Article:
Walters, S.J., Munro, J.F. and Brazier, J.E. (2001) Using the SF-36 with older adults: a cross-sectional community-based survey. Age and Ageing, 30 (4). pp. 337-343. ISSN: 0002-0729

https://doi.org/10.1093/ageing/30.4.337

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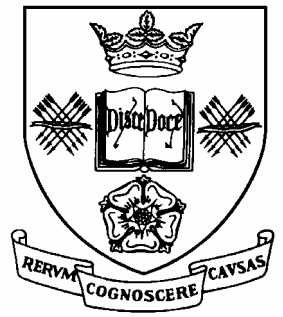

Using the SF-36 with older adults: cross-sectional community based survey

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Abstract

OBJECTIVES

To assess the practicality and validity of using the SF-36 in a community-dwelling population over 65 years old, and obtain population scores in this age group.

DESIGN

Postal survey, using a questionnaire booklet containing the SF-36 and other health related items, of all those aged 65 or over registered with twelve general practices. Non-respondents received up to two reminders at three-weekly intervals.

SETTING

Twelve randomly selected general practices in Sheffield.

SAMPLE

9897 subjects aged 65 to 104.

MAIN OUTCOME MEASURES

Scores for the eight dimensions of the SF-36 and a modified version of the physical functioning dimension.

RESULTS

The SF-36 achieved a response rate of 82% (n=8117) and dimension completion rates of 86.4% to 97.7%. Internal consistency measured by Cronbach's α exceeded 0.80 for all dimensions except social functioning. These results compare favourably with postal surveys of younger adults. Scores for older adults were calculated by age and sex. Comparison with data from younger people showed how physical health declines steeply with age, in marked contrast with mental health.

CONCLUSIONS

The SF-36 is a practical and valid instrument to use in postal surveys of older people living in the community. The population scores provided here may facilitate its use in future surveys of older adults.

Introduction

Measures of "health related quality of life" are commonly used in determining the effects of medical and community-based health interventions, in comparing the health of different populations and in assessing health needs. However, although people over 65 are a growing proportion of the population and are major users of health care, they have frequently been neglected in both the development and use of such measures. This may be because of uncertainty over the practicality and validity of using quality of life measures with older adults, and particular concerns over low response rates, inability to complete postal surveys independently, and questions which may be irrelevant to retired or severely impaired respondents.[1-4]

Given the increasing importance of older people as service users and potential beneficiaries of public health interventions, quality of life measures should clearly be adequately assessed and if necessary adapted for use in this population. The aims of this study were therefore to establish whether the SF-36, a popular self-completed generic health status instrument, could be successfully used in a large postal survey of older adults, and to provide population scores for a representative sample of community-dwelling adults over 65 years old.

Methods

Instruments Used

Although the SF-36 has US origins,[5] a validated anglicised version exists.[1] It asks 36 questions about health over the past four weeks, measuring 8 dimensions of health status: physical functioning; role limitation because of physical health; social functioning; vitality or energy; bodily pain; mental health; role limitation because of emotional problems; and general health. The responses to questions within each dimension are summed and transformed to generate dimension scores ranging from 0 ("poor health") to 100 ("good health").

Because our study population was retired and potentially in poor health, three minor changes were made to the standard SF-36 layout. First, the usual order of items in question 3 (typical daily activities) was reversed so that instead of moving from most to least vigorous activity, the items began with the least vigorous. The aim was to overcome the problem of older people seeing a very vigorous activity (running) at the top of the list and deciding that the question, or the entire survey, was irrelevant to them.

Second, three additional items were added to this question because some respondents might not be capable of even the most limited activity in the standard list ("bathing and dressing yourself"). The three items added were "feeding yourself", "getting up from a chair" and "walking in your home". To allow our results to be compared with those using the usual questions we report both standard and "extended" Physical dimension scores below. Third, we altered the wording of question 4 to remove the phrase "work or other", which would not be widely applicable in a retired population.

DATA COLLECTION

Twelve general practices in Sheffield were randomly selected from those with 2 to 5 partners, in the context of a study of physical activity in older adults. Of 13 practices approached, 12 agreed to participate. All individuals aged 65 or over registered with these practices were sent a 10 page postal questionnaire containing the SF-36, along with a physical activity questionnaire and a small number of sociodemographic questions. Up to two reminders were sent, at three weekly intervals.

ANALYSIS AND STATISTICAL METHODS

The usability of the SF-36 in older adults was assessed by examining response and completion rates by age group. Dimension scores were calculated only if all items contributing to the dimension had been completed. The internal consistency – the extent to which items correlate with items within their own dimension – was examined in terms of Cronbach's α and item-to-own-dimension correlation. Cronbach's α is a summary measure, generating a value between 0 and 1 for each dimension,[6] and values above 0.8 are usually regarded as acceptable.[7]

Evaluative properties were examined in terms of potential sensitivity to change or “responsiveness”. To some degree the ability to respond to change can be assessed in terms of the proportion of respondents at the floor (the worst score) or the ceiling (the best score) of each scale. A large proportion at either extreme will clearly limit the ability to register deterioration or improvement, respectively.

The ability to discriminate between different levels of ill heath is an essential requirement for any HRQoL instrument and was examined in terms of construct validity, where score distributions are compared between groups with known or expected health differences. For example, one might expect physical functioning scores to be lower, reflecting poorer perceived health, for women than for men, for older than younger people, and for those who have recently consulted a doctor compared with those who have not. Differences between these groups were tested with a *t* test or one-way analysis of variance, as appropriate, with a Bonferroni correction applied to adjust for multiple testing.

The value of the three additional items in the Physical dimension was examined in terms of completion, correlation with the Physical score and effect on the floor and ceiling of the Physical dimension.

Finally, data in the form of the mean, median and standard deviation for each age-sex group were calculated for all eight dimensions of the SF-36, and age-specific mean scores were plotted for each dimension, alongside scores from younger respondents to a large postal survey conducted in the same city.[1]

Results

RESPONSE RATE

Surveys were sent to 9887 individuals of whom 8117 (82%, 95% CI 81.3 to 82.8) returned a completed survey. The characteristics of respondents were broadly similar to those of people over 65 in the UK as a whole (table 1). The response rate was above 80% for all age groups except that aged 85 and over, which achieved 69% (95% CI: 66.2 to 71.9). Non-responders tended to be slightly older than responders (76.3 years v 74.5 years, difference 1.8 years, 95% CI: 1.4 to 2.2; p =0.001). Response rate did not vary by sex.

ITEM AND DIMENSION COMPLETION RATES

Item completion was high, being greater than 93% for all questions. Dimension completion (i.e. completion of all items in a dimension, allowing it to be calculated without interpolation) ranged from 86.4% to 97.7%. Dimension completion was lowest among those aged 85 or over, ranging from 83.3% to 94.4%.

For each dimension of the SF-36, non-completion was associated with increasing age ($p < 0.001$). Men were more likely ($p < 0.001$) than women to complete all dimensions except Pain ($p = 0.96$). Completion was also lower ($p < 0.003$) for respondents living alone. All eight dimensions were calculable for 5841 (72%, 95% CI: 71.0 to 72.9) of respondents.

INTERNAL CONSISTENCY

Cronbach's α exceeded 0.8 for all dimensions except social functioning (0.79), which is similar to results reported in studies of younger populations.[1; 2] The result for social functioning may partly reflect the low number of items (two) in that dimension.

EXTRA PHYSICAL FUNCTION ITEMS

Completion rates for the three additional items were comparable to other items in the Physical dimension and had little impact on the overall dimension completion rate (87.7% for the original dimension, 86.4% for the extended dimension). The added items correlated significantly with the original dimension: "feeding yourself" showed the weakest correlation ($r = 0.36$), but "getting up from a chair" and "walking in your home" had correlations of 0.68 and 0.67 respectively. The item to own dimension correlation exceeded the correlation with all other dimensions, supporting the logic of adding these items to the original scale. Cronbach's α for the Extended Physical dimension was 0.95**.**

POPULATION SCORES

Tables 2 and 3 show the mean and standard deviation of each SF-36 dimension by age and sex. Overall, women reported poorer health than men on all dimensions ($p < 0.001$), even after adjusting for age. People living alone reported worse health than those not living alone ($p < 0.001$, except General Health: $p=0.02$). Respondents consulting their doctor during the past two weeks

had poorer perceived health on all dimensions of the SF36 ($p < 0.001$) than those who did not. For each dimension, scores decreased with increasing age. These data support the construct validity of the SF-36 in older adults.

For each dimension and age group, table 4 gives median scores and the proportion of respondents at the floor and ceiling. While 6.5% (95% CI: 6.0 to 7.1) of respondents were at the floor of the original Physical dimension, extending the dimension with three additional items left only 1.2% (95% CI: 1.0 to 1.5) of respondents at the floor.

QUALITY OF LIFE AT DIFFERENT AGES

The mean score for each 5-year age band has been plotted for each dimension in Figures 1 to 8, alongside scores for adults aged 16 to 64 years, taken from a previous postal survey of younger adults in Sheffield.[1] Health related quality of life declines steadily with age, but the decline in the Physical and Physical Role Limitation dimensions is much sharper than for others. The mental health score remains almost constant, even in very old age.

One notable feature, which is apparent in all dimensions, is the higher than expected score in the 60-64 year age group. When sex-specific scores are plotted, this “blip” is apparent for women but not for men.

Discussion

This postal survey, using the SF-36 in a large representative population of community-dwelling older adults, achieved a response rate of 82%, which is as good as or better than previous experience in younger age groups (83% in Sheffield;[1] 72% in Oxford;[8] and 75% in Aberdeen[9]). Even among adults aged 85 or over, the response rate reached 69%. Dimension completion (88% to 98%) also compared favourably with that of other surveys.[1]

In this study we avoided using substitution procedures for missing data, but if this were done the number of respondents for whom all eight dimensions are calculable would increase from 5841 (72%) to 7076 (87%). This produces little impact on the normative scores, but could be useful if it is important to maximise the number of competed questionnaires.

These results demonstrate the practicality of using the SF-36 as a self-completed instrument in community based surveys of older people and contradict the experiences of a previous smaller postal survey.[4] The lower response rates reported from other studies have tended to relate to older people in outpatient or hospital settings with serious illness, rather than to an unselected community-dwelling population.[2 10 11] For some patient groups, particularly those with significant visual or cognitive disabilities, self-completing the SF-36 will be impractical,[11] and interview administration should be considered.[12 13] Administering the SF-36 by interview would substantially increase the expense of using it and limit comparability with data from younger populations.

Our findings and others have confirmed the internal consistency of items with their own dimensions in older populations.[12] The score distributions by age, gender and recent use of GP services support the construct validity of this instrument for the over-65s although because of multiple testing, some caution should be applied in the interpretation of P values we have reported.

Previous studies have found that items in the role functioning dimensions are problematic for older people in terms of lower completion and high proportions on the floor and ceiling of the dimension scores,[1 2] and our findings confirm this. The reference to “work” in the wording of these questions may be the cause of the lower completion rates,[2] and the floor and ceiling effects result from the use of dichotomous response choices (i.e. yes or no). Version two of the SF-36 partly overcomes this problem by increasing the number of response choices to five.[14]

We would advise potential users of the SF-36 among older adults to use the ordering of Physical Functioning items we used in this study and to amend the wording of questions 4 and 5 to remove the phrase “work or other”. Indeed, given the diversity of all populations we believe there is a strong case for these changes irrespective of the age of respondents. The addition of three extra questions to the Physical Functioning dimension was successful in reducing the “floor” of this dimension and did not appear to affect the validity or completion of the rest of the questionnaire. Adding these items still allows the standard Physical Function score to be calculated and comparisons with younger age

groups to be made, while improving the relevance of this dimension to older people.

Combining our data with that from a previous large survey of younger adults living in the same city has allowed us to plot mean scores for each dimension across the entire adult age range. Although these data are cross-sectional rather than longitudinal, and may therefore be subject to cohort as well as age effects, they suggest that health related quality of life may fall much more sharply with age for physical than for mental functioning, which seems hardly to fall at all. It is possible that this difference between dimensions is the result of a differential response bias, if those with mental health problems are less likely to respond than those with physical health problems, although the satisfactory response rates in all age groups suggests that the impact of response bias is unlikely to be great. Other dimensions decline at rates between these. For each dimension, 60 to 64-year olds show a slightly higher score than would be expected from the overall decline, which has not previously been described. Although possibly artefactual, this “blip” is also observable in the published Oxford norms[8] and in a national survey of health-related quality of life using a different instrument, the EQ-5D.[16] It occurs before the datasets join and seems to occur in women rather than men. Taken together, these observations suggest that health-related quality of life of women in this age group may indeed be higher than that of those five years older or younger, though whether this is an age or cohort effect could only be determined through a longitudinal study.

Overall, the findings from this and other studies of the SF-36 in older adults suggest that age *per se* should not be a bar to its use. Good response rates can be achieved in community populations with only minor modifications, without compromising validity or losing comparability with scores from younger age groups. Those undertaking population surveys who do not wish to exclude people over 65 should feel confident in using the SF-36.

Acknowledgements

We are grateful to the 12 practices who assisted us in this study, and to Gwyneth Askham for her clerical support.

Funding: This study is part of a trial of exercise in older adults funded by the NHS Research and Development Programme.

Competing interests: None declared.

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Table 1: Characteristics of sample

	Sheffield*	Great Britain[15]
Mean age (SD) years	74.6 (6.1)	
Age group (%)		
65-69	26.3%	30%
70-74	28.4%	27%
75-79	22.5%	22%
80-84	14.1%	13%
85+	8.7%	8%
Female	57.6%	56%
Living alone	38.7%	39%
Current smoker	17.1%	18%**
Consulted doctor at surgery during past fortnight	22.9%	21%
Visited by doctor at home during past fortnight	6.4%	5%

* The sample size ranged from 7961 to 8117.
** Aged 60 or over.

Table 2: Mean (SD) scores and sample sizes for SF-36 dimensions, by age: men

SF-36 Dimension		*Age (years) 65-69*	*70-74*	*75-79*	*80-84*	*85+*
Physical Function I	*Mean*	67.2	61.9	58.4	48.4	39.2
	SD	(29.8)	(30.3)	(30.4)	(30.5)	(28.7)
		n=925	n=932	n=694	n=377	n=158
Physical Function II	*Mean*	72.5	68.4	64.5	55.6	47.6
	SD	(26.2)	(26.8)	(27.5)	(28.1)	(26.4)
		n=917	n=916	n=685	n=372	n=155
Role Physical	*Mean*	56.6	47.6	43.5	30.2	29.8
	SD	(42.6)	(43.3)	(42.0)	(38.4)	(37.1)
		n=975	n=980	n=739	n=386	n=168
Bodily Pain	*Mean*	68.2	65.6	64.0	59.6	63.9
	SD	(27.7)	(28.0)	(29.1)	(28.8)	(26.4)
		n=1001	n=1012	n=767	n=414	n=172
General Health	*Mean*	57.4	56.0	56.2	52.1	51.5
	SD	(24.3)	(24.2)	(23.1)	(24.0)	(22.1)
		n=941	n=947	n=706	n=374	n=160
Vitality	*Mean*	58.6	55.8	53.8	48.5	46.5
	SD	(23.3)	(22.4)	(22.3)	(24.1)	(21.1)
		n=995	n=994	n=747	n=412	n=170
Social Function	*Mean*	78.6	75.1	70.4	63.0	59.7
	SD	(28.9)	(29.9)	(31.5)	(34.3)	(32.5)
		n=997	n=1004	n=759	n=410	n=173
Role Emotional	*Mean*	67.3	61.8	55.4	44.5	43.8
	SD	(42.0)	(43.7)	(44.0)	(44.6)	(44.5)
		n=961	n=972	n=723	n=377	n=163
Mental Health	*Mean*	74.9	74.3	73.8	71.8	71.2
	SD	(19.4)	(19.1)	(18.5)	(19.4)	(19.0)
		n=989	n=995	n=746	n=404	n=165

The dimensions of the SF-36 are scored on a 0 (worst possible health) to 100 (best possible health) scale.

Table 3: Mean (SD) scores and sample sizes for SF-36 dimensions by age: women

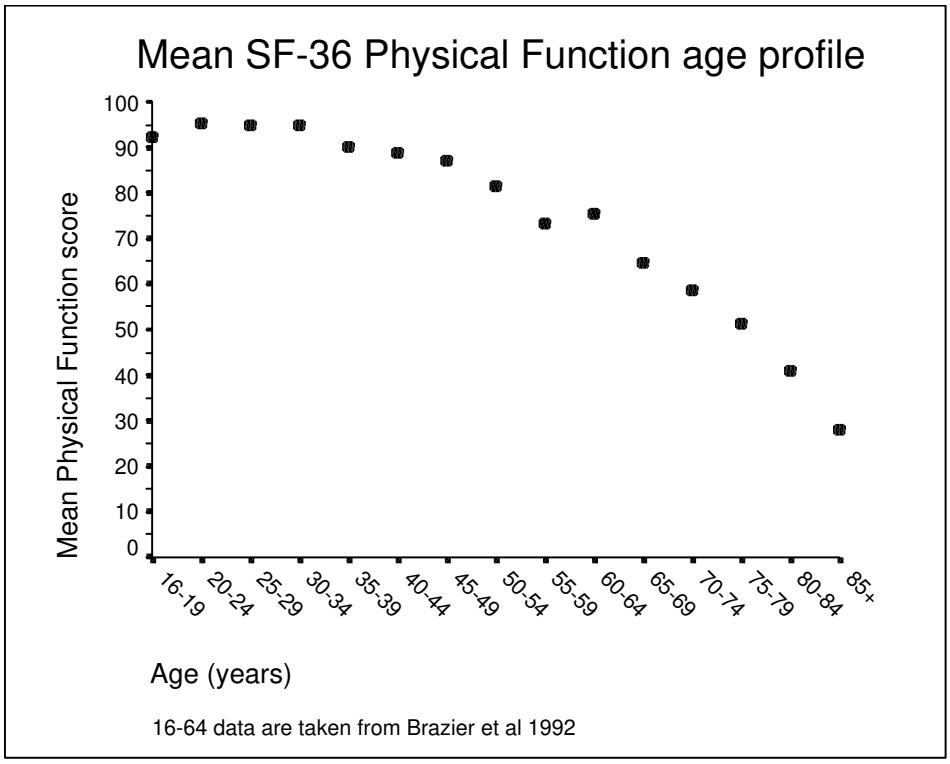
SF-36 Dimension		*Age (years) 65-69*	*70-74*	*75-79*	*80-84*	*85+*
Physical Function I	*Mean*	61.9	55.9	45.9	36.6	23.8
	SD	(29.1)	(29.4)	(28.9)	(29.3)	(25.0)
		n=1000	n=1112	n=873	n=601	n=444
Physical Function II	*Mean*	68.1	62.9	53.8	44.6	32.2
	SD	(25.7)	(26.1)	(26.3)	(27.0)	(23.7)
		n=991	n=1092	n=860	n=588	n=435
Role Physical	*Mean*	50.7	42.3	34.3	28.5	21.0
	SD	(43.4)	(42.6)	(40.5)	(38.5)	(34.0)
		n=1041	n=1179	n=940	n=630	n=465
Bodily Pain	*Mean*	63.4	60.1	57.7	52.5	48.8
	SD	(28.1)	(28.3)	(28.2)	(29.5)	(29.7)
		n=1096	n=1249	n=1028	n=693	n=502
General Health	*Mean*	56.9	55.8	52.6	47.7	44.4
	SD	(23.8)	(23.3)	(22.4)	(22.4)	(21.4)
		n=997	n=1127	n=885	n=576	n=433
Vitality	*Mean*	53.2	51.9	47.6	42.1	37.0
	SD	(23.2)	(22.6)	(21.5)	(21.7)	(21.7)
		n=1068	n=1209	n=977	n=663	n=472
Social Function	*Mean*	75.5	72.7	66.5	56.3	44.5
	SD	(29.0)	(30.2)	(31.9)	(33.2)	(33.1)
		n=1083	n=1228	n=998	n=669	n=495
Role Emotional	*Mean*	61.0	55.6	46.8	41.4	39.9
	SD	(43.4)	(44.2)	(45.0)	(43.6)	(45.4)
		n=1033	n=1171	n=916	n=611	n=444
Mental Health	*Mean*	67.8	68.1	66.8	64.7	63.9
	SD	(21.1)	(20.2)	(19.3)	(19.9)	(21.6)
		n=1059	n=1224	n=965	n=647	n=478

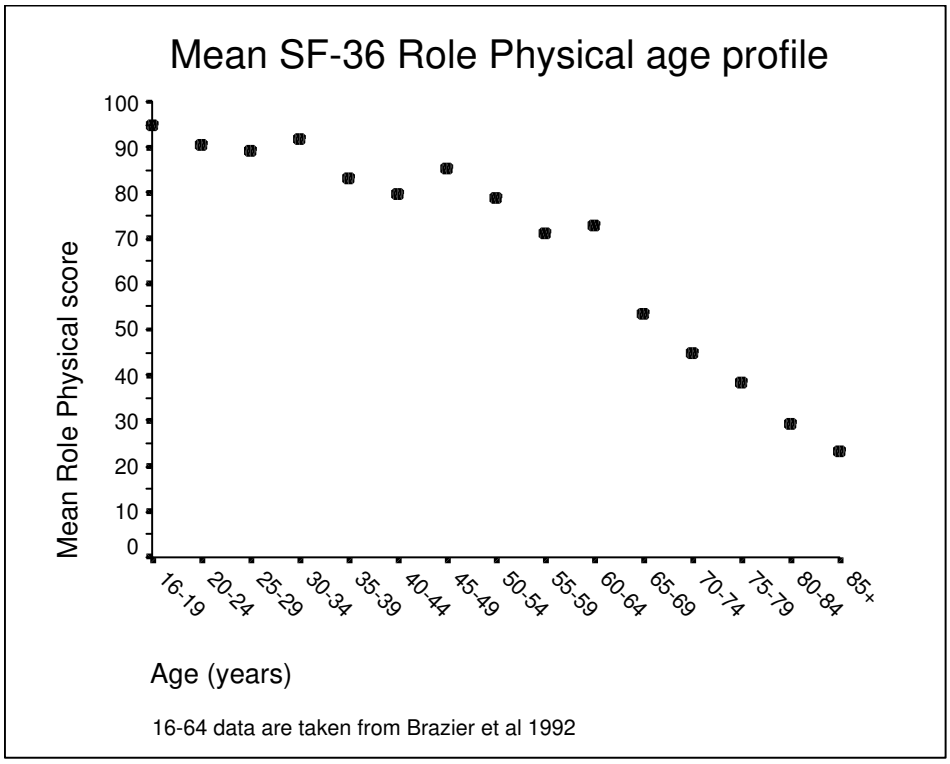
The dimensions of the SF-36 are scored on a 0 (worst possible health) to 100 (best possible health) scale.

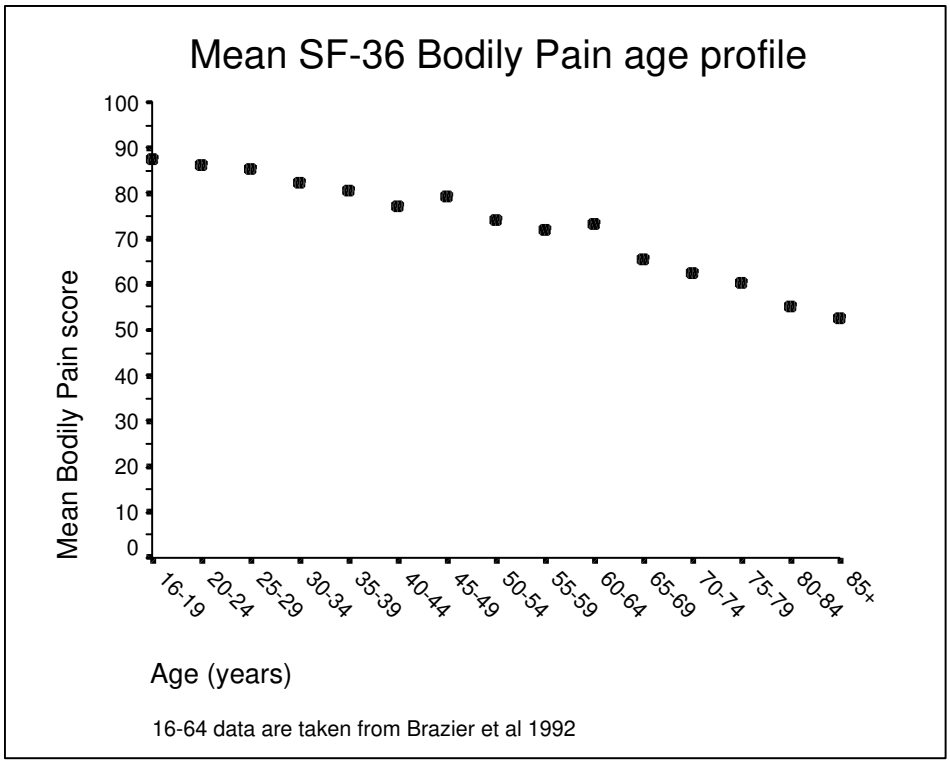
Table 4: Medians, floor and ceiling effects for SF-36 dimensions, by age*

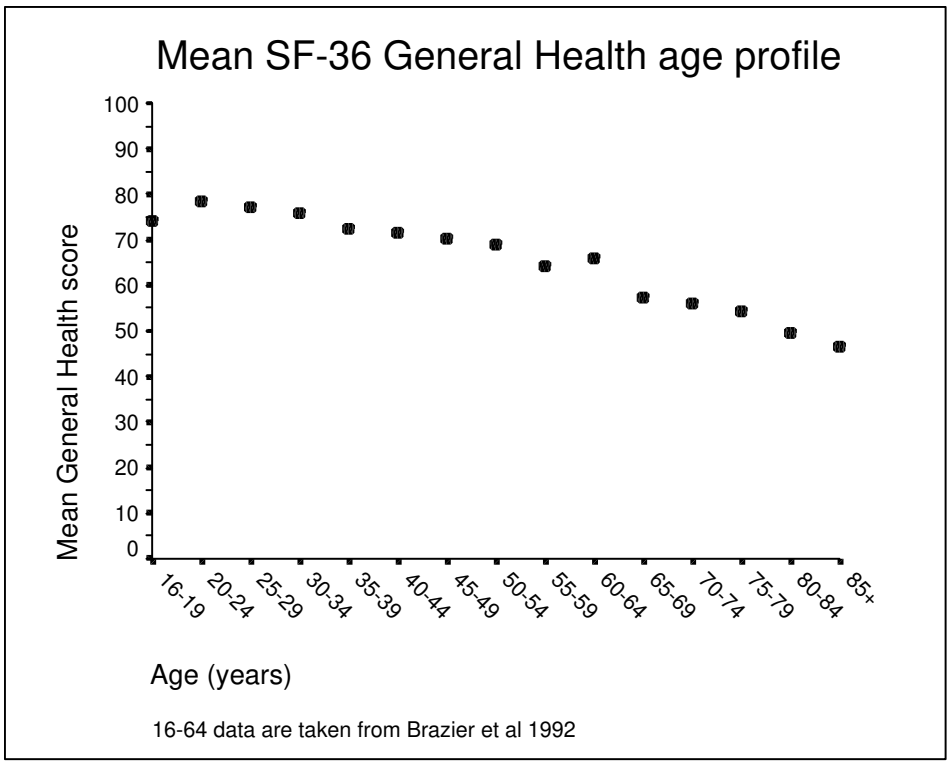
SF-36 Dimension		*Age (years) 65-69*	*70-74*	*75-79*	*80-84*	*85+*
Physical Function I	*median*	75.0	65.0	55.0	35.0	20.0
	% on floor, % at ceiling	(2.9, 5.9)	(4.3, 3.5)	(5.9, 2.0)	(11.1, 0.8)	(19.6, 0.5)
		n=1925	n=2044	n=1567	n=978	n=602
Physical Function II	*median*	80.8	73.1	61.5	50.0	30.8
	% on floor, % at ceiling	(0.5, 5.8)	(0.7, 3.4)	(0.9, 1.9)	(2.1, 0.5)	(4.1, 0.3)
		n=1908	n=2008	n=1545	n=960	n=590
Role Physical	*median*	50.0	25.0	25.0	0.0	0.0
	% on floor, % at ceiling	(30.9, 38.6)	(38.7, 30.8)	(44.6, 23.9)	(54.9, 16.4)	(61.0, 11.7)
		n=2016	n=2159	n=1679	n=1016	n=633
Bodily Pain	*median*	66.7	66.7	55.6	55.6	44.4
	% on floor, % at ceiling	(2.2, 21.1)	(2.7, 18.5)	(2.3, 17.4)	(4.4, 14.1)	(3.6, 14.8)
		n=2097	n=2261	n=1795	n=1107	n=674
General Health	*median*	60.0	57.0	55.0	50.0	45.0
	% on floor, % at ceiling	(0.8, 1.5)	(0.9, 1.7)	(0.5, 0.7)	(1.7, 0.7)	(1.2, 10.8)
		n=1938	n=2074	n=1591	n=950	n=593
Vitality	*median*	55.0	55.0	50.0	45.0	40.0
	% on floor, % at ceiling	(1.9, 1.6)	(2.6, 1.4)	(2.1, 0.5)	(4.5, 0.2)	(3.9, 0.2)
		n=2063	n=2203	n=1724	n=1075	n=642
Social Function	*median*	88.9	88.9	77.8	66.7	44.4
	% on floor, % at ceiling	(2.5, 46.7)	(3.5, 40.8)	(4.0, 32.8)	(6.6, 24.6)	(11.7, 15.0)
		n=2080	n=2232	n=1757	n=1079	n=668
Role Emotional	*median*	100.0	66.7	33.3	33.3	0.0
	% on floor, % at ceiling	(25.6, 53.2)	(30.5, 47.5)	(37.5, 40.2)	(44.7,32.2)	(50.4, 32.5)
		n=1994	n=2143	n=1639	n=988	n=607
Mental Health	*median*	76.0	72.0	72.0	68.0	68.0
	% on floor, % at ceiling	(0.1, 5.0)	(0.2, 5.2)	(0.2, 3.9)	(0.1, 3.9)	(0.5, 3.7)
		n=2048	n=2219	n=1711	n=1051	n=643

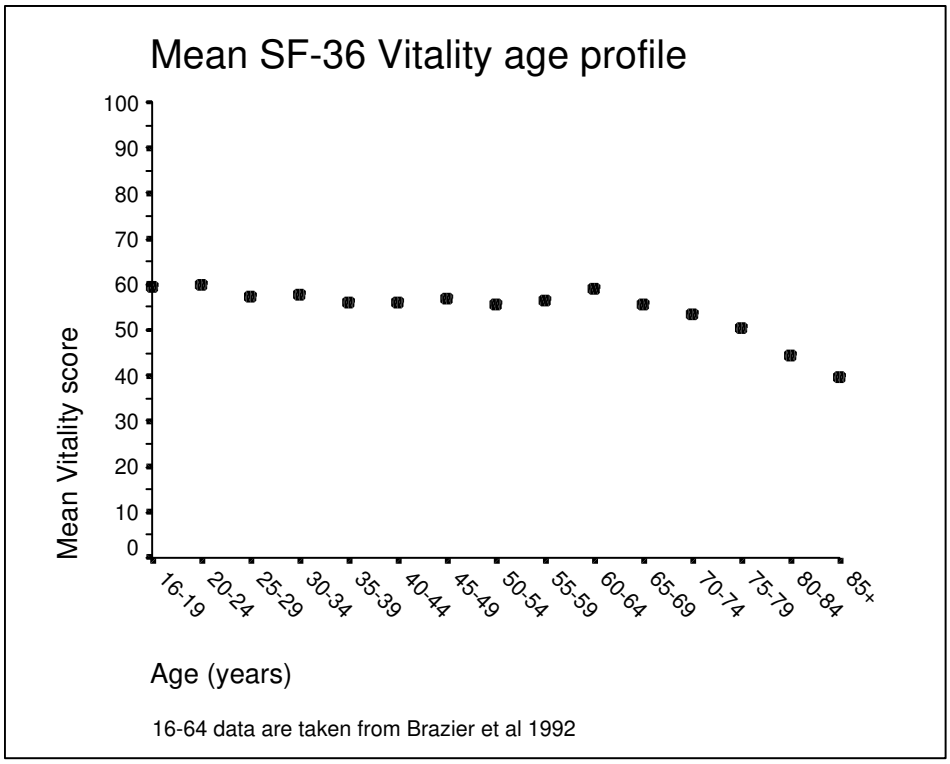
* Respondents at the “floor” are those who scored 0, and at the “ceiling” those who scored 100.

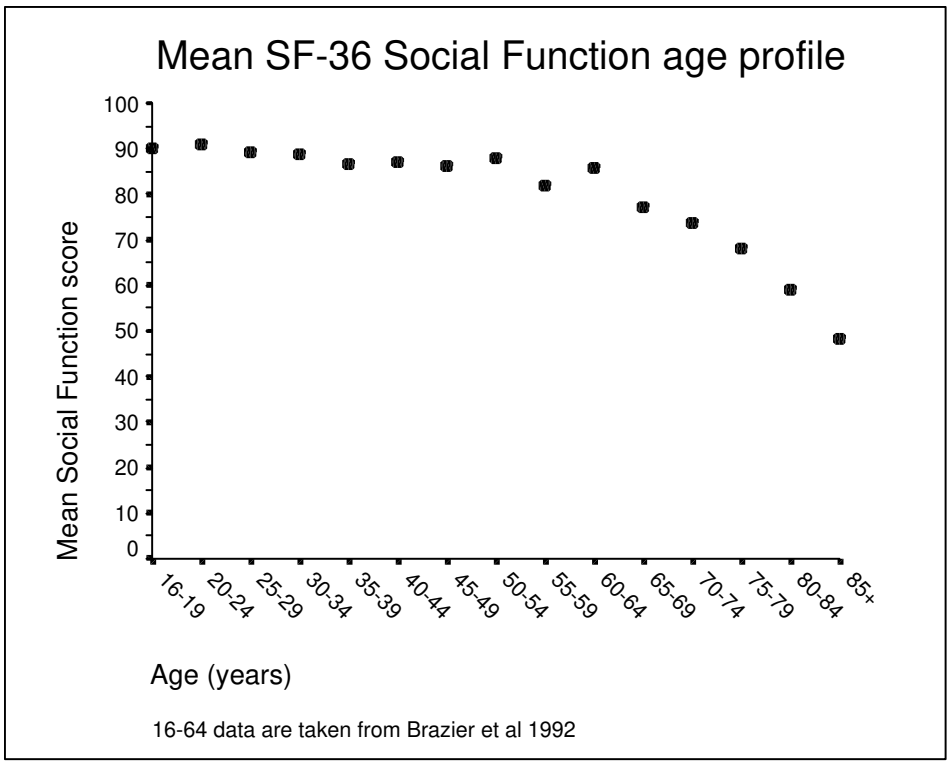

Mean SF-36 Physical Function age profile
Mean Physical Function score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992

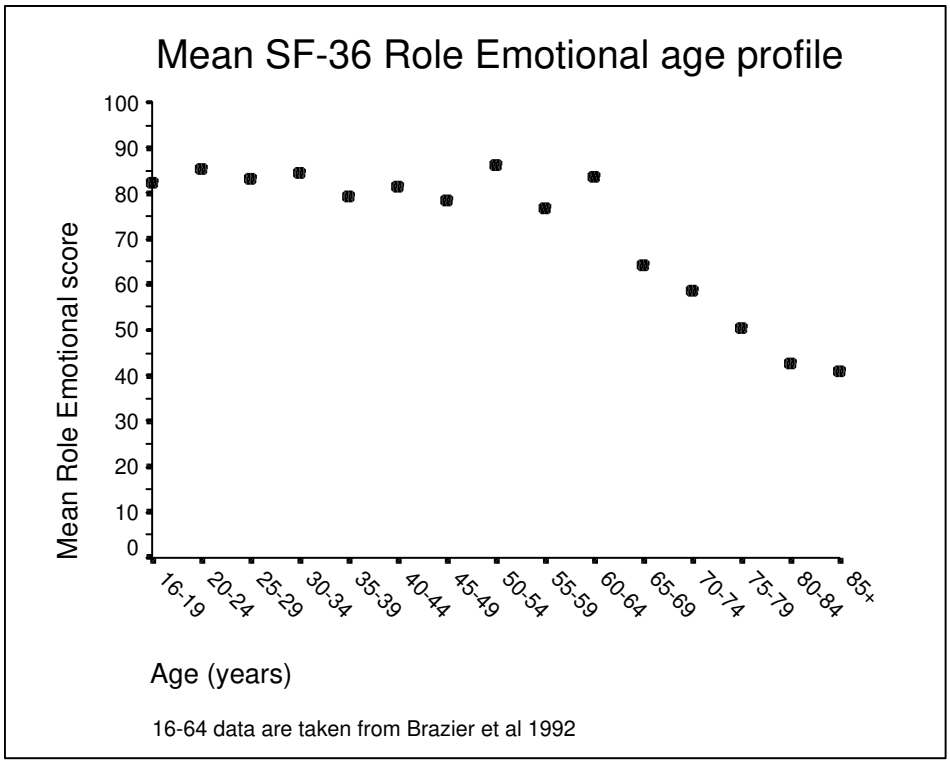

Mean SF-36 Role Physical age profile
Mean Role Physical score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992

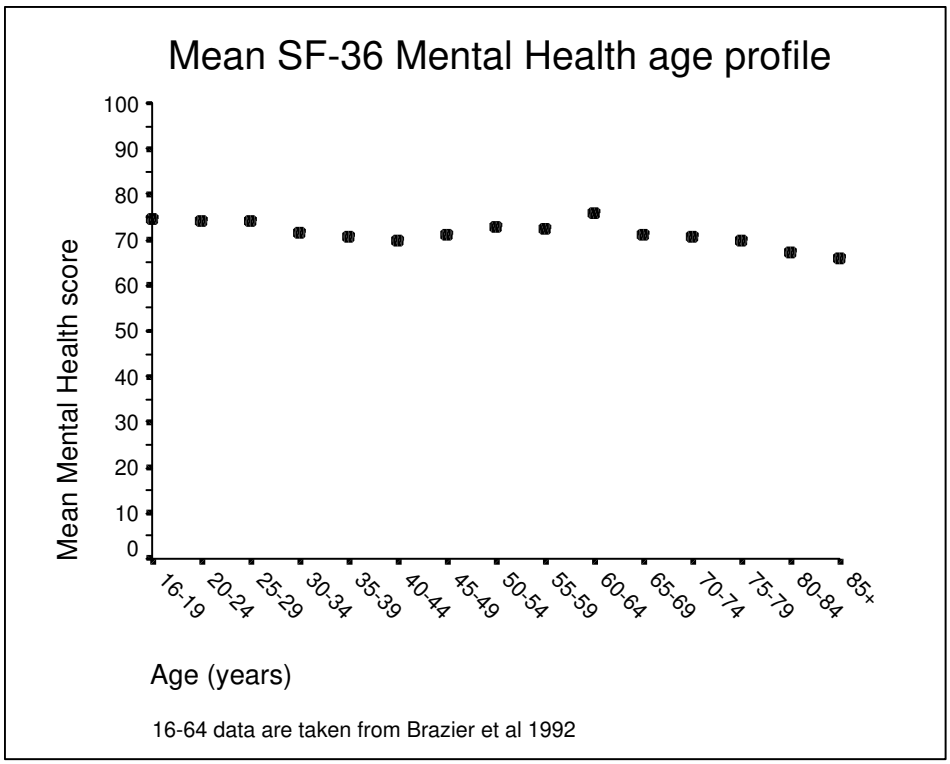

Mean SF-36 Bodily Pain age profile
Mean Bodily Pain score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992


Mean SF-36 General Health age profile
Mean General Health score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992


Mean SF-36 Vitality age profile
Mean Vitality score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992


Mean SF-36 Social Function age profile
Mean Social Function score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992


Mean SF-36 Role Emotional age profile
Mean Role Emotional score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992


Mean SF-36 Mental Health age profile
Mean Mental Health score
100
90
80
70
60
50
40
30
20
10
0
16-19
20-24
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80-84
85+
Age (years)
16-64 data are taken from Brazier et al 1992