−0.63 (−0.85 – −0.28)X	−0.63 (−0.88 – −0.28)+	−0.76 (−0.95 – −0.38)

* higher than 18–39 (p<0.01)   + higher than 60+ (p<0.01)   X – higher than 60+ (p<0.01)

Table 7.5   **Indices for Age Groups**

Age Groups	Overall Index	Index for Positive Means	Index for Negative Means
18–24	0	0	0
25–34	+0.07	+0.07	+0.07
35–44	+0.08	+0.09	+0.06
45–54	+0.08	+0.11	+0.06
55–64	+0.03	+0.06	−0.01
65–74	−0.05	−0.01	−0.10
75+	−0.14	−0.10	−0.19

Table 7.6   **Extreme Values by Sub–Group**

Sub–Group	Percentage of Total Responses (n=42916)	Percentage of Highest Score (n=5602)	Percentage of Lowest Scores (n=2013)
Those describing their health as dysfunctional	42.8%	48.7*	56.0*
Those rating their health below 75	27.1%	31.0*	37.0*
Those aged 65+	23.2%	25.0	46.7*
Those with no qualifications	36.6%	40.7	57.2*
Those male	43.1%	41.4	35.4*
Those married	60.3%	63.1	45.1*

* Significantly different (p <0.001)

Table 7.7   TTO Valuations by Sub-Groups used in Further Analysis (scores range from 1 to -1)

State	Full Data Set N = 3337		18–59 Age Group N = 2343		60+ Age Group N = 991	
	Mean	Median	Mean	Median	Mean	Median
21111	0.87	0.95	0.88	0.95	0.86	0.99
11211	0.87	0.95	0.88	0.93	0.84	0.95
11121	0.85	0.93	0.86	0.93	0.82	0.95
12111	0.83	0.93	0.85	0.93	0.77	0.93
11112	0.82	0.93	0.84	0.93	0.79	0.95
12211	0.76	0.90	0.80	0.90	0.68	0.88
12121	0.74	0.85	0.75	0.83	0.71	0.88
11122	0.72	0.83	0.74	0.83	0.68	0.83
22121	0.64	0.78	0.65	0.75	0.60	0.80
22112	0.66	0.74	0.68	0.75	0.60	0.73
11312	0.55	0.68	0.57	0.70	0.51	0.68
21222	0.55	0.65	0.56	0.65	0.51	0.68
12222	0.54	0.65	0.57	0.68	0.47	0.60
21312	0.51	0.65	0.53	0.65	0.48	0.63
22122	0.53	0.63	0.57	0.65	0.45	0.63
22222	0.50	0.63	0.54	0.63	0.40	0.55
11113	0.39	0.50	0.42	0.53	0.31	0.45
13212	0.38	0.50	0.41	0.50	0.29	0.48
13311	0.33	0.50	0.39	0.53	0.18	0.38
11131	0.20	0.38	0.21	0.38	0.21	0.33
12223	0.21	0.35	0.25	0.38	0.11	0.25
21323	0.15	0.30	0.17	0.30	0.10	0.30
23321	0.14	0.30	0.18	0.38	0.02	0.03
32211	0.14	0.25	0.22	0.30	−0.06	0.00
21232	0.06	0.13	0.09	0.21	−0.03	0.00
22323	0.04	0.03	0.09	0.13	−0.10	−0.03
33212	−0.02	0.00	0.06	0.11	−0.22	−0.40
23313	−0.07	0.00	−0.03	0.00	−0.16	−0.28
22331	−0.01	0.00	0.01	0.00	−0.07	−0.10
11133	−0.05	0.00	−0.02	0.00	−0.13	−0.30
21133	−0.07	−0.03	−0.03	0.00	−0.16	−0.28
23232	−0.10	−0.08	−0.03	0.00	−0.24	−0.38
33321	−0.14	−0.23	−0.09	−0.13	−0.24	−0.38
32313	−0.16	−0.23	−0.10	−0.08	−0.28	−0.43
22233	−0.15	−0.28	−0.11	−0.19	−0.24	−0.36
32223	−0.19	−0.28	−0.12	−0.18	−0.34	−0.48
13332	−0.23	−0.38	−0.18	−0.28	−0.35	−0.48
32232	−0.23	−0.38	−0.17	−0.30	−0.38	−0.50
32331	−0.27	−0.38	−0.21	−0.30	−0.41	−0.58
Uncon	−0.41	−0.38	−0.35	−0.30	−0.54	−0.59
33232	−0.33	−0.43	−0.29	−0.38	−0.43	−0.60
33323	−0.39	−0.48	−0.33	−0.38	−0.52	−0.73
33333	−0.54	−0.65	−0.52	−0.63	−0.60	−0.76

Figure 7.1

Ranking differences - Ranking and TTO
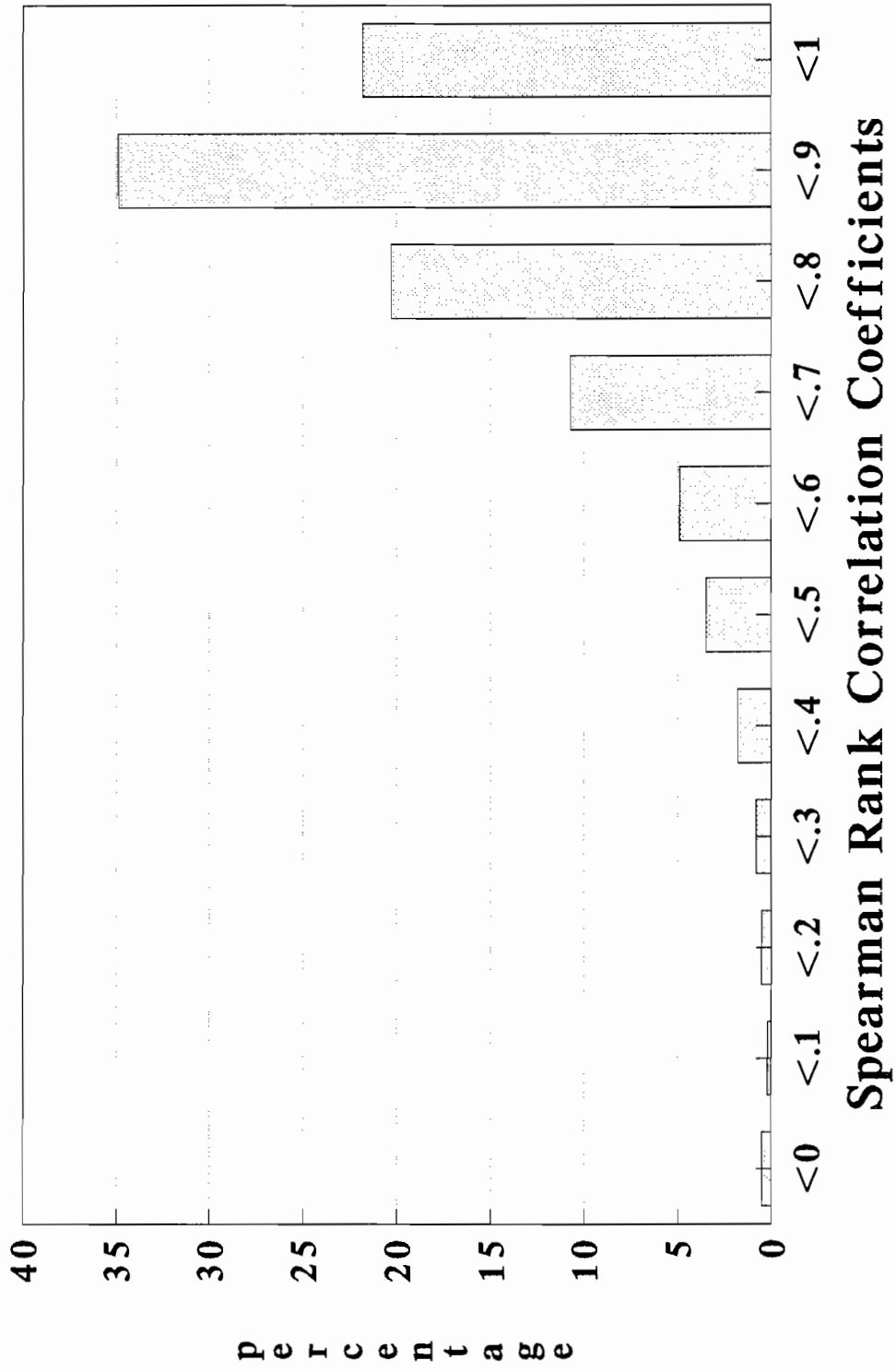Distribution of Spearman Correlations

Figure 7.2

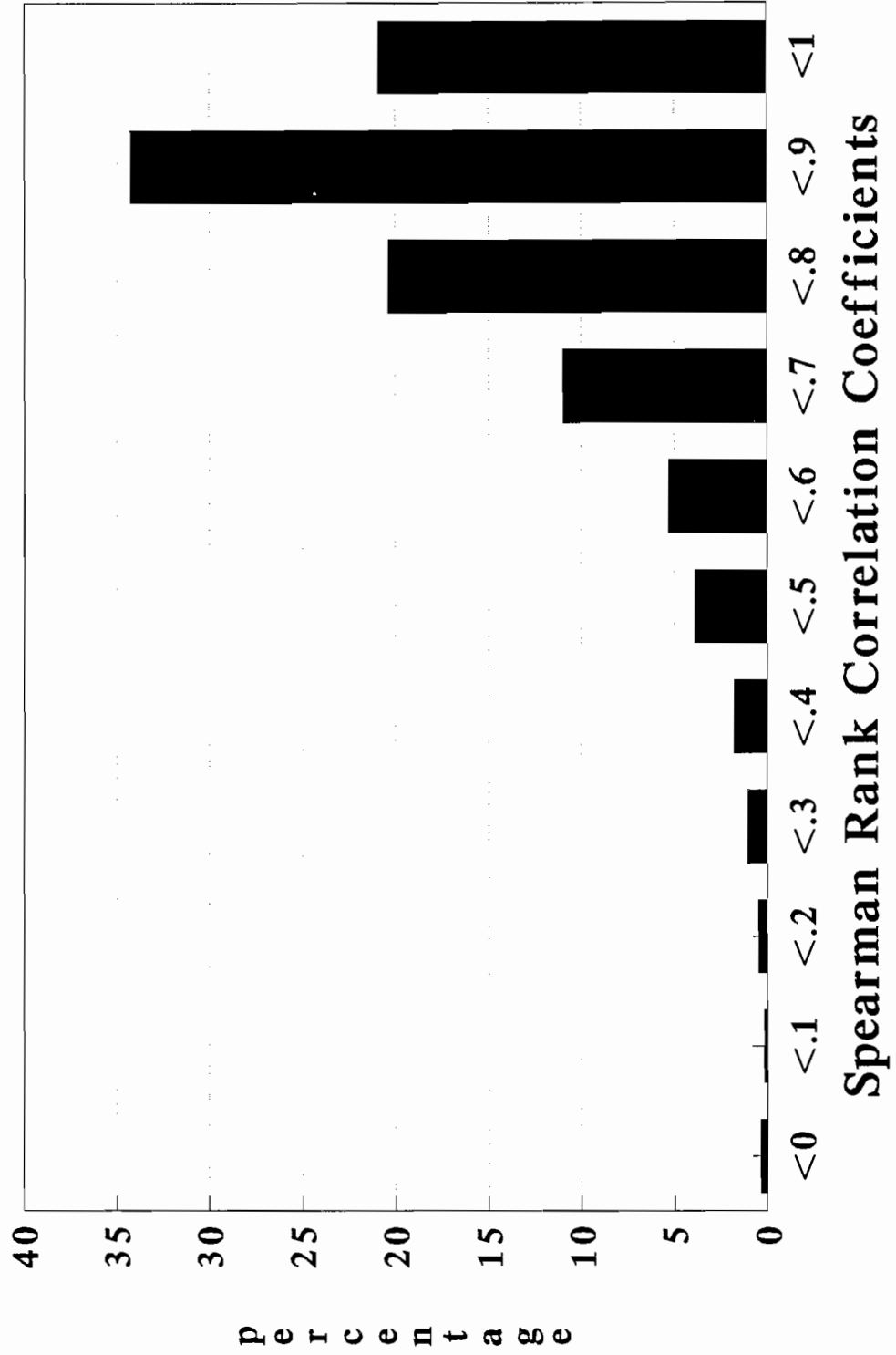# Ranking differences between VAS and TTO

Distribution of Spearman Correlations

Figure 7.3

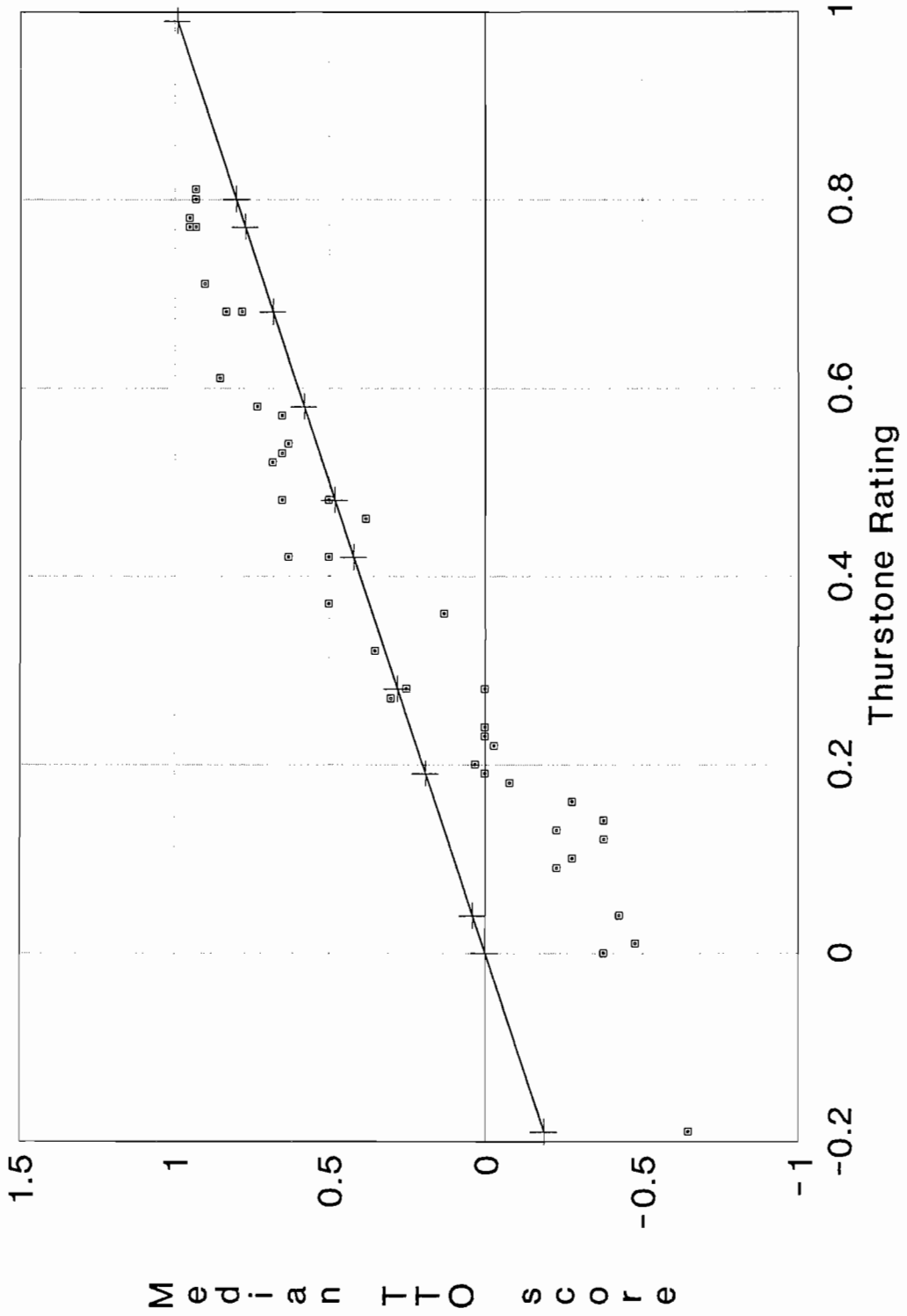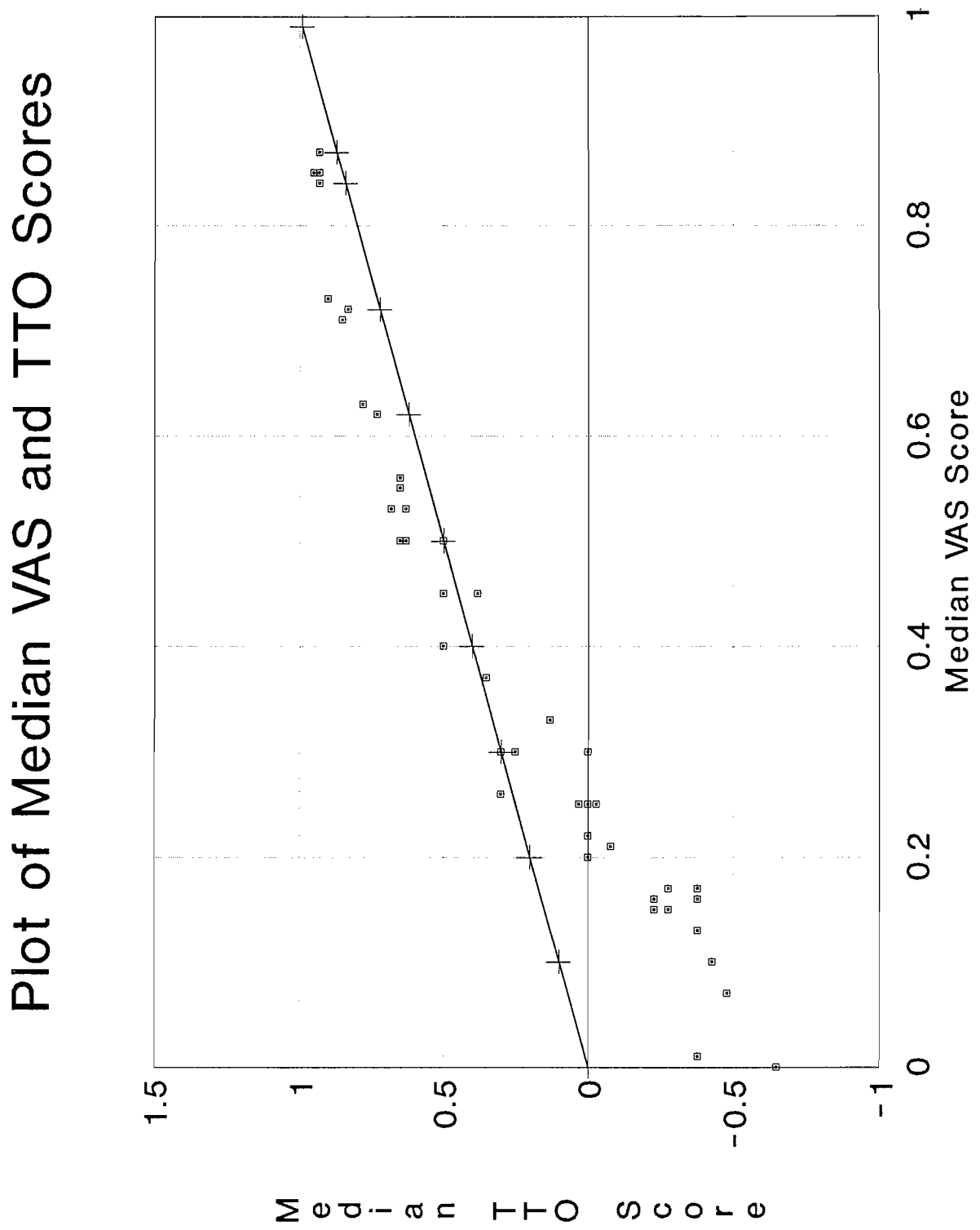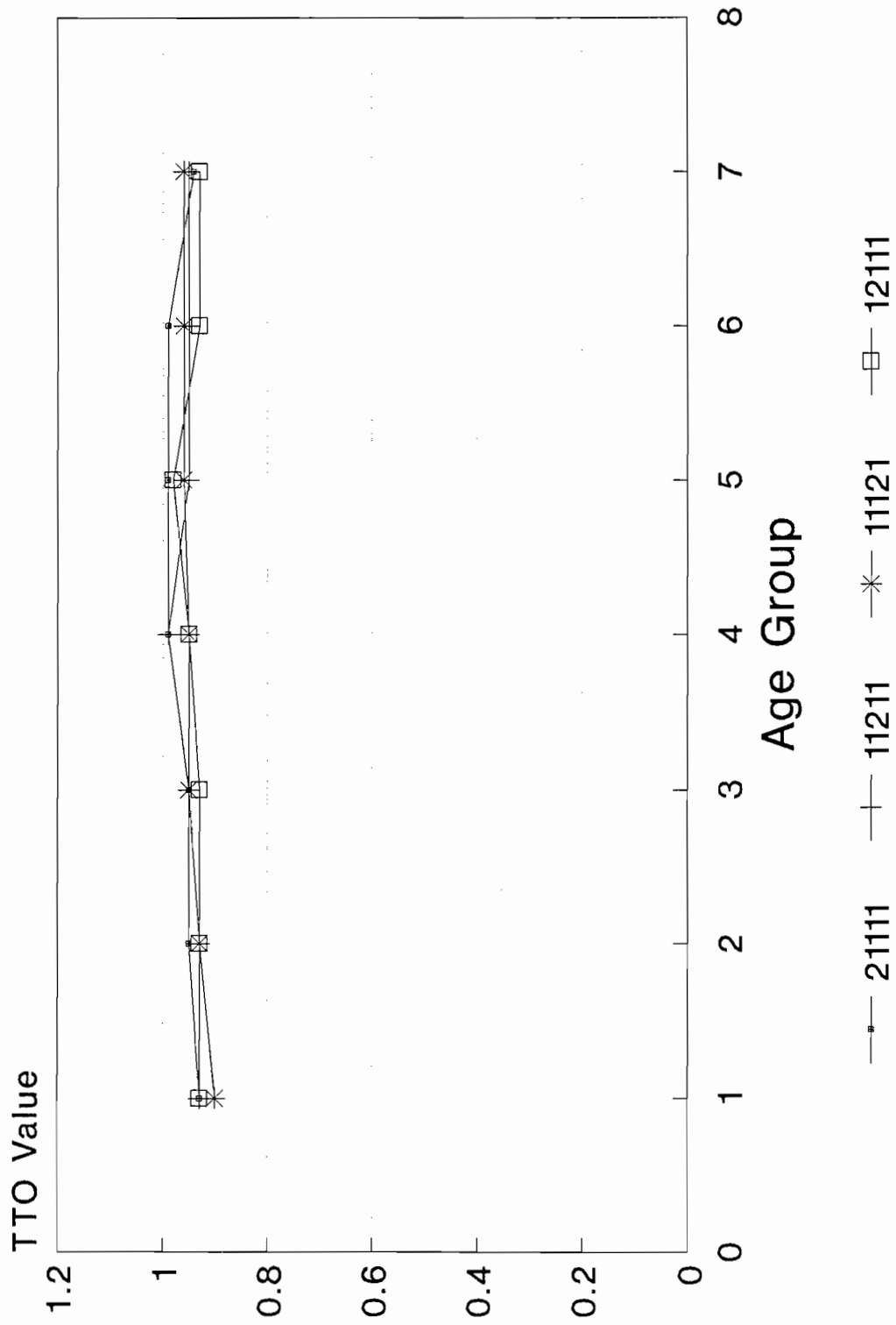Median Thurstone Ratings and TTO Scores
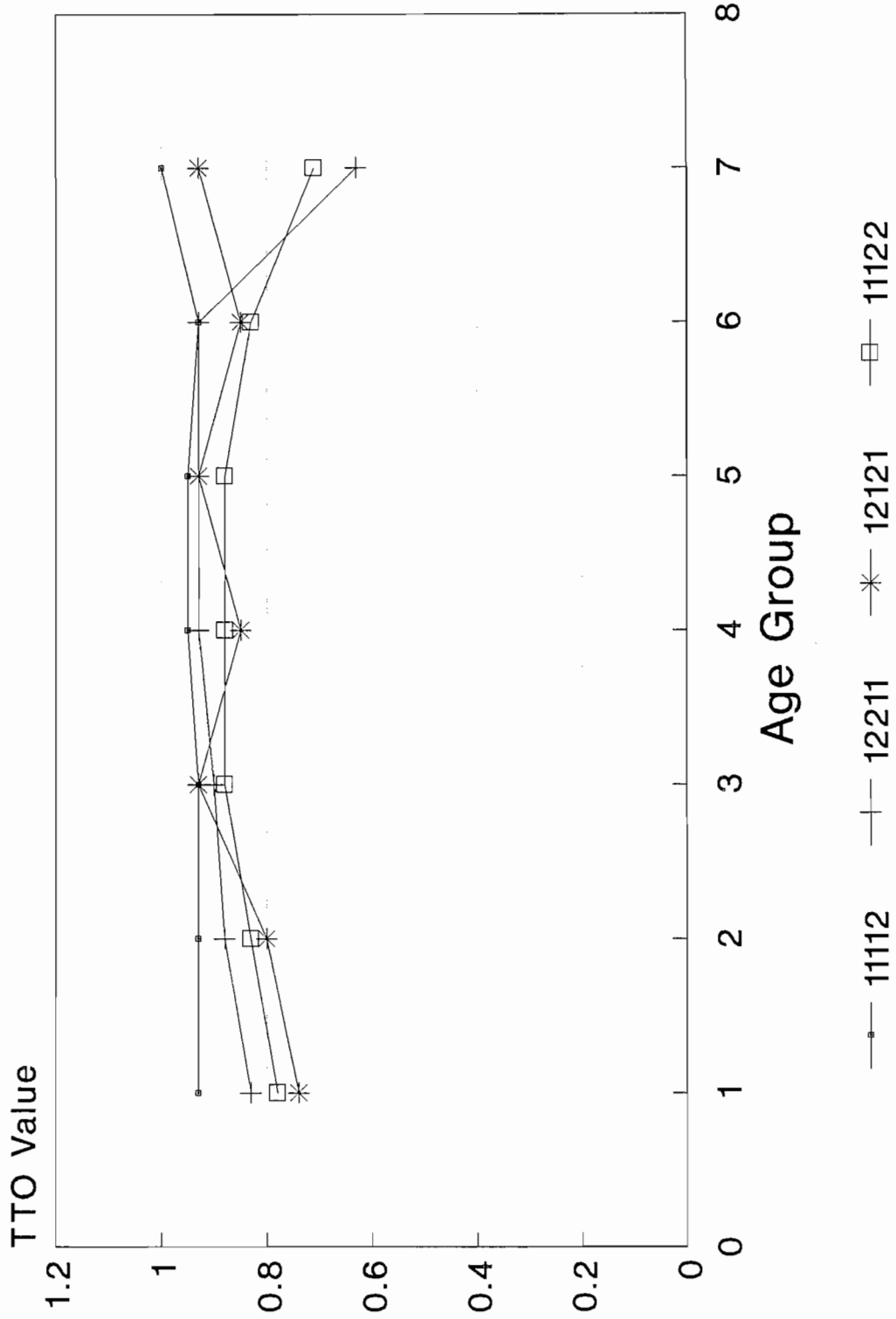
Figure 7.4

Plot of Median VAS and TTO Scores

TTO valuations by age group

TTO Value

Age Group

21111   + 11211   * 11121   □ 12111

TTO valuations by age group

TTO Value

Age Group

— 11112   +— 12211   ✱ 12121   □— 11122

TTO valuations by age group

TTO Value

Age Group

22121   22112   11312   21222

TTO valuations by age group

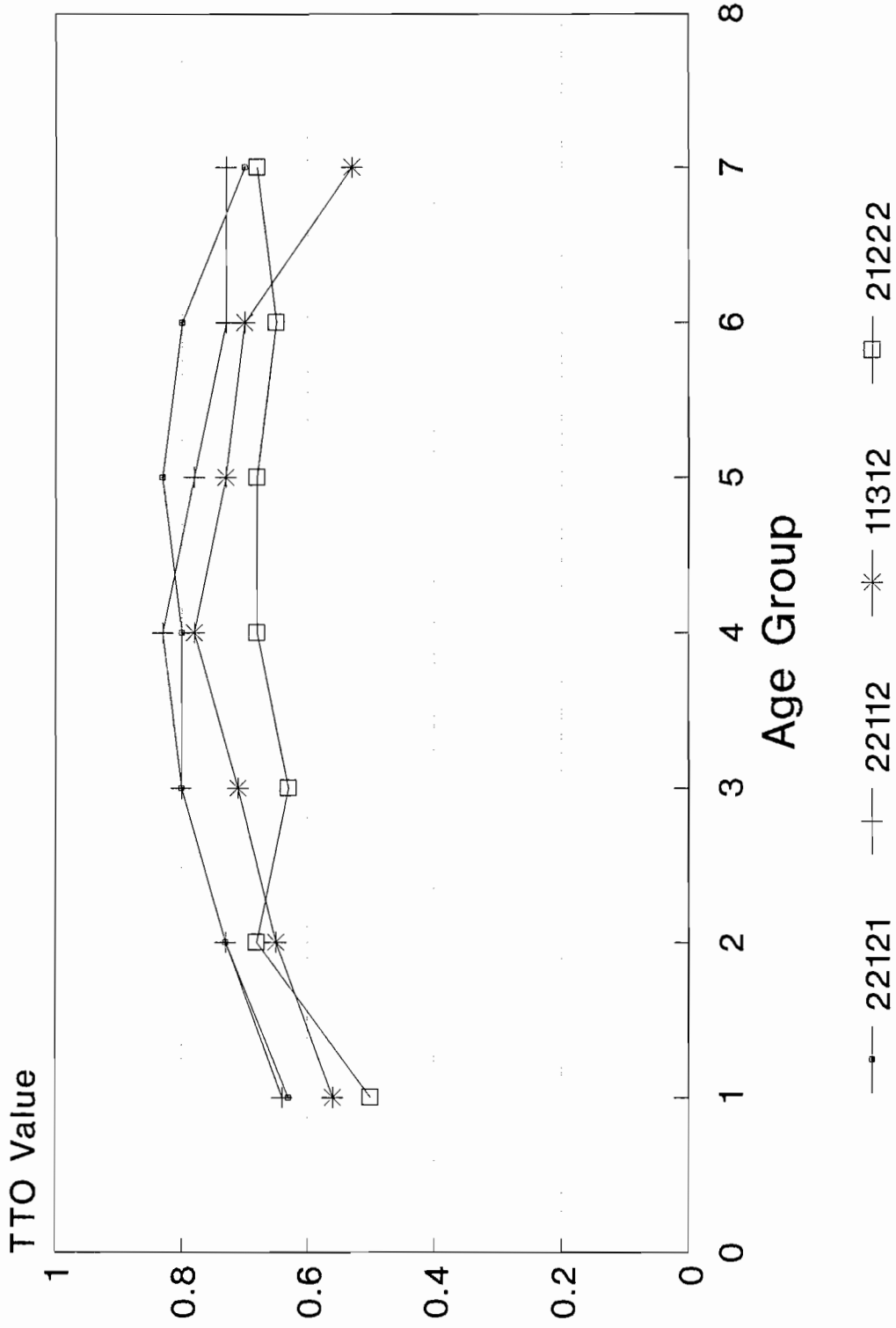# TTO valuations by age group
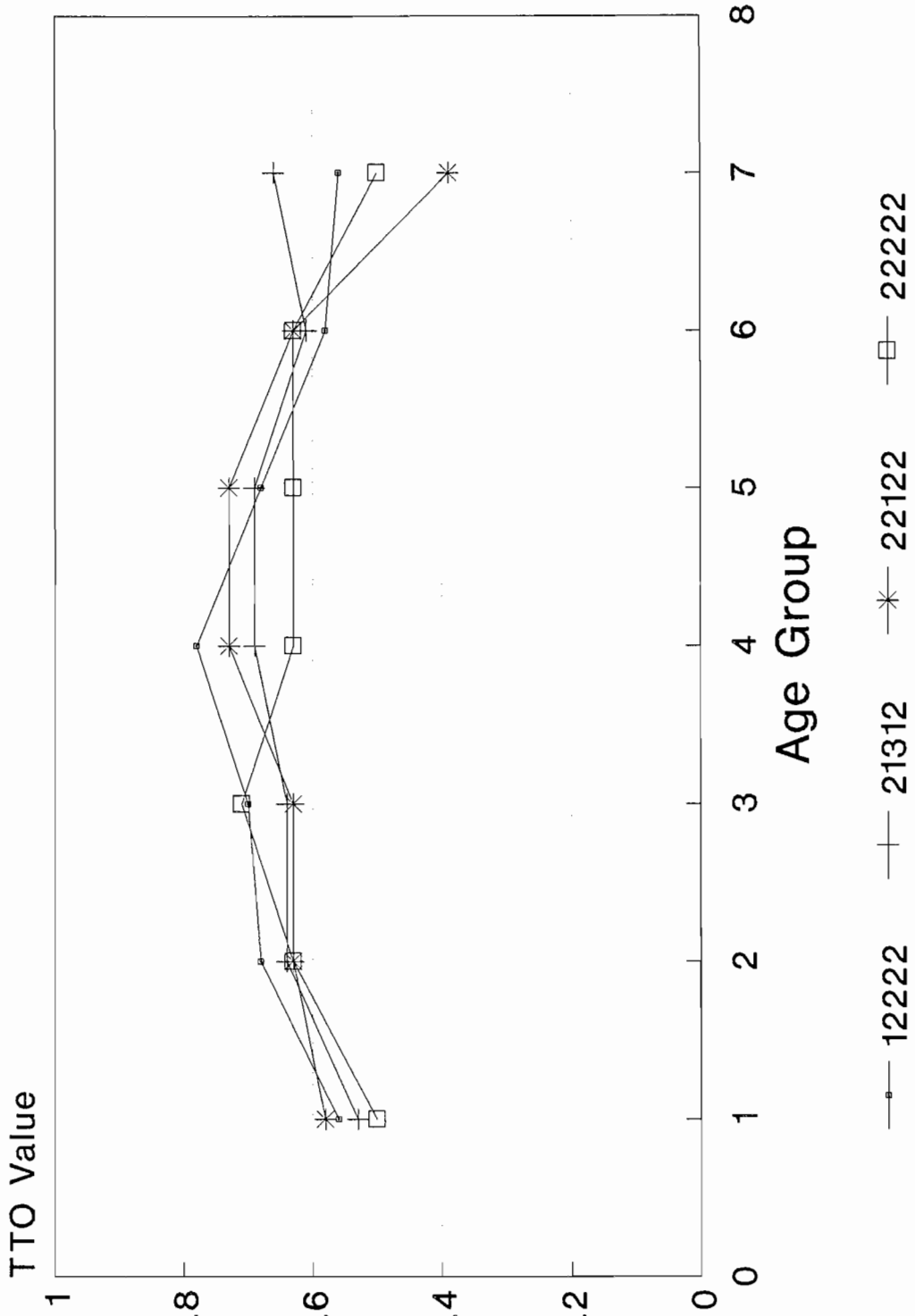
Annexe 7A(vi)

TTO valuations by age group

TTO valuations by age group

TTO valuations by age group

Annexe 7A(viii)

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TTO valuations by age group

TTO Value

Age Group

33321   32313   22233   32223

TTO valuations by age group

TTO Value

Age Group

— 13332   + 32232   ✳ 32331   □ uncon

Annexe 7A(x)

TTO valuations by age group

TTO Value

Age Group

-- 33232   -- 33323   -- 33333

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

—✳— VAS 12111   —□— TTO 12111

TTO and VAS valuations by age group

TTO and VAS Value

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

—✱— VAS 21222   —☐— TTO 21222

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

—*— VAS 22222   —□— TTO 22222

TTO valuations by age group

TTO and VAS Value

Age Group

—※— VAS 11131   —□— TTO 11131

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

VAS 32211   TTO 32211

TTO valuations by age group

TTO and VAS Value

Age Group

—*— VAS 23313   —□— TTO 23313

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

—*— VAS 23232   —□— TTO 23232

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

* VAS 32223   □ TTO 32223

TTO and VAS valuations by age group

TTO and VAS Value

Age Group

—✳— VAS uncon   —☐— TTO uncon

TTO and VAS valuations by age group

TTO Value

Age Group

—*— VAS 33333   —□— TTO 33333
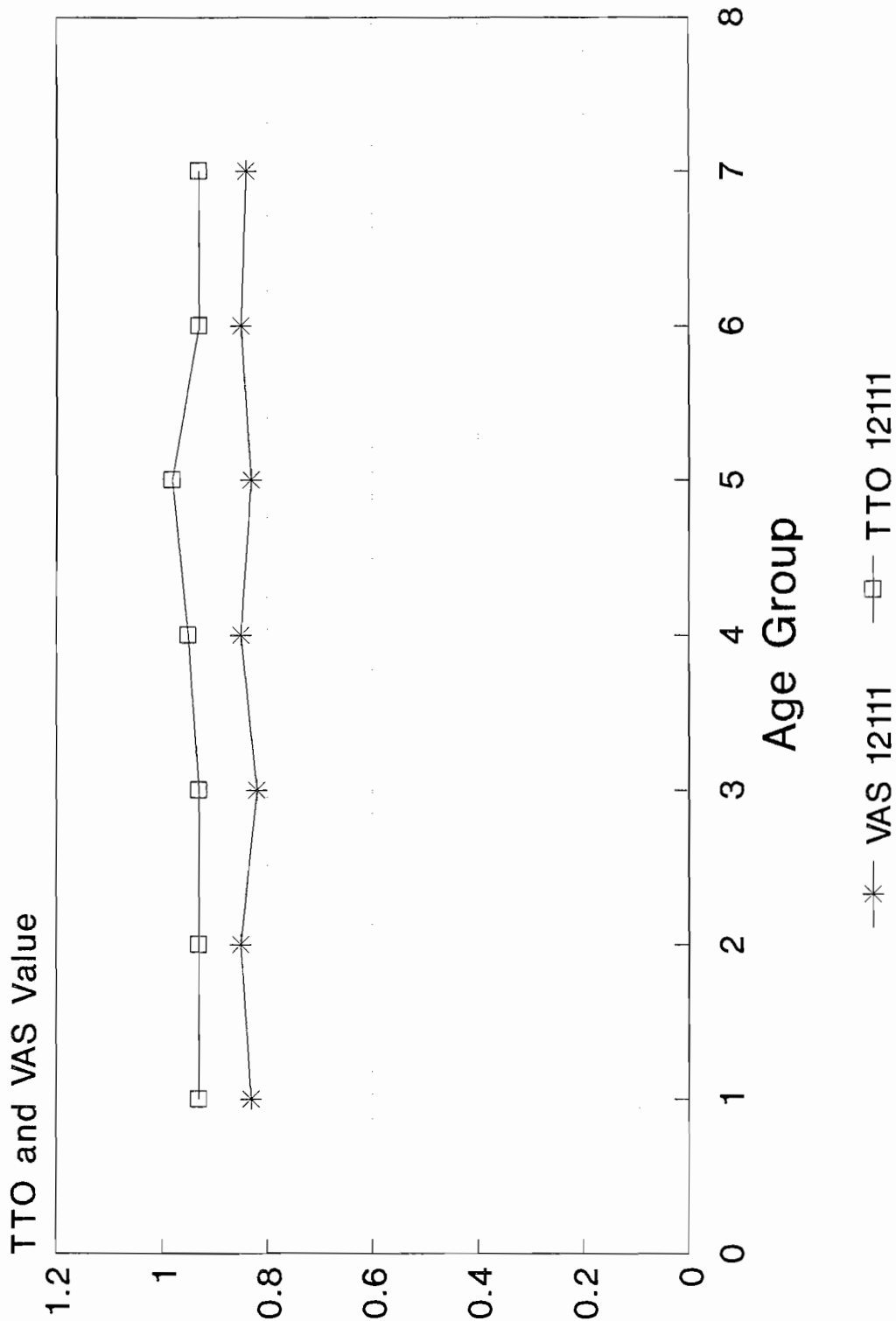
CHAPTER 8   THE RETEST SURVEY

8.1   Sample Characteristics

The respondents in the retest were representative of those in the test so far as all but one of the background characteristics (including self–rated health status) were concerned. The exception was educational level, where 28.6% of retest respondents had no qualifications compared with 37.0% of respondents not in the retest (Chi=6.26, d.f.=1, p<0.05). Those in the retest took on average 55.70 (s.d.=16.61) minutes to complete the test interview, but only 43.85 (s.d.=12.79) minutes to complete the retest interview. This was significantly shorter (p<0.001).

8.2   Missing Data

The data set from 221 respondents was near complete (Table 8.1). No data were missing from the ranking exercise, while in the VAS, 1 respondent omitted to value 13 states and a further respondent omitted to value state 33333. In the TTO, one value was missing from 12 states, and 2 values from a further 4 states. One respondent rated state 13212 at retest instead of state 23313 that had been rated at test, and another rated state 22222 instead of state 23321. The data for the two incorrect states for these 2 respondents have been excluded from both test and retest data sets.

8.3   Group Analysis

8.3.1   Exclusions from the Retest Data Set

As for the main data sets, respondents at retest with insufficient data for further analysis on each valuation method were identified.

8.3.1.1   The Ranking Exercise

2 respondents with missing data were excluded from the analysis of the ranking data – both had previously been excluded from the analysis of the test data. The respondents are listed in Annex 8A.

8.3.1.2   The VAS Valuation Exercise

9 respondents have been excluded from the VAS retest data set for the purposes of group analysis:

7 previously excluded from VAS test data set

1 with only 2 states valued at retest

1 excluded on TTO retest <u>and</u> in top 5% on VAS inconsistency

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9

At retest there were no respondents with death rated higher than all other states (or than 11111 alone), or with <3 states valued (besides death and 11111) or with all states given the same value. One respondent omitted to rate state 33333 at retest, and his data for this state have also been excluded from both test and retest data sets.

Mean VAS logical inconsistency at retest was 2.2% (s.d.=5.82). This was significantly lower (p<0.01) than at test where the same respondents had a mean inconsistency rate of 4.36% (s.d.=9.24). At retest 58.6% of respondents had no inconsistency at all compared with 52.6% at test.

8.3.1.3 The TTO Valuation Exercise

4 respondents have been excluded from the TTO retest data set for the purposes of group analysis:

1 previously excluded from TTO test data set

1 with all states missing at retest

1 with all states rated as worse than dead

1 with the same score given to all states

4

Mean TTO logical inconsistency at retest was 4.74% (s.d.=6.2). This was significantly lower (p<0.01) than at test where the same respondents had a mean inconsistency rate of 6.96%

(s.d.=7.83). At retest 40.1% of respondents had no inconsistency at all compared with only 24.0% at test.

8.3.2 Ranking Data

Spearman's rank correlation coefficient (rho) was calculated for each respondent, based on their ranking of 15 states at test and retest. The mean value for rho was 0.896 and over half the respondents had values for rho of 0.925 or higher. Only 1 respondent produced an identical ranking at test and retest. Only 1 respondent had a rank correlation below 0.4. The distribution of correlation coefficients is given in Figure 8.1.

The mean ranks and transformed scores derived from the ranking exercise at retest are given in Table 8.2a. The corresponding scale based on the initial test data of the same respondents is given in Table 8.2b. There was no significant difference in the rank order of states at test and retest.

Given the relatively small number of observations for each pair of states in the retest data it was not possible to calculate a scale based on the Thurstone model. Hence no comparison can be made between the test and retest data on this basis.

8.3.3 VAS Data

Raw and adjusted retest VAS scores are shown in Tables 8.3 and 8.4. There was one (strong) logical inconsistency in the adjusted scores at retest where state 21133 had the same median

value as state 11133 but should strictly had a lower score. There were no logical inconsistencies in the rankings of raw scores either at test or retest, nor in the adjusted scores at test.

At test, respondents not taking part in the retest gave a significantly higher median (adjusted) score to states 13311 and 33323 than respondents who then went on to do the retest, but $p < 0.05$ only in both cases. There were no statistically significant differences in VAS logical inconsistency, time taken for the interview between the respondents who did and did not take part in the retest.

8.3.4 TTO Data

Mean and median test TTO scores of those who were reinterviewed are shown in Table 8.5 and their retest scores are shown in Table 8.6. There were no logical inconsistencies in the median TTO scores at test but at retest the median value of state 21133 was higher than the median values of both 21133 and 22233. However, for those respondents who valued 11133 together with one or both of these more severe states, the majority gave a higher score to 11133. Given the study design, there were only a small number of such people and thus the inconsistency caused in the aggregate data appears to be result of those who valued 11133 (and not 21133 or 22233) giving it a lower than than those who valued 21133 or 22233 (and not 11133).

At test, respondents taking part in the retest gave a significantly higher median TTO score to state 33323 than respondents who did not go on to do the retest ($p < 0.01$). This was the

only significant difference in the TTO valuations given by the two groups of respondents. There were no statistically significant differences in TTO logical inconsistency or time taken for the interview between the respondents who did and did not take part in the retest.

8.4   Individual Analysis

In this section data from all respondents is included since the object is to assess the extent to which respondents do the second time around what they did the first time around. For comparisons on an individual–by–individual basis an intra–class correlation coefficient (ICC) was calculated for each respondent for each of the valuation methods. This statistic is calculated using the analysis of variance and is calculated using the following formula;

(between–within) / (between+within)

where "between" is the mean square of the difference between test and retest and "within" is the mean square of the difference within test and retest (i.e. the variance associated with the different states). The closer the ICC is to 1, the greater the reliability.

8.4.1   Ranking

The compact distribution of rank correlation coefficients was divided into 3 categories, 0.9–1.0, 0.8–0.9, and less than 0.8. Respondents within the 2 lower categories tended to have difficulty with the ranking exercise (p = .002), and with rating (p = 0.043). These respondents also reported more problems with pain (p = 0.011).

8.4.2   <u>VAS and TTO</u>

Figure 8.2 shows the distribution of ICCs for the VAS and TTO methods. It can be seen that the majority of respondents had an ICC that was close to 1 and only 13 respondents on the VAS and 24 respondents on the TTO had an ICC that was less than or equal to 0.5. Table 8.7 shows the mean and median ICCs for the two methods and are deemed to be acceptable.

For the VAS, the results of Mann–Whitney U tests suggested that those with problems on self–care, usual activities or anxiety/depression had higher ICCs than those with no problems on these dimensions (all $p<0.05$) although there was no difference between respondents claiming to be in the 11111 state and those in any dysfunctional state. In contrast, those in the <u>top</u> third of self–rated health status <u>at retest</u> had higher ICCs than those in the bottom or middle third (both $p<0.05$).

In the retest, respondents were asked whether they had experienced new illness(es) in themselves or in others since the first interview. Table 8.8 shows that very few respondents reported having experienced new illness. These respondents had ICCs on both the VAS and TTO that were no different from the remainder of respondents. Given such small numbers of respondents reporting new illness, it was impossible to compare the valuations of health states given by those reporting and not reporting new illness.

For the TTO, those in the top third of self–rated health status <u>at test</u> had higher ICCs than those in the bottom third ($p<0.01$). In addition, there is the intuitively appealing result that those with a degree or equivalent qualification had higher ICCs as a group than those with

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no qualifications at all ($p<0.05$).

An analysis of those with ICCs below 0.5 revealed that they were no different from the group of respondents with ICCs above 0.5. However, the small numbers in the former group may have been masking any differences. When a comparison was made between those with ICCs above and below the median, differences between the two groups were found. For the VAS, more men were found in the group with low ICCs (Chi=5.29, $p<0.05$) and for the TTO, more respondents who had experience of illness in themselves were found in the group with low ICCs (Chi=7.09, $p<0.05$).

8.5   Summary

The responses on all three methods were very reliable at both group and individual level, and inconsistency rates declined (even though they were already low).

Table 8.1   **Missing data by variable**

All figures represent percentage of data missing.

(n=221)

NewQualifs	Social Class	Accom	Rent	Smoke	NewIllself
0.9	1.8	0.5	0.5	0.5	1.4

Illother	Timeint	Diffrank	DiffVAS	DiffTTO
0.9	0.9	1.4	0.9	0.9

Other variables: no missing data

Table 8.2a   Mean Ranks at Retest

Dimensions	Mean rank	Std. dev.	Transformed score
1 1 1 1 1	1.03	0.23	1.00
1 1 1 2 1	2.5	0.72	0.88
1 1 1 1 2	2.55	0.76	0.88
2 1 1 1 1	2.67	0.97	0.87
1 1 2 1 1	2.74	0.9	0.86
1 2 1 1 1	2.8	0.85	0.86
1 1 1 2 2	3.81	1.23	0.78
1 2 1 2 1	4.14	0.85	0.75
1 2 2 1 1	4.22	0.92	0.74
2 2 1 2 1	4.91	1.14	0.69
2 1 2 2 2	5.11	1.13	0.67
2 2 1 1 2	5.12	1.65	0.67
1 2 2 2 2	5.56	1.09	0.63
2 2 1 2 2	5.91	1.47	0.61
1 1 3 1 2	6.09	1.47	0.59
2 2 2 2 2	6.14	1.43	0.59
1 1 1 1 3	6.38	2.09	0.57
3 1 3 1 2	6.38	1.71	0.57
1 1 1 3 1	6.98	2.44	0.52
1 3 2 1 2	7.04	1.81	0.51
1 2 2 2 3	7.43	1.14	0.48
1 3 3 1 1	7.71	1.82	0.46
2 1 2 3 2	8.37	1.91	0.41
3 2 2 2 1	8.51	1.82	0.39
2 3 3 2 1	8.63	1.88	0.39
2 1 1 3 3	8.69	2.08	0.38
3 1 2 3 1	8.72	1.94	0.38
1 1 1 3 3	8.78	2.33	0.37
2 2 3 3 1	9.12	1.93	0.35
2 2 2 3 2	9.33	1.97	0.33
2 3 3 1 3	9.87	1.63	0.28
2 3 2 3 2	10	1.88	0.27
3 3 2 1 2	10.1	2.08	0.27
2 2 2 3 3	10.13	1.81	0.26
3 2 3 1 3	10.15	1.63	0.26
3 2 2 3 2	10.35	1.88	0.25
3 2 2 2 3	10.69	1.37	0.22
1 3 3 3 2	10.76	1.99	0.21
3 3 3 2 1	10.84	1.61	0.21
2 2 2 1 2	10.94	1.75	0.20
3 1 3 2 3	11.71	1.06	0.14
3 3 3 2 3	12.24	1.27	0.09
unconscious	13.04	2.01	0.03
death	13.39	2.16	0.00
3 3 3 3 3	13.69	1.34	−0.02

Table 8.2b   Mean ranks at test

Dimensions	Mean rank	Std. dev.	Transformed score
1 1 1 1 1	1.06	0.43	1.00
1 1 2 1 1	2.65	1.13	0.87
1 1 1 2 1	2.68	1.09	0.87
1 1 1 1 2	2.78	1.46	0.86
1 2 1 1 1	3	1.35	0.84
2 1 1 1 1	3.12	1.65	0.83
1 2 2 1 1	3.89	1.2	0.77
1 2 1 2 1	4.25	1.32	0.74
1 1 1 2 2	4.34	1.65	0.73
2 2 1 1 2	5.31	1.72	0.66
2 2 1 2 1	5.4	1.83	0.65
1 2 2 2 2	5.65	1.41	0.63
2 2 1 2 2	5.77	1.4	0.62
2 1 2 2 2	5.79	1.9	0.62
1 1 3 1 2	5.91	2.1	0.61
1 1 1 1 3	5.96	2.19	0.60
2 2 2 2 2	6.07	1.62	0.59
3 1 3 1 2	6.16	1.45	0.59
1 3 2 1 2	6.83	1.92	0.53
1 1 1 3 1	7.07	2.85	0.51
1 3 3 1 1	7.38	1.95	0.49
1 2 2 2 3	7.39	1.56	0.49
2 1 2 3 2	7.88	1.85	0.45
3 1 2 3 1	8.14	2.45	0.43
1 1 1 3 3	8.2	2.41	0.42
2 3 3 2 1	8.43	1.97	0.40
3 2 2 2 1	8.45	1.77	0.40
2 1 1 3 3	8.94	1.98	0.36
2 2 3 3 1	9.23	1.98	0.34
2 2 2 3 2	9.33	1.63	0.33
2 3 2 3 2	9.91	1.45	0.28
2 2 2 3 3	10.08	1.92	0.27
2 3 3 1 3	10.09	1.82	0.27
3 2 2 2 3	10.17	2.1	0.26
3 3 2 1 2	10.32	1.74	0.25
3 3 3 2 1	10.33	1.96	0.25
3 2 3 1 3	10.33	1.92	0.25
1 3 3 3 2	10.4	2.23	0.24
3 2 2 3 2	10.56	1.68	0.23
2 2 2 1 2	11.11	1.81	0.19
3 1 3 2 3	11.62	1.41	0.15
3 3 3 2 3	12.14	1.47	0.10
unconscious	13.09	2.24	0.03
death	13.42	2.2	0.00
3 3 3 3 3	13.57	1.23	−0.01

Table 8.3   RAW VAS Scores: Test versus Retest

	Number of Observations	TEST Median (IQR)	RETEST Median (IQR)
11111	212	100.0 (100–100)	100.0 (100–100)
11112	85	87.0 (71–94)	90.0 (75–95)
11211	84	87.5 (75–95)	85.5 (76–92)
11121	73	86.0 (75–93)	90.0 (80–94)
21111	91	85.0 (75–90)	88.0 (80–93)
12111	91	85.0 (75–90)	85.0 (80–94)
11122	52	75.0 (65–84)	80.0 (71–85)
12211	46	75.0 (60–80)	75.0 (59–82)
12121	50	75.0 (60–80)	75.0 (65–80)
22121	47	65.0 (51–75)	70.0 (60–78)
22112	63	65.0 (50–75)	70.0 (55–78)
21222	59	65.0 (50–75)	65.0 (55–75)
12222	57	62.0 (50–75)	60.0 (50–72)
11312	52	60.0 (42–75)	60.0 (50–70)
13212	54	59.0 (45–70)	50.0 (39–65)
22122	62	55.0 (49–70)	55.5 (50–70)
22222	59	51.0 (46–60)	54.0 (50–65)
21312	49	51.0 (40–68)	50.0 (40–70)
11113	52	50.0 (36–70)	52.0 (40–75)
11131	60	46.5 (26–74)	49.0 (31–65)
13311	48	46.5 (30–60)	49.0 (35–59)
11133	55	42.0 (25–50)	30.0 (20–45)
12223	48	40.0 (29–58)	50.0 (30–60)
32211	50	37.5 (25–55)	40.0 (25–50)
21232	58	36.0 (25–50)	40.0 (25–50)
22331	52	35.0 (21–49)	30.0 (20–44)
21133	51	33.0 (19–46)	30.0 (24–50)
21323	55	31.0 (18–50)	35.0 (25–45)
23321	51	31.0 (20–50)	31.0 (20–45)
33212	63	27.0 (15–35)	25.0 (11–40)
22323	48	26.5 (19–44)	30.0 (16–45)
32313	46	26.0 (12–35)	20.0 (12–40)
23232	53	25.0 (16–35)	25.0 (15–41)
23313	51	25.0 (15–35)	25.0 (20–35)
22233	62	25.0 (15–40)	25.0 (14–32)
32232	53	25.0 (10–32)	25.0 (14–35)
32223	53	25.0 (15–36)	25.0 (15–31)
32331	47	24.0 (10–34)	18.0 (8–25)
33321	47	23.0 (15–30)	22.0 (15–30)
13332	44	20.0 (10–30)	25.0 (13–35)
33232	58	14.5 (8–20)	12.5 (8–25)
33323	51	11.0 (5–20)	10.0 (5–20)
uncon	212	3.0 (0–10)	5.0 (1–10)
33333	211	3.0 (0–9)	2.0 (0–5)
death	212	0.0 (0–10)	0.0 (0–10)

Table 8.4   Adjusted VAS Scores: Test versus Retest

	Number of Observations	TEST Median (IQR)	RETEST Median (IQR)
11111	212	100.0 (100–100)	100.0 (100–100)
11112	85	0.89 (0.75–0.94)	0.89 (0.78–0.94)
11211	84	0.88 (0.76–0.93)	0.85 (0.75–0.92)
11121	73	0.87 (0.75–0.94)	0.89 (0.80–0.94)
21111	91	0.85 (0.72–0.90)	0.88 (0.75–0.92)
12111	91	0.85 (0.75–0.91)	0.85 (0.75–0.94)
11122	52	0.75 (0.61–0.83)	0.80 (0.70–0.85)
12211	46	0.74 (0.60–0.79)	0.73 (0.55–0.83)
12121	50	0.73 (0.59–0.80)	0.75 (0.65–0.80)
22121	47	0.63 (0.50–0.75)	0.67 (0.56–0.75)
22112	63	0.60 (0.49–0.75)	0.69 (0.48–0.75)
21222	59	0.60 (0.47–0.70)	0.63 (0.51–0.75)
11312	52	0.60 (0.38–0.72)	0.60 (0.45–0.70)
12222	57	0.60 (0.45–0.75)	0.56 (0.50–0.72)
22122	62	0.55 (0.46–0.70)	0.55 (0.45–0.69)
13212	54	0.51 (0.44–0.67)	0.49 (0.30–0.60)
21312	49	0.51 (0.39–0.65)	0.45 (0.26–0.62)
22222	59	0.50 (0.40–0.60)	0.51 (0.46–0.65)
11113	52	0.50 (0.35–0.73)	0.50 (0.30–0.75)
11131	60	0.42 (0.15–0.67)	0.46 (0.26–0.61)
13311	48	0.41 (0.28–0.58)	0.45 (0.28–0.57)
11133	55	0.39 (0.18–0.50)	0.30 (0.14–0.44)
21232	58	0.35 (0.18–0.50)	0.34 (0.14–0.50)
12223	48	0.34 (0.22–0.55)	0.43 (0.24–0.60)
32211	50	0.34 (0.15–0.51)	0.33 (0.12–0.46)
22331	52	0.31 (0.20–0.46)	0.30 (0.10–0.43)
21323	55	0.30 (0.11–0.44)	0.32 (0.12–0.45)
21133	51	0.30 (0.14–0.44)	0.29 (0.20–0.44)
23321	51	0.30 (0.20–0.44)	0.28 (0.19–0.44)
22323	48	0.25 (0.11–0.35)	0.28 (0.10–0.44)
32223	53	0.25 (0.15–0.31)	0.23 (0.10–0.30)
23313	51	0.24 (0.11–0.35)	0.20 (0.12–0.35)
23232	53	0.23 (0.12–0.34)	0.25 (0.10–0.42)
22233	62	0.22 (0.13–0.38)	0.20 (0.06–0.31)
32313	46	0.22 (0.10–0.35)	0.18 (0.10–0.40)
33321	47	0.21 (0.11–0.28)	0.20 (0.07–0.26)
33212	63	0.19 (0.08–0.33)	0.21 (0.09–0.35)
32331	47	0.18 (0.03–0.27)	0.11 (0.00–0.23)
32232	53	0.17 (0.04–0.26)	0.20 (0.07–0.34)
13332	44	0.16 (0.10–0.29)	0.20 (0.05–0.30)
33232	58	0.10 (0.05–0.20)	0.10 (0.02–0.20)
33323	51	0.10 (−0.01–0.16)	0.09 (−0.06–0.15)
uncon	212	0.01 (−0.01–0.05)	0.01 (0.00–0.05)
33333	211	0.01 (−0.06–0.06)	0.00 (−0.07–0.05)
death	212	0.00 (−)	0.00 (−)

Table 8.5   TTO Test Scores of Those in the Retest

State	N	Mean (SD)		Median (IQR)	
21111	91	0.86	(0.26)	0.95	(0.83 – 1.00)
11211	86	0.84	(0.27)	0.93	(0.78 – 1.00)
11121	75	0.81	(0.27)	0.93	(0.70 – 1.00)
12111	93	0.81	(0.31)	0.93	(0.70 – 1.00)
11112	84	0.85	(0.23)	0.95	(0.78 – 1.00)
12211	47	0.72	(0.30)	0.78	(0.58 – 0.95)
12121	49	0.70	(0.30)	0.70	(0.60 – 0.93)
11122	53	0.71	(0.37)	0.83	(0.66 – 0.96)
22121	47	0.58	(0.53)	0.73	(0.50 – 0.93)
22112	66	0.59	(0.46)	0.79	(0.46 – 0.93)
11312	54	0.54	(0.49)	0.70	(0.33 – 0.91)
21222	60	0.60	(0.37)	0.64	(0.43 – 0.86)
12222	58	0.48	(0.54)	0.65	(0.03 – 0.93)
21312	51	0.47	(0.57)	0.63	(0.35 – 0.88)
22122	62	0.54	(0.45)	0.64	(0.43 – 0.85)
22222	58	0.52	(0.51)	0.63	(0.44 – 0.86)
11113	53	0.27	(0.58)	0.43	(−0.10 – 0.79)
13212	54	0.46	(0.50)	0.53	(0.34 – 0.83)
13311	51	0.47	(0.47)	0.53	(0.33 – 0.83)
11131	60	0.17	(0.55)	0.30	(−0.38 – 0.60)
12223	49	0.27	(0.52)	0.33	(0.00 – 0.65)
21323	59	0.03	(0.58)	0.28	(−0.53 – 0.50)
23321	51	0.18	(0.54)	0.33	(−0.35 – 0.65)
32211	48	0.14	(0.62)	0.29	(−0.48 – 0.61)
21232	57	0.17	(0.56)	0.33	(−0.30 – 0.55)
22323	48	0.00	(0.54)	0.01	(−0.44 – 0.39)
33212	62	−0.06	(0.66)	−0.05	(−0.64 – 0.60)
23313	51	−0.07	(0.50)	0.00	(−0.48 – 0.38)
22331	53	−0.06	(0.59)	0.13	(−0.68 – 0.36)
11133	55	0.04	(0.61)	0.13	(−0.50 – 0.53)
21133	52	0.00	(0.66)	0.10	(−0.69 – 0.49)
23232	57	−0.07	(0.55)	0.00	(−0.58 – 0.44)
33321	52	−0.06	(0.63)	−0.03	(−0.63 – 0.49)
32313	46	−0.21	(0.53)	−0.24	(−0.73 – 0.25)
22233	62	−0.07	(0.56)	0.00	(−0.55 – 0.38)
32223	53	−0.24	(0.55)	−0.38	(−0.78 – 0.16)
13332	45	−0.30	(0.52)	−0.40	(−0.78 – 0.00)
32232	53	−0.25	(0.59)	−0.38	(−0.76 – 0.00)
32331	49	−0.21	(0.62)	−0.30	(−0.78 – 0.35)
Uncon	215	−0.44	(0.37)	−0.43	(−0.83 – −0.08)
33232	55	−0.34	(0.49)	−0.38	(−0.68 – −0.05)
33323	52	−0.20	(0.54)	−0.26	(−0.68 – 0.17)
33333	213	−0.52	(0.42)	−0.63	(−0.88 – −0.23)

Table 8.6   TTO Retest Scores

State	N	Mean (SD)		Median (IQR)	
21111	91	0.84	(0.24)	0.93	(0.75 – 1.00)
11211	87	0.86	(0.22)	0.93	(0.83 – 1.00)
11121	74	0.85	(0.22)	0.95	(0.79 – 1.00)
12111	93	0.87	(0.21)	0.95	(0.83 – 1.00)
11112	85	0.84	(0.27)	0.95	(0.80 – 1.00)
12211	47	0.72	(0.37)	0.83	(0.65 – 0.93)
12121	49	0.72	(0.35)	0.83	(0.53 – 0.98)
11122	54	0.76	(0.32)	0.85	(0.64 – 0.00)
22121	47	0.64	(0.46)	0.70	(0.50 – 0.00)
22112	66	0.69	(0.30)	0.78	(0.53 – 0.93)
11312	54	0.58	(0.44)	0.71	(0.46 – 0.89)
21222	60	0.58	(0.40)	0.63	(0.46 – 0.88)
12222	58	0.54	(0.49)	0.69	(0.48 – 0.84)
21312	51	0.55	(0.45)	0.63	(0.33 – 0.88)
22122	62	0.56	(0.41)	0.60	(0.43 – 0.84)
22222	59	0.48	(0.49)	0.53	(0.33 – 0.93)
11113	53	0.34	(0.52)	0.50	(0.00 – 0.70)
13212	55	0.42	(0.50)	0.53	(0.28 – 0.73)
13311	51	0.46	(0.46)	0.53	(0.30 – 0.73)
11131	60	0.31	(0.50)	0.48	(−0.02 – 0.60)
12223	50	0.23	(0.57)	0.40	(−0.23 – 0.68)
21323	59	0.00	(0.57)	0.05	(−0.48 – 0.50)
23321	52	0.16	(0.56)	0.23	(−0.24 – 0.63)
32211	49	0.19	(0.61)	0.38	(−0.38 – 0.68)
21232	59	0.08	(0.64)	0.30	(−0.58 – 0.60)
22323	48	0.14	(0.52)	0.20	(−0.21 – 0.50)
33212	63	−0.01	(0.62)	0.23	(−0.58 – 0.50)
23313	51	−0.04	(0.59)	0.00	(−0.58 – 0.45)
22331	53	−0.12	(0.61)	0.00	(−0.73 – 0.40)
11133	55	0.00	(0.59)	0.00	(−0.38 – 0.48)
21133	52	0.01	(0.62)	0.21	(−0.69 – 0.44)
23232	57	−0.07	(0.58)	0.00	(−0.64 – 0.40)
33321	52	−0.14	(0.59)	−0.28	(−0.67 – 0.33)
32313	46	−0.13	(0.59)	0.00	(−0.79 – 0.43)
22233	62	−0.04	(0.59)	0.05	(−0.65 – 0.48)
32223	54	−0.22	(0.53)	−0.38	(−0.73 – 0.30)
13332	45	−0.09	(0.56)	−0.03	(−0.54 – 0.40)
32232	54	−0.23	(0.58)	−0.33	(−0.79 – 0.33)
32331	49	−0.18	(0.55)	−0.28	(−0.61 – 0.23)
Uncon	217	−0.43	(0.39)	−0.38	(−0.83 – −0.03)
33232	56	−0.31	(0.55)	−0.40	(−0.84 – 0.19)
33323	52	−0.26	(0.53)	−0.35	(−0.72 – 0.05)
33333	215	−0.53	(0.40)	−0.63	(−0.88 – −0.30)

Table 8.7   Intra–Class Correlation Coefficients

	N	Mean (SD)	Median (IQR)
VAS	219	0.78 (0.19)	0.82 (0.73 – 0.90)
TTO	220	0.73 (0.22)	0.79 (0.64 – 0.88)

Table 8.8   New Experience of Illness

New illness in self	N	%	New illness in others	N	%
Yes	9	4.1%	Yes	29	13.2%
No	209	95.9%	No	190	86.8%
Missing	3		Missing	2	

Figure 8.1

Distribution of Spearmans rho

Test / retest ranking

Number of respondents

Spearmans rho

■ Frequency
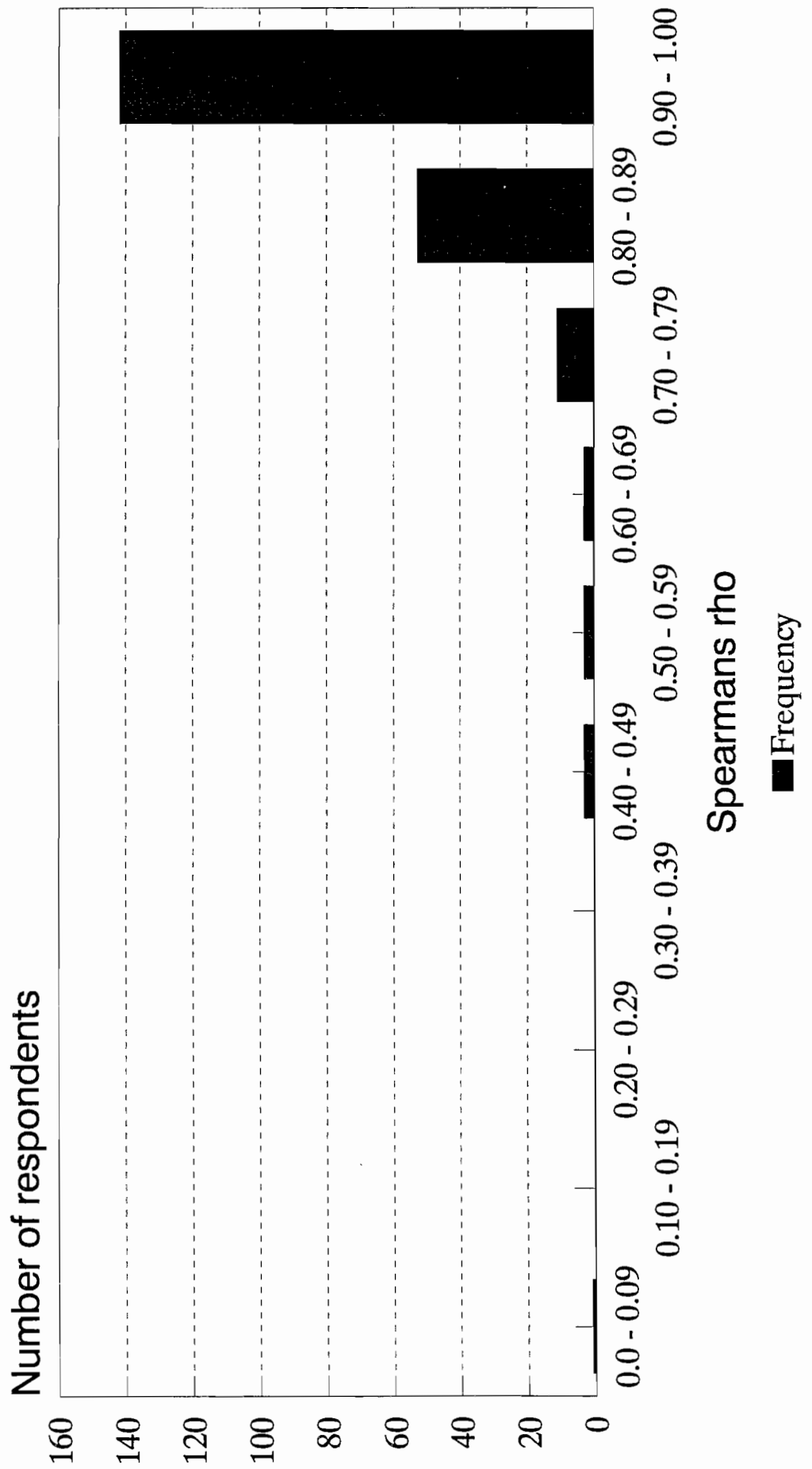
Distribution of ICCs
The VAS and TTO
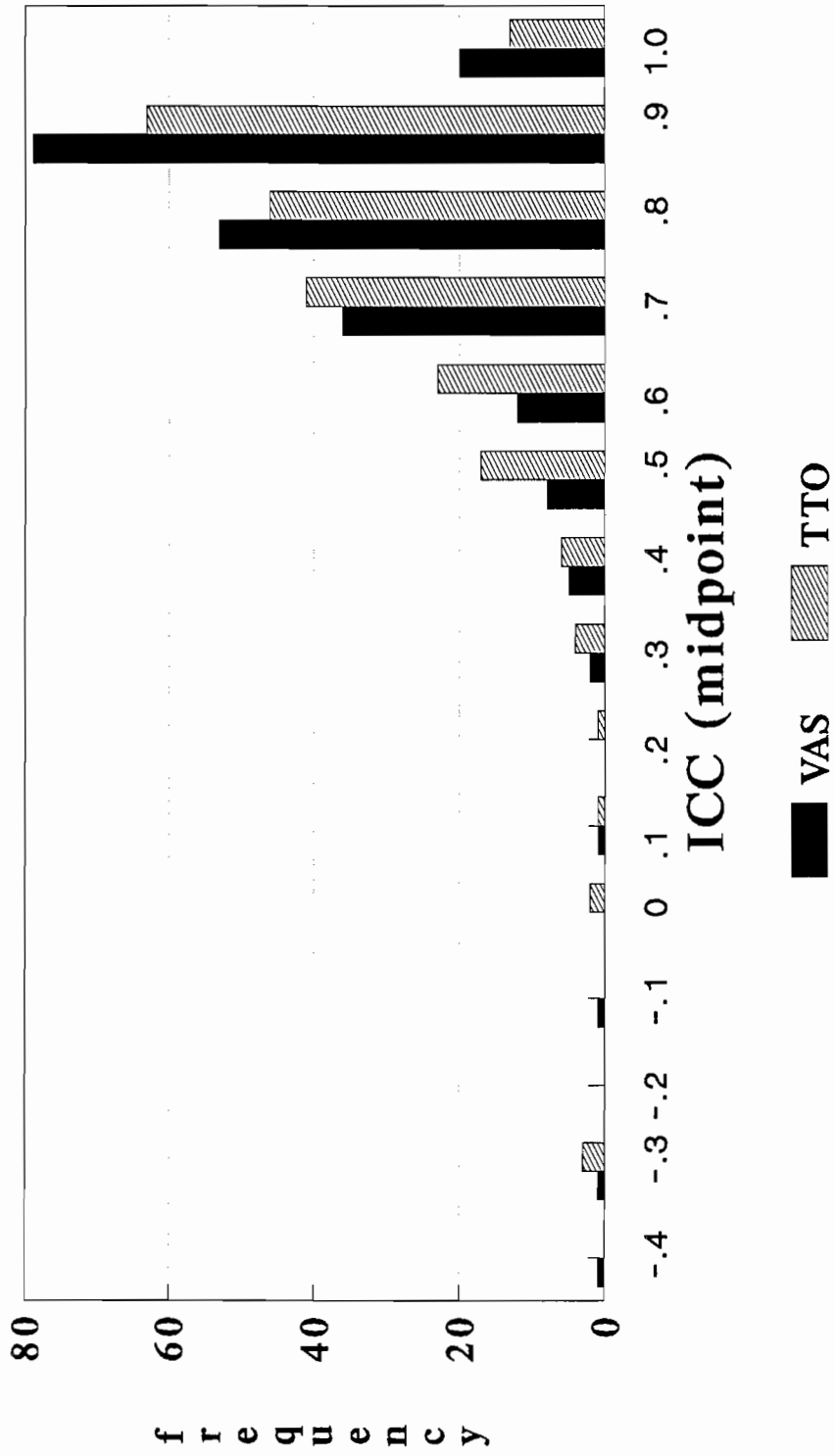
ANNEXE 8A: RESPONDENTS EXCLUDED FROM RANKING, VAS AND TTO DATASETS

RESPONDENTS EXCLUDED FROM RANKING DATASET

1.   2 respondents with missing data at test
        3376   4808

RESPONDENTS EXCLUDED FROM VAS RETEST DATA SET

1.   7 respondents previously excluded from test VAS data set:
        911 2865 3101 3194 4315 4452 5048

2.   1 respondent with 13 states missing at retest
        4518

3.   1 respondent with high inconsistency on VAS and unusable data on TTO:
        4698

RESPONDENTS EXCLUDED FROM TTO DATA SET

1.   1 respondent previously excluded from the TTO data set:
        2364

2.   1 respondent with all states missing
        4518

3.   1 respondent with all states rated worse than death
        4698

4.   1 respondent with the same score given to all states
        2892

CHAPTER 9   CONCLUSIONS

This First Report has concentrated on the factual reporting of the data generated from our main survey. It is to be followed by a Second Report which will be devoted to the task of modelling valuations for the 200 states in the Euroqol Classification for which we do not have direct valuations. It will also be followed by a series of special papers analysing in more detail certain topics that are of particular interest for policy reasons or for scientific reasons. These subsequent studies will also give us an opportunity to revisit some of the analyses presented here, but using more complex methods (eg using multivariate rather than bivariate methods of analysis). This report should therefore be seen as no more than a preliminary account of our data.

As was indicated in Chapter 1, this survey represents the culmination of many years of preparatory work designed to find an effective way of generating data on health state valuations from a large representative sample of the general public. Chapter 2 showed that we achieved representativeness, an achievement for which we owe a great debt to our collaborators Social and Community Planning and Research (SCPR). Their Technical Report on the Main Survey needs to be read alongside this Report for a fuller appreciation of the enormity of this part of the task.

In Chapter 3 we set out the criteria we used in deciding which data were to be discarded for particular purposes. In general our policy has been to discard as little data as possible, even when we considered some respondents' data rather unbelievable. The risk this carries is, of course, that there is imported into the analysis a great deal of "noise" which makes

the "signal" harder to detect. It may partly explain why the measures of dispersion in this data set are rather higher than those that we found in the pilot studies. But the alternative policy of discarding inconvenient or implausible data carries rather greater dangers for the credibility of the results, and we are encouraged by the fact that despite discarding a remarkably small proportion of the data (mostly due to incompleteness at key points) some clear "signals" do nevertheless emerge.

The data in Chapter 4 is really an incidental byproduct of our survey. We did not set out to conduct a national survey of self-reported health, but there was in fact such a survey embedded in our approach. It has generated a data set that will repay further study in its own right. Its immediate value to us lies in its role as a validation of the Euroqol descriptive system, and of the "thermometer", as extremely simple means of detecting significant differences in self-reported health across different socio-demographic groups. It adds to our confidence that the health state descriptors used in our valuation studies will identify actual differences in health even in a "normal" population living in their own homes.

The valuation data, which lies at the heart of the survey, begins to be reported in Chapter 5. The ranking task made the least demands on respondents' discriminatory powers, and so is of particular importance for those who believe that one can have little confidence in valuation data that goes beyond the ordinal level of measurement. Two matters are of considerable importance here. The first is that by reworking these rankings as "paired comparisons" it is possible, by a tried and trusted method, to generate at group level a set of valuations that should have interval properties. When this is done we have a set of

valuations which contains no logical inconsistencies. The second important matter is that that set is extremely close to the VAS one generated by the "thermometer" (as reported in Chapter 6), which was also generated by a method which should produce an interval scale. This suggests very strongly that we have here a scale with interval properties, which is a very important conclusion.

The VAS data (reported in Chapter 6) contained another important finding, however, and that is that there appears to be a systematic difference in valuations between the owner-occupying, well-educated professional and managerial classes on the one hand, and the rest of the population on the other. This difference is statistically significant, and is such that the "higher" social classes appear much less tolerant of ill-health than are the rest of the population. This is not exactly a surprising finding, but it is in fact the only sub-group difference we detected in the VAS data (age, for instance, does not make a difference). Again this is a matter to which we must return, for to date we have only had time to conduct bivariate and rather crude multivariate analysis on these data. It may be that we shall detect other interesting relationships when we are able to sift the data more finely.

The TTO data in Chapter 7 threw up a puzzle that we had not anticipated and which we have not yet got to the bottom of. It appears that the elderly rate poor health states much worse than do people under the age of 60, which flies in the face of a widespread belief that they become more tolerant of ill-health as they grow older, and hence would rate poor health higher than do younger people. We have suggested two possible explanations for this apparent anomaly, and there may be others. One explanation accepts that what we have measured is "real", and means that when people are reaching the end of their lives,

they see little reason to put up with long periods of poor health (10 years without change, then death) and are more likely to prefer to bring it to an end than would a younger person. The alternative explanation does not accept that the data represent respondents' "real" valuations, but puts them down to the fact that older people may not believe that they actually have 10 years life expectancy, and so feel quite prepared to sacrifice rather freely future years they do not expect to have. This would explain the lower values attached to poor health states, and is further supported by the fact that the VAS valuations do not show this downward trend for the elderly. On the other hand, although the length of time to be spent in each state was stressed throughout the interview, it may not have been as salient in the VAS exercise as it becomes in the TTO task. So it remains something of a mystery which we are planning to explore urgently.

Having found this surprising phenomenon in our main survey, we wondered whether it was present in our earlier pilot data without our noticing it at the time. The results obtained by re-working that data are shown in Figures 9.1 and 9.2. In the Pilot Study only 6 states were valued (other than 11111 and dead), and two different TTO variants were used, one using props as in the Main Survey, the other using no props. For completeness, both are reported here. The props version shows no such phenemenon as the one we found in the main survey, but there is some suggestion of it in the No Props version.

As mentioned earlier, there is another matter of some interest which turned out to be different from what we had expected, and that is that the measures of dispersion (SDs and IQRs) associated with the VAS and TTO valuations (as reported in Chapters 6 and 7) are much higher in the main survey than they were in the Pilot Study. It may be that part

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of the explanation is that we have not discarded data simply because respondents are "outliers". But be that as it may, the consequence is that whereas we had expected, with a sample size of 3235, to be able to detect at the 5% significance level a .05 difference in the valuations given to most states, we are now in a situation where the best we could hope to detect would be a .1 difference.

But the interpretation of measures of dispersion as measures of consensus does not tell the whole story, because it is quite possible that most individuals rank adjacent states in the same way, but some do so consistently using high values, whilst others do so consistently using low values. To assess whether this is in fact the case, we used the Wilcoxon Matched Pairs Signed Ranks test for all those people who actually valued both states in any pair. The results of this exercise are shown in Table 9.1 for VAS and in Table 9.2 for TTO. It will be seen that there are only a few states adjacent to any particular state which are not significantly different from it at the 1% level.

As regards the comparison of the valuations between methods, the close match between the Paired Comparison Results and the VAS results has already been noted. The ranking of the states in the overall sets of valuations produced by each method is virtually identical, and at individual level it is also reassuringly high (indicating that individuals express consistent preferences across methods). The earlier literature indicated a simple power relationship between the VAS valuations and the TTO valuations. But here we have found a rather different relationship, namely a "spreading" effect. For the mild states the TTO values are higher than the VAS ones, for the "middle" states they are much the same, and for the severe states the TTO valuations are much lower. Re-

examining the Pilot data more closely, we have found a similar pattern there (see Figure 9.3). We are seeking an explanation of this phenomenon, one possibility being that it is due to the different starting points for each task.

Finally we come to the reliability of all these data, as investigated by the comparison of test and retest data in Chapter 8. Once more this was reassuring, with intra-class coefficients in the conventionally acceptable range.

All in all we are confident that we have a very good data set which will constitute a rich source of material for deeper investigation in the years ahead. We shall ourselves exploit it during the remainder of 1994, and we then plan to deposit it in the ESRC Survey Research Archive for others to use at will. In the short-term there are several "loose ends" requiring further investigation, and we intend to pursue these urgently so far as time, energy and financial resources permit.

Table 9.1   Significant Differences Between Health States: VAS Valuations

Comparisons made by Wilcoxon matched–pairs signed–ranks tests based on data from respondents who valued <u>both</u> states in any one pair.

STATE	STATES <u>NOT</u> SIGNIFICANTLY DIFFERENT IN SCORE i.e. p>0.01
21111	11211, 11121, 12111, 11112
11211	21111, 11121
11121	21111, 11211, 11112, 12111
12111	21111, 11121
11112	21111, 11121
12211	12121, 11122
12121	12211, 11122
11122	12121, 12211
22121	22112
22112	22121
11312	11113, 22222, 22122, 21222
21222	12222, 22122, 11312
12222	11113, 22122, 21222
21312	11113, 11131, 13212 22222
22122	12222, 11113, 11312, 21222
22222	21312, 11113, 11312
11113	12222, 21312, 11131, 22222, 22122, 11312
13212	21312, 11131
13311	12223, 11131
11131	11113, 13311, 13212, 21312
12223	13311
21323	32211, 23321, 11133
23321	32211, 22323, 11133, 21323, 21133
32211	23321, 21232, 22323, 11133, 21323
21232	32211
22323	32211, 23321, 33212, 22331, 21133, 23232
33212	22323, 32232, 22331, 23313, 21133, 23232
23313	13332, 33212, 32232, 22331, 22233, 23232
22331	33212, 22323, 23313, 21133, 23232
11133	32211, 23321, 21323
21133	23321, 33212, 22323, 22331
23232	33212, 22323, 22331, 23313
33321	13332, 32223, 32331, 32232, 32313
32313	32223, 32232, 33321
22233	32223, 32232, 23313
32223	13332, 32232, 33321, 22233, 32313
13332	32223, 32232, 33321, 23313
32232	13332, 33212, 32223, 33321, 22233, 32313, 23313
32331	33321
uncon	all states significantly different to 'unconscious'
33232	all states significantly different to 33232
33323	all states significantly different to 33323
33333	all states significantly different to 33333

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Table 9.2   Significant Differences Between Health States: TTO Valuations

Comparisons made by Wilcoxon matched-pairs signed-ranks tests based on data
from respondents who valued <u>both</u> states in any one pair.

STATE	STATES <u>NOT</u> SIGNIFICANTLY DIFFERENT IN SCORE i.e. p>0.01
21111	11211, 12111
11211	21111, 11121, 12111, 11112
11121	11211, 11112, 12111
12111	11211, 11112, 11121, 21111
11112	11121, 12111, 11211
12211	11122, 12121
12121	12211, 22112
11122	12211
22121	11312, 22112
22112	22121, 11312, 21222, 12121
11312	22121, 22112, 21222, 12222, 21312, 22122, 22222
21222	11312, 22112, 21312, 22122, 22222
12222	11312, 22122, 22222
21312	11312, 21222, 22122, 22222
22122	11312, 21222, 12222, 21312
22222	11312, 21222, 12222, 21312
11113	13212, 13311
13212	11113, 13311
13311	13212, 11113
11131	21323, 12223, 23321, 32211, 22323
12223	11131, 21323, 23321, 32211
21323	11131, 12223, 23321, 32211, 21232
23321	11131, 12223, 21323, 21232, 32211
32211	11131, 12223, 21323, 23321, 21232
21232	21323, 22323, 23321, 32211
22323	11131, 23313, 22331, 11133, 21133, 21232, 33212
33212	22323, 23313, 22331, 11133, 21133, 23232, 22233
23313	21133, 23232, 22323, 33212, 22331, 11133
22331	23313, 21133, 23232, 22323, 33212, 11133
11133	23313, 22331, 21133, 22323, 33212, 32223
21133	23232, 22323, 33212, 23313, 22331, 11133, 33321, 32223
23232	33212, 23313, 22331, 21133, 33321, 32223
33321	21133, 23232, 32313, 22233, 32223, 13332
32313	33321, 22233, 32223, 13332, 32232
22233	32313, 33212, 33321, 32223, 13332, 32232
32223	11133,21133,23232,33321,32313,22233, 32232, 13332, 32232
13332	33321, 32313, 22233, 32223, 32232
32232	32313, 22233, 32223, 32223, 13332
32331	33232, 33323
uncon	33323
33232	32331, 33323
33323	32331, uncon, 33232
33333	all states significantly different to 33333

Figure 9.1   Data from Pilot Study

Median TTO Props valuations

Differences by age group
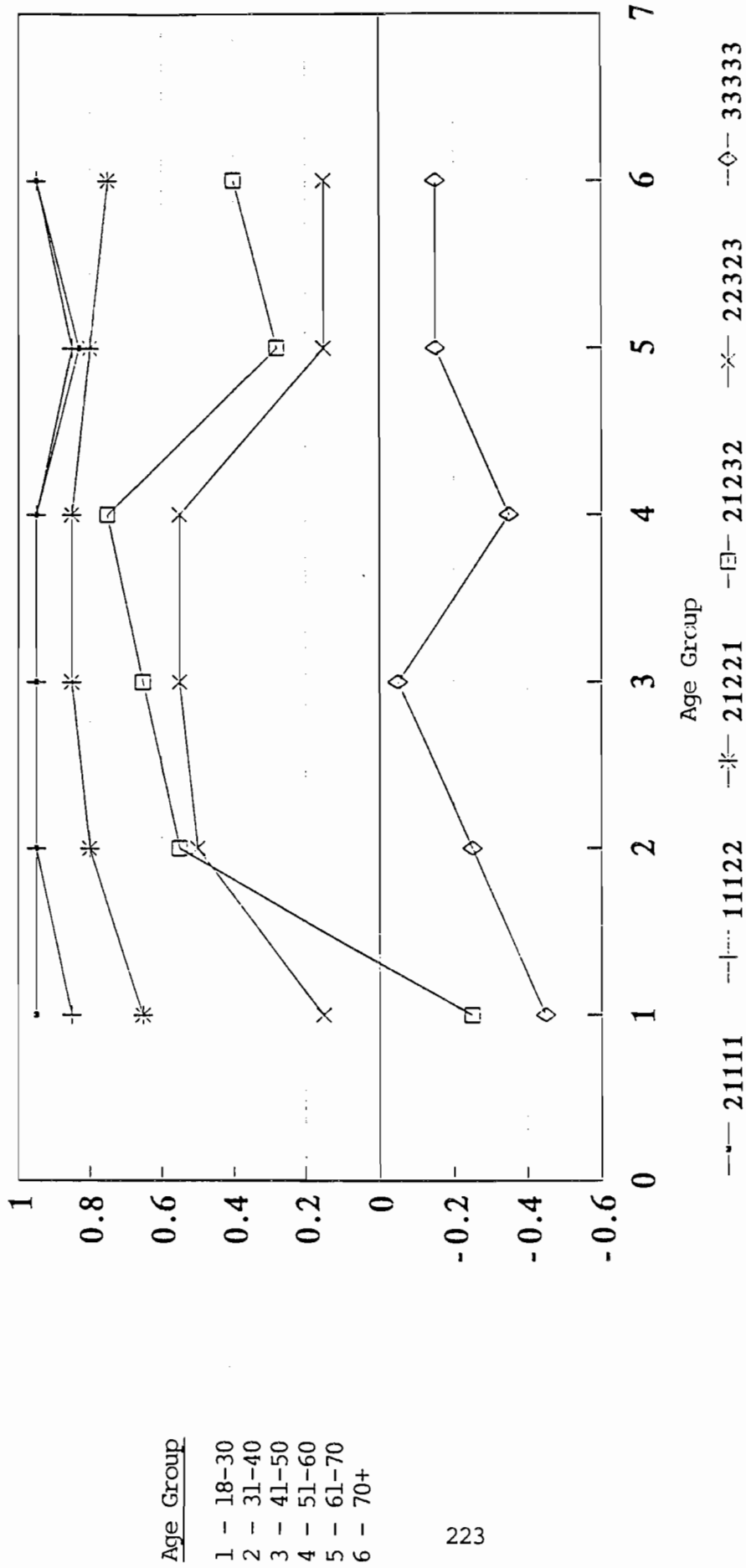
Age Group

1 – 18–30
2 – 31–40
3 – 41–50
4 – 51–60
5 – 61–70
6 – 70+

—┼— 21111   —┼— 11122   —※— 21221   —□— 21232   —×— 22323   —◇— 33333

Source: MVH Pilot Study

Figure 9.2   Pilot Study Results

Median TTO No Props valuations

Differences by age group

—·— 21111   —┼— 11122   —*— 21221   —☐— 21232   —×— 22323   —◇— 33333
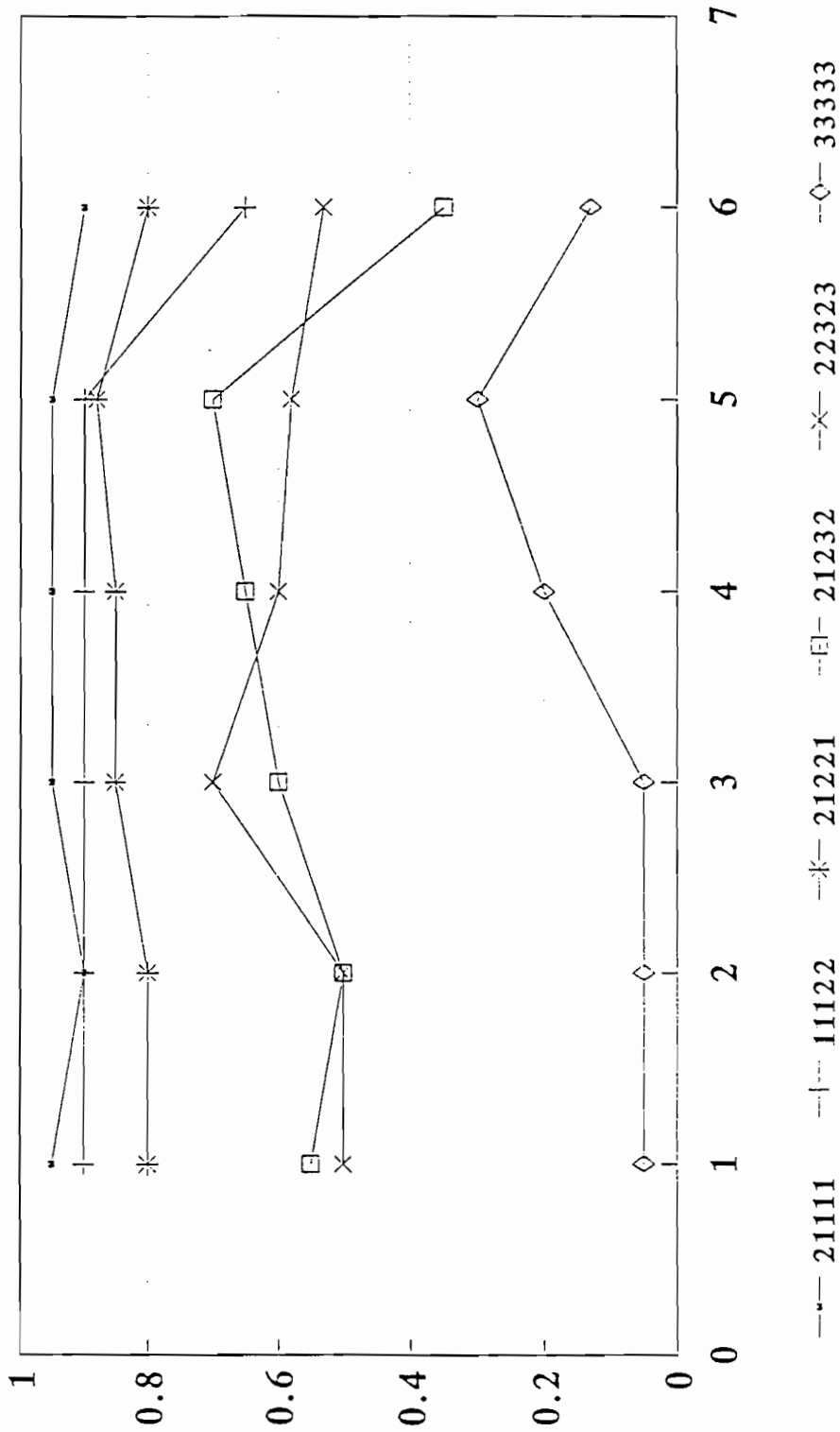
Source: MVH Pilot Study

Figure 9.3   Pilot Study Results

Plot of Median VAS and TTO Props
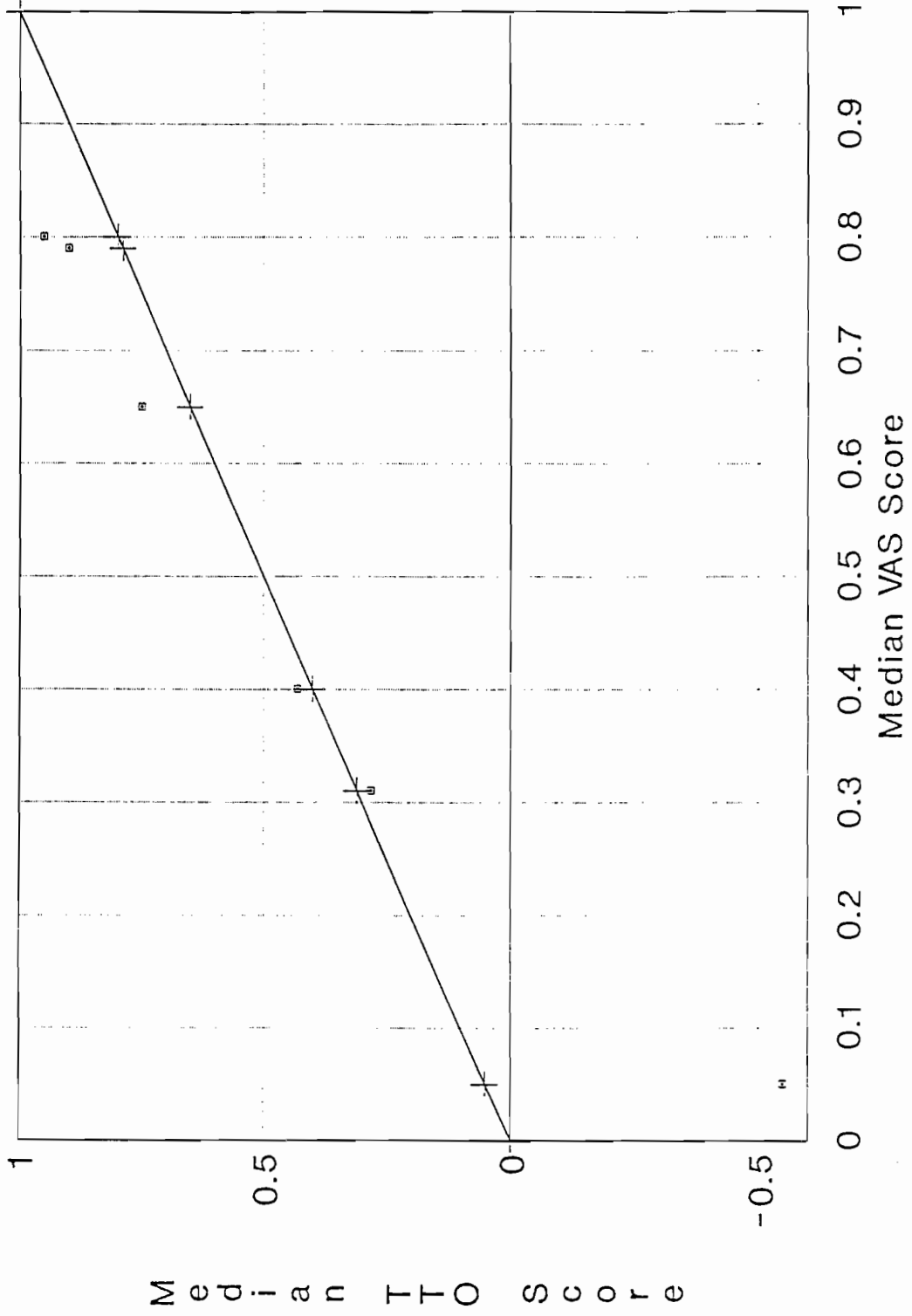
Source: MVH Pilot Study

ANNEXE A: CODING BOOKLET

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 1			
1-4	Serial number	IDNO	Respondent Identifier
10-11	Regional Health Authority	RHA	1 'Scotland' 2 'Northern' 3 'Yorkshire' 4 ' Trent' 5 'E Anglia' 6 'NW Thames' 7 'NE Thames' 8 'SE Thames' 9 'SW Thames' 10 'Wessex' 11 ' Oxford' 12 'South Western' 13 'W Midlands' 14 'Mersey' 15 'North Western' 16 'Wales'
15-16	Standard Economic Region	SER	1 'North' 2 'Yorks & H'side' 3 'E Midlands' 4 'E Anglia' 5 'SE' 6 'SW' 7 'W Midlands' 8 'NW' 9 'Wales' 10 ' Scotland
48-51	Card Allocation sheet	CAS	
61-70	Sample Weight	WEIGHT	
RECORD 2			
1-4	Serial number		
7-28	States used in interview	STAT1 to STAT11	
29-34	Date of interview	DATEINT	
35-38	Time at start of interview	STARTINT	
39-43	Batch Code	BATCH	
RECORD 3			
1-4	Serial number		
7-8	State ranked as 'best'	BESTRANK	
9-10	State ranked as 'worst'	WORSRANK	
11	Presence of middle state	ISMIDRAN	1 'Yes' 2 'No' 9 'missing'
12-13	State ranked at 'middle'	MIDRANK	
14	Presence of top middle state	ISTMRANK	1 'Yes' 2 'No' 9 'missing'
15-16	State ranked at 'top middle'	TMRANK	
17	Presence of bottom middle state	ISBMRANK	1 'Yes' 2 'No' 9 'missing'
18-19	State ranked at 'bottom middle'	BMRANK	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 4			
1-4	Serial number		
7-10	Time at start of TTO	STARTTTO	
11-12	**FIRST TTO STATE** 10 yrs A or 10 yrs B (Q 12b)	TTO1	
13-14		TENTEN	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
15-16	Response check	PREFTENB	1 'Yes' 2 'No (1st time)' 3 'No (2nd time)' 9 'missing'
17	0 yrs A or 10 yrs B (Q b)	ZERTEN1	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
18	Halfway point-state better than death (Q e)	HALFB1	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
19	Cross under 9 (Q f)	XNINE1	1 'Is a X under 9' 2 'Is not a X under 9' 9 'missing'
20	Willing to sacrifice any time (Q g)	AVOIDB1	1 'Yes' 2 'No' 9 'missing'
21-22	How many weeks willing to sacrifice (Q g)	WEEKS1	
23	Halfway point-state worse than death (Q j)	HALFW1	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
24-25	**SECOND TTO STATE** 0 yrs A or 10 yrs B (Q b)	TTO2	
26		ZERTEN2	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
27	Halfway point-state better than death (Q e)	HALFB2	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
28	Cross under 9 (Q f)	XNINE2	1 'Is a X under 9' 2 'Is not a X under 9' 9 'missing'
29	Willing to sacrifice any time (Q g)	AVOIDB2	1 'Yes' 2 'No' 9 'missing'

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
30-31	How many weeks willing to sacrifice (Q g)	WEEKS2	
32	Halfway point-state worse than death (Q j)	HALFW2	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
33-34	**THIRD TTO STATE**	TTO3	
35	0 yrs A or 10 yrs B (Q b)	ZERTEN3	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
36	Halfway point-state better than death (Q e)	HALFB3	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
37	Cross under 9 (Q f)	XNINE3	1 'Is a X under 9' 2 'Is not a X under 9' 9 'missing'
38	Willing to sacrifice any time (Q g)	AVOIDB3	1 'Yes' 2 'No' 9 'missing'
39-40	How many weeks willing to sacrifice (Q g)	WEEKS3	
41	Halfway point-state worse than death (Q j)	HALFW3	1 'Life A' 2 'Life B' 3 'The same' 9 'missing'
42-43	**FOURTH TTO STATE**	TTO4	From here to HALFW13 the value labels are the same as for TTO3 to HALFW3
44	0 yrs A or 10 yrs B (Q b)	ZERTEN4	
45	Halfway point-state better than death (Q e)	HALFB4	
46	Cross under 9 (Q f)	XNINE4	
47	Willing to sacrifice any time (Q g)	AVOIDB4	
48-49	How many weeks willing to sacrifice (Q g)	WEEKS4	
50	Halfway point-state worse than death (Q j)	HALFW4	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
51-52	**FIFTH TTO STATE**	TTO5	
53	0 yrs A or 10 yrs B (Q b)	ZERTEN5	
54	Halfway point-state better than death (Q e)	HALFB5	
55	Cross under 9 (Q f)	XNINE5	
56	Willing to sacrifice any time (Q g)	AVOIDB5	
57-58	How many weeks willing to sacrifice (Q g)	WEEKS5	
59	Halfway point-state worse than death (Q j)	HALFW5	
60-61	**SIXTH TTO STATE**	TTO6	
62	0 yrs A or 10 yrs B (Q b)	ZERTEN6	
63	Halfway point-state better than death (Q e)	HALFB6	
64	Cross under 9 (Q f)	XNINE6	
65	Willing to sacrifice any time (Q g)	AVOIDB6	
66-67	How many weeks willing to sacrifice (Q g)	WEEKS6	
68	Halfway point-state worse than death (Q j)	HALFW6	
69-70	**SEVENTH TTO STATE**	TTO7	
71	0 yrs A or 10 yrs B (Q b)	ZERTEN7	
72	Halfway point-state better than death (Q e)	HALFB7	
73	Cross under 9 (Q f)	XNINE7	
74	Willing to sacrifice any time (Q g)	AVOIDB7	
75-76	How many weeks willing to sacrifice (Q g)	WEEKS7	
77	Halfway point-state worse than death (Q j)	HALFW7	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 5			
1-4	Serial number		
7-8	**EIGHTH TTO STATE**	TTO8	
9	0 yrs A or 10 yrs B (Q b)	ZERTEN8	
10	Halfway point-state better than death (Q e)	HALFB8	
11	Cross Under 9 (Q f)	XNINE8	
12	Willing to sacrifice any time (Q g)	AVOIDB8	
13-14	How many weeks willing to sacrifice (Q g)	WEEKS8	
15	Halfway point-state worse than death (Q j)	HALFW8	
16-17	**NINTH TTO STATE**	TTO9	
18	0 yrs A or 10 yrs B (Q b)	ZERTEN9	
19	Halfway point-state better than death (Q e)	HALFB9	
20	Cross under 9 (Q f)	XNINE9	
21	Willing to sacrifice any time (Q g)	AVOIDB9	
22-23	How many weeks willing to sacrifice (Q g)	WEEKS9	
24	Halfway point-state worse than death (Q j)	HALFW9	
25-26	**TENTH TTO STATE**	TTO10	
27	0 yrs A or 10 yrs B (Q b)	ZERTEN10	
28	Halfway point-state better than death (Q e)	HALFB10	
29	Cross under 9 (Q f)	XNINE10	
30	Willing to sacrifice any time (Q g)	AVOIDB10	
31-32	How many weeks willing to sacrifice (Q g)	WEEKS10	
33	Halfway point-state worse than death (Q j)	HALFW10	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
34-35	**ELEVENTH TTO STATE**	TTO11	
36	0 yrs A or 10 yrs B (Q b)	ZERTEN11	
37	Halfway point-state better than death (Q e)	HALFB11	
38	Cross Under 9 (Q f)	XNINE11	
39	Willing to sacrifice any time (Q g)	AVOIDB11	
40-41	How many weeks willing to sacrifice (Q g)	WEEKS11	
42	Halfway point-state worse than death (Q j)	HALFW11	
43-44	**TWELFTH TTO STATE**	TTO12	
45	0 yrs A or 10 yrs B (Q b)	ZERTEN12	
46	Halfway point-state better than death (Q e)	HALFB12	
47	Cross under 9 (Q f)	XNINE12	
48	Willing to sacrifice any time (Q g)	AVOIDB12	
49-50	How many weeks willing to sacrifice (Q g)	WEEKS12	
51	Halfway point-state worse than death (Q j)	HALFW12	
52-53	**THIRTEENTH TTO STATE**	TTO13	
54	0 yrs A or 10 yrs B (Q b)	ZERTEN13	
55	Halfway point-state better than death (Q e)	HALFB13	
56	Cross under 9 (Q f)	XNINE13	
57	Willing to sacrifice any time (Q g)	AVOIDB13	
58-59	How many weeks willing to sacrifice (Q g)	WEEKS13	
60	Halfway point-state worse than death (Q j)	HALFW13	
61-64	Time at end of TTO	ENDTTO	
65-67	Time taken for TTO	TIMETTO	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 6			
1-4	Serial number		
7	Marital status	MARSTAT	1 'Married' 2 'Cohabiting' 3 'separated or divorced 4 'widowed' 5 'not married' 9 'missing' '99' missing
8-9	Number of people in household	HOUSENUM	
10-11	Number of children aged 15 or under	KIDS	'99' missing
12	Sex of respondent	SEXRESP	1 'Male' 2 'Female' 9 'Missing'
13-14	Age of respondent	AGERESP	99 'missing'
16	Legal responsibility for house – respondent	HOUSRESP	1 'Yes' 2 'No' 9 'missing'
17	Sex of 2nd person	SEX2	1 'Male' 2 'Female' 9 'missing'
18-19	Age of 2nd person	AGE2	99 'missing'
20	Relationship to respondent	RELATE2	1 'Partner' 2 'Child' 3 'Parent' 4 'Other relative' 5 'unrelated' 9 'missing''
21	Legal responsibility for house – 2nd person	HOUSE2	1 'Yes' 2 'No' 9 'missing'
22	Sex of 3rd person	SEX3	Value labels for SEX3 to HOUSE10 are same as for SEX2 to HOUSE2
23-24	Age of 3rd person	AGE3	
25	Relationship to respondent	RELATE3	
26	Legal responsibility for house	HOUSE3	
27	Sex of 4th person	SEX4	
28-29	Age of 4th person	AGE4	
30	Relationship to respondent	RELATE4	
31	Legal responsibility for house	HOUSE4	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
32	Sex of 5th person	SEX5	
33-34	Age of 5th person	AGE5	
35	Relationship to respondent	RELATE5	
36	Legal responsibility for house	HOUSE5	
37	Sex of 6th person	SEX6	
38-39	Age of 6th person	AGE6	
40	Relationship to respondent	RELATE6	
41	Legal responsibility for house	HOUSE6	
42	Sex of 7th person	SEX7	
43-44	Age of 7th person	AGE7	
45	Relationship to respondent	RELATE7	
46	Legal responsibility for house	HOUSE7	
47	Sex of 8th person	SEX8	
48-49	Age of 8th person	AGE8	
50	Relationship to respondent	RELATE8	
51	Legal responsibility for house	HOUSE8	
52	Sex of 9th person	SEX9	
53-54	Age of 9th person	AGE9	
55	Relationship to respondent	RELATE9	
56	Legal responsibility for house	HOUSE9	
57	Sex of 10th person	SEX10	
58-59	Age of 10th person	AGE10	
60	Relationship to respondent	RELATE10	
61	Legal responsibility for house	HOUSE10	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 7			
1-4	Serial number		
7-8	Age left school	EDUCAGE	01 'under 16' 02 '16' 03 '17' 04 '18' 05 'over 18' 06 'still at school' 07 'still at university' 97 'other' 99 'missing'
9-10	Eduational qualifications	EDUCQUAL	See attached sheet
11-12	Employment	EMPLOY	01 'Full-time education' 02 'Govt training or employment programme' 03 'In paid work' 04 'Waiting to take up paid work' 05 'Registered unemployed' 06 'Unemployed, looking for job' 07 'Unemployed, not looking for job' 08 'Sick or disabled' 09 'Retired' 10 'Looking after home' 11 'Other' 99 'missing'
24-25	Employment status	ES	See attached sheet
26-27	Socio-economic group	SEG	See attached sheet
28	Social Class	SC	1 'I' 2 'II' 3 'IIIN' 4 'IIIM' 5 'IV' 6 'V' 7 'Armed Forces' 8 'Insufficient Information'
29-30	Industry Code List	SIC	See attached sheet
32	Accommodation	ACCOM	1 'Detached house or bungalow' 2 'Semi-detached house or bungalow' 3 'Terraced house' 4 'Purpose-built flat/maisonette' 5 'Converted flat/maisonette' 6 'Room, not self-contained' 7 'other' 9 'missing'
33	House ownership	RENTOWN	1 'Own outright' 2 'Buying on mortgage' 3 'Rent - LA' 4 'Rent - Housing Association' 5 'Rent - private' 6 'Rent free, squatting etc' 7 'other' 9 'missing'
34	Smoking	CIGS	1 'Yes' 2 'No' 9 'missing'
35	Number of cigarettes per day	NUMCIGS	1 'Less than 10' 2 '10-19' 3 '20 or more' 9 'missing'

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
36	Current or past job looking after ill people	ILLJOB	1 'Yes' 2 'No' 9 'missing'
37-39	Name/title of job	TITLEJOB	0 'Voluntary work' 1 'nurse' 2 'doctor' 3 'other medical/welfare professional' 4 'Home help/care assistant' 5 'other hospital job' 6 'student nurse/doctor' 7 'other' 8 'unclear' 9 'missing'
40	Personal experience of serious illness	ILLSELF	1 'Yes' 2 'No' 9 'missing'
41-42	Start of serious illness (month)	ILLSTMO	99 'missing'
43-44	Start of serious illness (year)	ILLSTYR	99 'missing'
45-46	End of serious illness (month)	ILLENDMO	99 'missing'
47-48	End of serious illness (year)	ILLENDYR	99 'missing'
49-50	Serious illness still continuing	ILLSTILL	97 'Still continuing'
51	Serious illness in close others	ILLOTHER	1 'Yes' 2 'No' 9 'missing'
52	Who - 1st person	ILLWHO1	1 'Close family member' 2 'other relative' 3 'Friend' 4 'other' 9 'missing'
53	When start ill - 1st person	ILLSTAR1	1 'within last year' 2 '1-5 years ago' 3 'more than 5 yrs ago' 9 'missing'
54	When finish ill - 1st person	ILLEND1	1 'still continuing' 2 'within last year' 3 '1-5 yrs ago' 4 'more than 5 yrs ago' 9 'missing'
55 56	Who - 2nd person When start ill - 2nd person	ILLWHO2 ILLSTAR2	Value labels for ILLWHO2 to ILLEND3 are same as those for ILLWHO1 to ILLEND1

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
57	When finish ill - 2nd person	ILLEND2	
58	Who - 3rd person	ILLWHO3	
59	When start ill - 3rd person	ILLSTAR3	
60	When finish ill - 3rd person	ILLEND3	
RECORD 8			
1-4	Serial number		
7	Whose experience in mind	JUDGE	1 'Self only' 2 'Someone else only' 3 'Self and someone else' 4 'None' 9 'Missing'
8	Who were these people	JUDGEWHO	1 'Same person at Q37b' 2 'Same person at Q37b + different person 3 'Only different person to Q37b' 9 'missing'
9	Valuation affected by event in next 10 years	NEXTTEN	1 'Yes' 2 'No' 3 'Don't know' 4 'Missing'
10	Has telephone	PHONE	1 'Yes' 2 'No' 9 'missing
11	Phone number given	PHONENUM	1 'Number given' 2 'Number refused' 9 'missing'
12	Willing to do re-interview	REINT	1 'Yes' 2 'No' 3 'Maybe' 9 'missing'
13-16	Time at end of interview	ENDINT	
17-19	Time taken for interview	TIMEINT	999 'missing'
20	Difficulty with ranking	DIFFRANK	1 'None' 2 'Slight' 3 'Major' 4 'Don't know' 9 'missing'
21	Difficulty with VAS	DIFFVAS	As for DIFFRANK
22	Difficulty with TTO	DIFFTTO	As for DIFFRANK
23-26	Interviewer number	INTNO	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 9			
1-4	Serial number		
7	Euroqol mobility	MOB	1 'No problems in walking about' 2 'Some problems in walking about' 3 'Confined to bed' 9 'missing'
8	Euroqol selfcare	SELFCARE	1 'No problems with selfcare' 2 'Some problems washing or dressing self' 3 'Unable to wash or dress self' 9 'missing'
9	Euroqol usual activities	UACT	1 'No problems performing usual activities' 2 'Some problems with usual activities' 3 'Unable to perform usual activities' 9 'missing'
10	Euroqol pain/discomfort	PAIN	1 'No pain or discomfort' 2 'Moderate pain or discomfort' 3 'Extreme pain or discomfort' 9 'missing'
11	Euroqol anxiety/depression	MOOD	1 'Not anxious or depressed' 2 'Moderately anxious or depressed' 3 'Extremely anxious or depressed' 9 'missing'
RECORD 10			
1-4	Serial number		
7-8	Coder number	CODERNO	
9-14	Date of coding	CODEDATE	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
RECORD 11			
1-4	Serial number		
7-8	Rank given to state 11111	RANKAP	Missing value for RANKAP to RANKZT is 99
9-10	Rank of state 32211	RANKBU	
11-12	Rank of state 23321	RANKBX	
13-14	Rank of state 11211	RANKCG	
15-16	Rank of state 11112	RANKCW	
17-18	Rank of immediate death	RANKDE	
19-20	Rank of state 12121	RANKDH	
21-22	Rank of state 21232	RANKEN	
23-24	Rank of state 13332	RANKEQ	
25-26	Rank of state 12222	RANKFD	
27-28	Rank of state 12211	RANKFH	
29-30	Rank of state 33212	RANKGJ	
31-32	Rank of state 21312	RANKGZ	
33-34	Rank of state 33323	RANKHB	
35-36	Rank of state 33232	RANKHL	
37-38	Rank of state 11113	RANKIW	
39-40	Rank of state 22323	RANKJL	
41-42	Rank of state 32223	RANKJY	
43-44	Rank of state 32331	RANKKA	
45-46	Rank of state 12223	RANKKV	
47-48	Rank of state 11131	RANKLC	
49-50	Rank of state 32232	RANKMG	
51-52	Rank of state 11133	RANKMV	
RECORD 12			
1-4	Serial number		
7-8	Rank of state 33321	RANKNA	
9-10	Rank of state 22331	RANKNS	
11-12	Rank of state 13311	RANKOM	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
13-14	Rank of state 21323	RANKPB	
15-16	Rank of state 12111	RANKPK	
17-18	Rank of state 13212	RANKQD	
19-20	Rank of state 22233	RANKQY	
21-22	Rank of state 32313	RANKRF	
23-24	Rank of state 22222	RANKRX	
25-26	Rank of state 22112	RANKSL	
27-28	Rank of state 11121	RANKSP	
29-30	Rank of state 22121	RANKTR	
31-32	Rank of unconscious	RANKUN	
33-34	Rank of state 22122	RANKVJ	
35-36	Rank of state 21111	RANKWQ	
37-38	Rank of state 21222	RANKWZ	
39-40	Rank of state 23313	RANKXC	
41-42	Rank of state 33333	RANKXT	
43-44	Rank of state 21133	RANKYG	
45-46	Rank of state 23232	RANKYM	
47-48	Rank of state 11312	RANKZK	
49-50	Rank of state 11122	RANKZT	
RECORD 13			
1-4	Serial number		
12-16	TTO score for 32211	TTOBU	Missing values for TTOBU to TTOZT are -9.996,
17-21	TTO score for 23321	TTOBX	9.996, 9.997, 9.998, 9.999
22-26	TTO score for 11211	TTOCG	
27-31	TTO score for 11112	TTOCW	
37-41	TTO score for 12121	TTODH	
42-46	TTO score for 21232	TTOEN	
47-51	TTO score for 13332	TTOEQ	
52-56	TTO score for 12222	TTOFD	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
57-61	TTO score for 12211	TTOFH	
62-66	TTO score for 33212	TTOGJ	
67-71	TTO score for 21312	TTOGZ	
72-76	TTO score for 33323	TTOHB	
RECORD 14			
1-4	Serial number		
7-11	TTO score for 33232	TTOHL	
12-16	TTO score for 11113	TTOIW	
17-21	TTO score for 22323	TTOJL	
22-26	TTO score for 32223	TTOJY	
27-31	TTO score for 32331	TTOKA	
32-36	TTO score for 12223	TTOKV	
37-41	TTO score for 11131	TTOLC	
42-46	TTO score for 32232	TTOMG	
47-51	TTO score for 11133	TTOMV	
RECORD 15			
1-4	Serial number		
7-11	TTO score for 33321	TTONA	
12-16	TTO score for 22331	TTONS	
17-21	TTO score for 13311	TTOOM	
22-26	TTO score for 21323	TTOPB	
27-31	TTO score for 12111	TTOPK	
32-36	TTO score for 13212	TTOQD	
37-41	TTO score for 22233	TTOQY	
42-46	TTO score for 32313	TTORF	
47-51	TTO score for 22222	TTORX	
52-56	TTO score for 22112	TTOSL	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
57-61	TTO score for 11121	TTOSP	
62-66	TTO score for 22121	TTOTR	
67-71	TTO score for unconscious	TTOUN	
72-76	TTO score for 22122	TTOVJ	
RECORD 16			
1-4	Serial number		
7-11	TTO score for 21111	TTOMQ	
12-16	TTO score for 21222	TTOWZ	
17-21	TTO score for 23313	TTOXC	
22-26	TTO score for 33333	TTOXT	
27-31	TTO score for 21133	TTOYG	
32-36	TTO score for 23232	TTOYM	
37-41	TTO score for 11312	TTOZK	
42-46	TTO score for 11122	TTOZT	
RECORD 17			
1-4	Serial number		
7-9	VAS score for 11111	CRAP	Missing values for CRAP to CROWN are 996, 999
10-12	VAS score for 32211	CREU	
13-15	VAS score for 23321	CRBX	
16-18	VAS score for 11211	CRCG	
19-21	VAS score for 11112	CRCW	
22-24	VAS score for immediate death	CRDE	
25-27	VAS score for 12121	CRDH	
28-30	VAS score for 21232	CREN	
31-33	VAS score for 13332	CREQ	
34-36	VAS score for 12222	CRFD	
37-39	VAS score for 12211	CRFH	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
40-42	VAS score for 33212	CRGJ	
43-45	VAS score for 21312	CRGZ	
46-48	VAS score for 33323	CRHB	
49-51	VAS score for 33232	CRHL	
52-54	VAS score for 11113	CRIW	
55-57	VAS score for 22323	CRJL	
58-60	VAS score for 32223	CRJY	
61-63	VAS score for 32331	CRKA	
64-66	VAS score for 12223	CRKV	
67-69	VAS score for 11131	CRLC	
70-72	VAS score for 32232	CRMG	
73-75	VAS score for 11133	CRMV	
RECORD 18			
1-4	Serial number		
7-9	VAS score for 33321	CRNA	
10-12	VAS score for 22331	CRNS	
13-15	VAS score for 13311	CROM	
16-18	VAS score for 21323	CRPB	
19-21	VAS score for 12111	CRPK	
22-24	VAS score for 13212	CRQD	
25-27	VAS score for 22233	CRQY	
28-30	VAS score for 32313	CRRF	
31-33	VAS score for 22222	CRRX	
34-36	VAS score for 22112	CRSL	
37-39	VAS score for 11121	CRSP	
40-42	VAS score for 22121	CRTR	
43-45	VAS score for unconscious	CRUN	
46-48	VAS score for 22122	CRVJ	
49-51	VAS score for 21111	CRWQ	

COLUMN NO.	VARIABLE	VARIABLE NAME	VALUE LABEL
52-54	VAS score for 21222	CRWZ	
55-57	VAS score for 23313	CRXC	
58-60	VAS score for 33333	CRXT	
61-63	VAS score for 21133	CRYG	
64-66	VAS score for 23232	CRYM	
67-69	VAS score for 11312	CRZK	
70-72	VAS score for 11122	CRZT	
73-75	VAS score for own health	CROWN	

Educational Qualifications

Degree (or degree level qualification)   01

Teaching qualification
HNC/HND, BEC/TEC Higher, BTEC Higher   02
City and Guilds Full Technological Certificate
Nursing qualification (SRN, SCM, RGN, RM, RHV, Midwife)

'A' levels/SCE higher
ONC/OND/BEC/TEC **not** higher   03
City and Guilds Advanced/Final level

'O' Level (Grade A–C if after 1975)
GCSE (grades A–C)
CSE grade 1
SCE Ordinary (bands A–C)
Standard Grade (level 1–3)   04
SLC Lower
SUPE Lower or Ordinary
School Certificate or Matric
City and Guilds Craft/Ordinary level

CSE Grades 2–5
GCE 'O' level (grades D&E if after 1975)
GCSE (grades D,E,F,G)
SCE Ordinary (Bands D&E)   05
Standard Grade (level 4,5)
Clerical or commercial qualifications
Apprenticeship

CSE Ungraded   06

Other qualifications (SPECIFY) _____   07

No qualifications   08

Missing   99

Employment Status Codes

Those used in C01980 have been expanded to accommodate partial and missing information codes. The categories are:

01 self-employed (25+ employees)
02 self-employed (1-24 employees)
03 self-employed (no employees)
04 self-employed (NA how many employees)
05 manager (establishment of 25+ employees)
06 manager (establishment of 1-24 employees)
07 manager (NA size of establishment)
08 foreman/supervisor
09 other employee
10 employee (NA if manager/foreman/other)
11 NA/insufficient information to code more specifically.

These codes are not normally of interest in themselves, but are relevant, together with occupation code, in deriving S.E.G. and social class.

Social Class

```
1 -   I
2 -   II (Managerial and Technical)
3 -   IIIN
4 -   IIIM
5 -   IV
6 -   V
7 -   Armed Forces
8 -   Inadequate Description:
```

Socio-Economic Group

```
01 -   Employees (Large Establishments)
02 -   Managers (Large Establishments)
03 -   Employees (Small Establishments)
04 -   Managers (Small Establishments)
05 -   Professional (Self-Employed)
06 -   Professional (Employee)
07 -   Intermediate Non-Manual Ancillary
08 -   Intermediate Non-Manual Foreman
09 -   Junior Non-Manual
10 -   Personal Services
11 -   Manual Foremen/Supervisors
12 -   Skilled Manual
13 -   Semi-Skilled Manual
14 -   Unskilled Manual
15 -   Own Account Non-Professional
16 -   Farmers (Employees and Managers)
17 -   Farmers (Own Account)
18 -   Agricultural Workers
19 -   Armed Forces
20 -   NA, Inadequate Description
```

1980 INDUSTRY CODE LIST (SIC)

Class

AGRICULTURE FORESTRY & FISHING

01 Agriculture and Horticulture
02 Forestry
03 Fishing

ENERGY & WATER SUPPLY INDUSTRIES

11 Coal extraction & manufacture of solid fuels
12 Coke ovens
13 Extraction of mineral oil & natural gas
14 Mineral oil processing
15 Nuclear fuel production
16 Production & distribution of electricity, gas & other forms of energy
17 Water supply industry

EXTRACTION OF MINERALS & ORES OTHER THAN FUELS: MANUFACTURE OF METALS, MINERAL PRODUCTS & CHEMICALS

21 Extraction & preparation of metalliferous ores
22 Metal manufacturing
23 Extraction of minerals N.E.S
24 Manufacture of non-metallic mineral products
25 Chemical industry
26 Production of man-made fibres

METAL GOODS, ENGINEERING & VEHICLES INDUSTRIES

31 Manufacture of metal goods N.E.S
32 Mechanical engineering
33 Manufacture of office machinery & data processing equipment
34 Electrical & electronic engineering
35 Manufacture of motor vehicles & parts
36 Manufacture of other transport equipment
37 Instrument engineering

OTHER MANUFACTURING INDUSTRIES

41 Food, drink & tobacco manufacturing industries (incl. 42 from book)
43 Textile industry
44 Manufacture of leather & leather goods
45 Footwear & clothing industries
46 Timber & wooden furniture industries
47 Manufacture of paper & paper products, printing & publishing
48 Processing of rubber & plastics
49 Other manufacturing industries

Class

CONSTRUCTION

50 Construction

DISTRIBUTION, HOTELS & CATERING, REPAIRS

61 Wholesale distribution (except dealing in scrap & waste materials)
62 Dealing in scrap & waste materials
63 Commission agents
64 Retail distribution (incl. 65 from book)
66 Hotels & catering
67 Repair of consumer goods & vehicles

TRANSPORT & COMMUNICATION

71 Railways
72 Other inland transport
74 Sea transport
75 Air transport
76 Supporting services to transport
77 Miscellaneous transport services & storage N.E.S
79 Postal services & telecommunications

BANKING, FINANCE, INSURANCE, BUSINESS SERVICES & LEASING

81 Banking & finance
82 Insurance except for compulsory social security
83 Business services
84 Renting of movables
85 Owning & dealing in real estate

OTHER SERVICES

91 Public administration, national defence & compulsory social service
92 Sanitary services
93 Education
94 Research & development
95 Medical & other health services: veterinary services
96 Other services provided to the general public
97 Recreational services & other cultural services
98 Personal services
99 Domestic services
00 Diplomatic representation, international organisations, allied armed services
89 Unable to classify/NA