The SF-36

Age Cohorts	Younger, Mid-age and Older
Surveys	All
Definition	See sections describing the Component Scores and Subscales
Statistical form	Continuous variable
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Derived Variables - *Subscales*	**Index Number**	**Index Numbers for Source Items**	**Source Item**
Physical Functioning (PF)	SF36-037	SF36-003 to SF36-012	PF1 to PF10
Role Physical (RP)	SF36-038	SF36-013 to SF36-016	RP1 to RP4
Bodily Pain (BP)	SF36-039	SF36-021 & SF36-022	BP1 & BP2
General Health (GH)	SF36-040	SF36-001, SF36033- to SF36-036	GH1 TO GH5
Vitality (VT)	SF36-041	SF36-023, SF36-027, SF36-029, SF36-031	VT1 to VT5
Social Functioning (SF)	SF36-042	SF36-020 & SF36-032	SF1 & SF2
Role Emotional (RE)	SF36-043	SF36-017 to SF36-019	RE1 to RE3
Mental Health (MH)	SF36-044	SF36-024 to SF36-026, SF36-028 & SF36-030	MH1 to MH5
Health Transition (HT)	SF36-045	Not applicable	HT1

Derived Variables - *Component Scores*		**Index Number**	**Index Numbers for Source Items**
Physical Health Component Scores:	○ PCSA	SF36-046	SF36-001 to SF36-036
	○ PCSWHA	SF36-048	
	○ PCS_ABS	SF36-050	
	○ PCS_US	SF36-052	
Mental Health Component Scores:	○ PCSA	SF36-047	SF36-001 to SF36-036
	○ PCSWHA	SF36-049	
	○ PCS_ABS	SF36-051	
	○ PCS_US	SF36-053	

Background

The SF-36[1] is a self-report, 36 item survey measuring health-related quality-of-life. Thirty-five items are used to construct 8 scales. An additional item measures health transition.

Survey response codes are re-coded according to standardised procedures[1] (details over). Generally, scores for each scale are calculated for respondents completing 50% or more of the items within a scale. Among these respondents, the value for any missing item is imputed as the mean value for non-missing items. The names of the scales, scale abbreviations, the number of items included in each and the maximum number of items imputed are shown below.

SF-36 Scales	Abbreviation	Number of items in scale	Maximum number of items imputed
Physical Health			
Physical Functioning	PF	10	5
Role Physical	RP	4	2
Bodily Pain	BP	2	1
General Health	GH	5	2
Mental Health			
Vitality	VT	4	2
Social Functioning	SF	2	1
Role Emotional	RE	3	1
Mental Health	MH	5	2

Raw scores are calculated as the sum of (re-coded) scale items and transformed to a 0 to 100 scale according to the formula:

$$\text{Transformed score} = \frac{\text{Raw score} - \text{Minimum possible raw score}}{\text{Possible raw score range}} * 100$$

If scores for all 8 scales are available, two summary measures known as component scores are derived[2]: the Physical Health Component Score and the Mental Health Component Score.

All scales and the component scores are positively scored so that higher scores represent better health-related quality-of-life.

The text of SF-36 items and a summary of how the scales and component scores are constructed are given in following sections.

Physical Functioning
The following questions are about activities you might do during a typical day. Does YOUR HEALTH NOW LIMIT YOU in these activities? If so, how much?

PF1	VIGOROUS activities such as running, lifting heavy objects, participating in strenuous sports
PF2	MODERATE activities, such as moving a table, pushing a vacuum cleaner, bowling or playing golf
PF3	Lifting or carrying groceries
PF4	Climbing SEVERAL flights of stairs
PF5	Climbing ONE flight of stairs
PF6	Bending, kneeling or stooping
PF7	Walking MORE THAN ONE kilometre
PF8	Walking HALF a kilometre
PF9	Walking 100 metres
PF10	Bathing or dressing yourself

Code	Response
1	Yes, limited a lot
2	Yes, limited a little
3	No, not limited at all

ALSWH re-coding of missing items
Sets of related items within the physical functioning sub-scale establish the level of function for particular activities: overall activity level (PF1 to PF3), climbing (PF4 and PF5) and walking (PF7 to PF9). Where a higher level of functioning in each set is 'Not limited' but an item for a lower level of the related function is 'missing', the lower level of functioning is re-coded to 'Not limited'. Conversely, where a lower level of functioning is 'Limited a lot' and the item for a higher level of the related function is 'missing', the higher level of functioning is re-coded to 'Limited a lot'.

Overall activity level

Vigorous activity	**Moderate activity**	**Lifting/carrying groceries**	**Re-code**
Not limited at all	Missing		Moderate activity = Not limited at all
Missing	Limited a lot		Vigorous activity = Limited a lot
Missing		Limited a lot	Vigorous activity = Limited a lot

Climbing

Climbing SEVERAL flights of stairs	Climbing ONE flight of stairs	Re-code
Not limited at all	Missing	Climbing ONE flight of stairs = Not limited at all
Missing	Limited a lot	Climbing SEVERAL flights of stairs = Limited a lot

Walking

Walking more than 1 kilometre	Walking half a kilometre	Walking 100 metres	Re-code
Not limited at all	Missing		Walking HALF a kilometre = Not limited at all
	Not limited at all	Missing	Walking 100 metres = Not limited at all
Not limited at all		Missing	Walking 100 metres = Limited a lot
Missing	Limited a lot		Walking more than one kilometre = Limited a lot
	Missing	Limited a lot	Walking 100 metres = Limited a lot
Missing		Limited a lot	Walking 100 metres = Limited a lot

The SAS code defining the PF sub-scale is:

```
ARRAY PFI(10) PF01-PF10 ;
DO I = 1 TO 10 ;
   IF PFI(I) < 1 OR PFI(I) > 3 THEN PFI(I) = . ;
END ;
PFNUM = N(OF PF01-PF10) ;
PFMEAN = MEAN(OF PF01-PF10) ;
IF PFNUM GE 5 THEN
DO I = 1 TO 10 ;
  IF PFI(I)= . THEN PFI(I) = PFMEAN ;
END ;
IF PFNUM GE 5 THEN RAWPF = SUM(OF PF01-PF10) ;
PF = ((RAWPF - 10)/(30-10)) * 100 ;
```

Role Physical
During THE PAST 4 WEEKS, have you had any of the following problems with your work (including your work outside the home and housework) or other regular daily activities AS A RESULT OF YOUR PHYSICAL HEALTH?

RP1	Cut down on the amount of time you spent on work or other activities
RP2	Accomplished less than you would like
RP3	Were limited in the kind of work or other activities
RP4	Had difficulty performing the work or other activities (for example it took extra effort)

Code	Response
1	Yes
2	No

ALSWH re-coding of missing items
If any response to RP1-RP4 is 'Yes' and none of these items has a 'No' response recorded, all missing items are coded to 'No'.

The SAS code defining the RP sub-scale is:

```
ARRAY RPA(4) RP1-RP4 ;
DO I = 1 TO 4 ;
   IF RPA(I) < 1 OR RPA(I) > 2 THEN RPA(I) = . ;
END ;
ROLPNUM = N(OF RP1-RP4) ;
ROLPMEAN = MEAN(OF RP1-RP4) ;
IF ROLPNUM GE 2 THEN
DO I = 1 TO 4 ;
   IF RPA(I) = . THEN RPA(I) = ROLPMEAN ;
END ;
IF ROLPNUM GE 2 THEN RAWRP = SUM(OF RP1-RP4) ;
RP = ((RAWRP - 4)/(8-4)) * 100 ;
```

Bodily Pain

BP1 How much BODILY pain have you had during the PAST 4 WEEKS?

Code	Re-code[1]	Response
1	6.0	None
2	5.4	Very mild
3	4.2	Mild
4	3.2	Moderate
5	2.2	Severe
6	1.0	Very severe

BP2 During the PAST FOUR WEEKS, how much did PAIN interfere with your normal work (including both work outside the home and housework)?

If BP1 and BP2 are both answered.

Code	Re-code[1] if BP1 =	Re-code	Response
1	'None' (1)	6	Not at all
1	'Very mild' -'Very severe' (2-6)	5	Not at all
2	'None'-'Very severe' (1-6)	4	A little bit
3	'None'-'Very severe' (1-6)	3	Moderately
4	'None'-'Very severe' (1-6)	2	Quite a bit
5	'None'-'Very severe' (1-6)	1	Extremely

If BP1 is not answered.

Code	Re-code[1]	Response
1	6.0	Not at all
2	4.75	A little bit
3	3.5	Moderately
4	2.25	Quite a bit
5	1.0	Extremely

The SAS code defining the BP sub-scale is:

```
IF BP1 < 1 OR BP1 > 6 THEN BP1 = . ;
IF BP2 < 1 OR BP2 > 5 THEN BP2 = . ;
/*  RECODES IF NEITHER BP1 OR BP2 HAS A MISSING VALUE  */
IF BP1 NE . AND BP2 NE . THEN DO ;
   IF BP1 = 1 THEN RBP1 = 6 ;
   IF BP1 = 2 THEN RBP1 = 5.4 ;
   IF BP1 = 3 THEN RBP1 = 4.2 ;
   IF BP1 = 4 THEN RBP1 = 3.1 ;
   IF BP1 = 5 THEN RBP1 = 2.2 ;
   IF BP1 = 6 THEN RBP1 = 1 ;
   IF BP2 = 1  AND BP1 = 1 THEN RBP2 = 6 ;
   IF BP2 = 1  AND 2 LE BP1 LE 6 THEN RBP2 = 5 ;
   IF BP2 = 2  AND 1 LE BP1 LE 6 THEN RBP2  = 4 ;
   IF BP2 = 3  AND 1 LE BP1 LE 6 THEN RBP2  = 3 ;
   IF BP2 = 4  AND 1 LE BP1 LE 6 THEN RBP2  = 2 ;
   IF BP2 = 5  AND 1 LE BP1 LE 6 THEN RBP2  = 1 ;
END ;
/*  RECODES IF BP1 IS NOT MISSING AND BP2 IS MISSING  */
IF BP1 NE . AND BP2 = . THEN DO ;
   IF BP1 = 1 THEN RBP1 = 6 ;
   IF BP1 = 2 THEN RBP1 = 5.4 ;
   IF BP1 = 3 THEN RBP1 = 4.2 ;
   IF BP1 = 4 THEN RBP1 = 3.1 ;
   IF BP1 = 5 THEN RBP1 = 2.2 ;
   IF BP1 = 6 THEN RBP1 = 1 ;
   RBP2 = RBP1 ;
END ;
/*  RECODES IF BP1 IS MISSING AND BP2 IS NOT MISSING  */
IF BP1 = . AND BP2 NE . THEN DO ;
   IF BP2 = 1 THEN RBP2 = 6 ;
   IF BP2 = 2 THEN RBP2 = 4.75 ;
   IF BP2 = 3 THEN RBP2 = 3.5 ;
   IF BP2 = 4 THEN RBP2 = 2.25 ;
   IF BP2 = 5 THEN RBP2 = 1 ;
   RBP1 = RBP2 ;
```

```
END ;
BPNUM = N(BP1,BP2) ;
IF BPNUM GE 1 THEN RAWBP = SUM(RBP1,RBP2) ;
BP = ((RAWBP - 2)/(12-2)) * 100 ;
```

General Health

GH1 In general, would you say your health is:

Code	Re-code[1]	Response
1	5.0	Excellent
2	4.4	Very good
3	3.4	Good
4	2.0	Fair
5	1.0	Poor

How TRUE or FALSE is EACH of the following statements for you?

GH2	I seem to get sick a little easier than other people
GH3	I am as healthy as anybody I know
GH4	I expect my health to get worse
GH5	My health is excellent

Code	Re-code[1] GH3 & GH5	Response
1	5	Definitely true
2	4	Mostly true
3	3	Don't know
4	2	Mostly false
5	1	Definitely false

The SAS code defining the GH sub-scale is:

```
ARRAY GHP(5) GH1-GH5 ;
DO I= 1 TO 5 ;         IF GHP(I) < 1 OR GHP(I) > 5 THEN GHP(I) = . ;  END ;
IF GH1 = 1 THEN RGH1 =   5 ;
IF GH1 = 2 THEN RGH1 = 4.4 ;
IF GH1 = 3 THEN RGH1 = 3.4 ;
IF GH1 = 4 THEN RGH1 =   2 ;
IF GH1 = 5 THEN RGH1 =   1 ;
RGH3 = 6 - GH3 ;
RGH5 = 6 - GH5 ;
GHNUM = N(GH1,GH2,GH3,GH4,GH5) ;
GHMEAN = MEAN(RGH1,GH2,RGH3,GH4,RGH5) ;
ARRAY RGH(5) RGH1 GH2 RGH3 GH4 RGH5 ;
IF GHNUM GE 3  THEN
DO I= 1 TO 5 ;
```

```
  IF RGH(I) = . THEN RGH(I) = GHMEAN ;
END ;
IF GHNUM GE 3  THEN RAWGH = SUM(RGH1,GH2,RGH3,GH4,RGH5) ;
GH = ((RAWGH - 5)/(25-5)) * 100 ;
```

Vitality

For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the PAST 4 WEEKS:

VT1	Did you feel full of life
VT2	Did you have a lot of energy
VT3	Did you feel worn out
VT4	Did you feel tired

Code	Re-code[1] VT1 & VT2	Response
1	6	All of the time
2	5	Most of the time
3	4	A good bit of the time
4	3	Some of the time
5	2	A little of the time
6	1	None of the time

The SAS code defining the VT sub-scale is:

```
ARRAY VI(4) VT1-VT4 ;
DO I = 1 TO 4 ;
  IF VI(I) < 1 OR VI(I) > 6 THEN VI(I) =. ;
END ;
RVT1 = 7-VT1 ;
RVT2 = 7-VT2 ;
VITNUM = N(VT1,VT2,VT3,VT4) ;
VITMEAN = MEAN(RVT1,RVT2,VT3,VT4) ;
ARRAY RVI(4) RVT1 RVT2 VT3 VT4 ;
IF VITNUM GE 2 THEN
DO I = 1 TO 4 ;
  IF RVI(I) = . THEN RVI(I) = VITMEAN ;
END ;
IF VITNUM GE 2 THEN RAWVT= SUM(RVT1,RVT2,VT3,VT4) ;
VT = ((RAWVT-4)/(24-4)) * 100 ;
```

Social Functioning

SF1 During the PAST 4 WEEKS, to what extent has your physical health or emotional problems interfered with your normal social activities with family, friends, neighbours or groups?

Code	Re-code[1]	Response
1	5	Not at all
2	4	A little bit
3	3	Moderately
4	2	Quite a bit
5	1	Extremely

SF2 During the PAST 4 WEEKS, how much of the time has your PHYSICAL HEALTH OR EMOTIONAL PROBLEMS interfered with your social activities (like visiting friends, relatives, etc)?

Code	Response
1	All of the time
2	Most of the time
3	A good bit of the time
4	Some of the time
5	A little of the time
6	None of the time

The SAS code defining the SF sub-scale is:

```
ARRAY SOC(2) SF1-SF2 ;
DO I = 1 TO 2 ;
   IF SOC(I) < 1 OR SOC(I) > 5 THEN SOC(I) = . ;
END ;
RSF1 = 6 - SF1 ;
SFNUM = N(SF1,SF2) ;
SFMEAN = MEAN(RSF1,SF2) ;
ARRAY RSF(2) RSF1 SF2 ;
DO I = 1 TO 2 ;
  IF RSF(I) = . THEN RSF(I) = SFMEAN ;
END ;
IF SFNUM GE 1 THEN RAWSF = SUM(RSF1,SF2) ;
SF = ((RAWSF - 2)/(10-2)) * 100 ;
```

Role Emotional

During the PAST 4 WEEKS, have you had any of the following problems with your work or other regular daily activities AS A RESULT OF ANY EMOTIONAL PROBLEMS (such as feeling depressed or anxious)?

RE1	Cut down on the amount of time you spent on work or other activities
RE2	Accomplished less than you would like
RE3	Didn't do work or other activities as carefully as usual

Code	Response
1	Yes
2	No

ALSWH re-coding of missing items
If any response to parts a, b or c is 'Yes' and none of these parts have a 'No' response recorded, all missing items are coded to 'No'.

The SAS code defining the RE sub-scale is:

```
ARRAY RM(3) RE1-RE3 ;
DO I = 1 TO 3 ;
   IF RM(I) < 1 OR RM(I) > 2 THEN RM(I) = . ;
END ;
ROLMNUM = N(OF RE1-RE3) ;
ROLMMEAN = MEAN(OF RE1-RE3) ;
IF ROLMNUM GE 2 THEN
DO I = 1 TO 3 ;
   IF RM(I) = . THEN RM(I) = ROLMMEAN ;
END ;
IF ROLMNUM GE 2 THEN RAWRE = SUM(OF RE1-RE3) ;
RE = ((RAWRE - 3)/(6-3)) * 100 ;
```

Mental Health

For each question, please give the one answer that comes closest to the way you have been feeling. How much of the time during the PAST 4 WEEKS:

MH1	Have you been a very nervous person
MH2	Have you felt so down in the dumps that nothing could cheer you up
MH3	Have you felt calm and peaceful
MH4	Have you felt down
MH5	Have you been a happy person

Code	Re-code[1] MH3 & MH5	Response
1	6	All of the time
2	5	Most of the time
3	4	A good bit of the time
4	3	Some of the time
5	2	A little of the time
6	1	None of the time

The SAS code defining the MH sub-scale is:

```
ARRAY MHI(5) MH1-MH5 ;
DO I = 1 TO 5 ;
   IF MHI(I) < 1 OR MHI(I) > 6 THEN MHI(I)=. ;
END ;
RMH3 = 7-MH3 ;
RMH5 = 7-MH5 ;
MHNUM=N(MH1,MH2,MH3,MH4,MH5) ;
MHMEAN=MEAN(MH1,MH2,RMH3,MH4,RMH5) ;
ARRAY RMH(5) MH1 MH2 RMH3 MH4 RMH5 ;
IF MHNUM GE 3 THEN
DO I = 1 TO 5 ;
   IF RMH(I) = . THEN RMH(I) = MHMEAN ;
END ;
IF MHNUM GE 3 THEN RAWMH = SUM(MH1,MH2,RMH3,MH4,RMH5) ;
MH = ((RAWMH-5)/(30-5)) * 100 ;
```

Health transition

HT1 Compared to one year ago, how would you rate your health in general now?

Code	Response
1	Much better now than one year ago
2	Somewhat better now than one year ago
3	About the same as one year ago
4	Somewhat worse now than one year ago
5	Much worse now than one year ago

The heath transition item should be used as categorical variable in statistical analysis.

Standardised Component Scores

The summary measures for physical and mental health known as the Physical Health Component Score (PCS) and the Mental Health Component Score (MCS) may be derived when the scores for all 8 scales of the SF-36 are available. First each scale is standardized to the relevant population, according to the formula:

$$\text{Standardized Scale} = \frac{(\text{Transformed Scale} - \text{Population mean})}{\text{Population standard deviation}}$$

Then PCS and MCS are calculated as the weighted sum of standardised scale scores, according to the formula:

Component Score = (Weighted Sum of Standardised SF-36 scales x 10) + 50

Two pairs of components scores were included in the ALSWH survey datasets distributed before April 2006. One pair was standardised against data for Australian women of similar age[3,4] (18 to 24 years, 45 to 54 years and 65 years or more for the Younger, Mid-age and Older women respectively) and are named *pcsa* and *mcsa.* Scores were also standardised against the ALSWH sample at Survey 1 (*pcswha* and *mcswha*). From April 2006 onwards, an additional two pairs of components scores were added, each standardised against a general adult population. One pair (*pcs_abs* and *mcs_abs*) is standardised against the Australian population[5] to allow comparison between cohorts and second is standardised against the US population[2] (*pcs_us* and *mcs_us*) to facilitate comparison with international data. The means and standard deviations used in these various standardisations are shown in Table 1.

The factor weights for *pcswha* and *mcswha* were derived form analysis of responses at Survey 1; published weights for Australian and US populations were used to calculate the other component scores (Table 2).

Table 1 Mean & standard deviation (SD) for standardization of SF-36 scales

a. PCSA & MCSA: Age matched Australian Population in 1995[3]

	Younger		Mid-age		Older	
SF-36 Scale	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
PF	90.9	17.5	83.5	21.4	57.3	28.8
RP	86.7	28.7	84.2	32.4	56.0	42.8
BP	82.1	20.8	77.8	23.5	65.4	28.6
GH	73.9	19.5	73.5	20.0	61.1	22.4
VT	63.4	18.9	64.8	18.3	57.4	21.4
SF	84.0	20.0	86.5	20.8	77.3	27.7
RE	84.6	29.9	86.9	29.0	72.1	37.0
MH	73.0	15.8	75.2	15.4	75.3	17.3

b. PCSWHA & MCSWHA: Survey 1 (1996) responses for the ALSWH cohort

	Younger		Mid-age		Older	
SF-36 Scale	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
PF	90.19	15.42	85.08	18.66	63.35	25.94
RP	82.82	30.35	79.57	35.22	57.39	43.24
BP	74.18	21.47	70.65	23.80	65.09	26.68
GH	68.34	20.56	71.90	20.60	65.36	22.04
VT	56.64	19.81	58.08	20.94	60.02	20.90
SF	76.03	23.16	81.38	23.72	81.09	25.58
RE	69.98	37.40	76.96	36.33	75.80	37.87
MH	67.91	18.27	72.12	18.00	76.52	17.21

c. PCS_ABS, PCS_US, MCS_ABS & MCS_US: Adult Population

	Australia 1995[5]		USA[2]	
SF-36 Scale	**Mean**	**SD**	**Mean**	**SD**
PF	83.46290	23.22864	84.52	22.89
RP	80.28166	34.83783	81.20	33.80
BP	76.94163	24.83714	75.49	23.56
GH	71.81575	20.35165	72.21	20.17
VT	64.47694	19.77187	61.05	20.87
SF	85.06929	22.29047	83.60	22.38
RE	83.19165	32.15215	81.29	33.03
MH	75.97772	16.96210	74.84	18.01

Table 2 Factor weights for component scores

a. Weights for adult population samples which are applied to all 3 age cohorts

	PCS			MCS		
SF-36 Scale	Australia 1994[4]	Australia 1995[5]	USA[2]	Australia 1994[4]	Australia 1995[5]	USA[2]
PF	0.44	0.47268	0.42402	-0.20	-0.24358	-0.22999
RP	0.41	0.38210	0.35119	-0.17	-0.13410	-0.12329
BP	0.32	0.36750	0.31754	-0.08	-0.12414	-0.09731
GH	0.14	0.18993	0.24954	0.11	0.05271	-0.01571
VT	-0.08	-0.01883	0.02877	0.34	0.27100	0.23534
SF	0.02	-0.01324	-0.00753	0.24	0.26460	0.26876
RE	0.004	-0.14971	-0.19206	0.22	0.35922	0.43407
MH	-0.31	-0.27145	-0.22069	0.54	0.48753	0.48581

b. Weights for each cohort of the ALSWH Sample at Survey 1 (1996)

	PCS			MCS		
SF-36 Scale	Younger	Mid-age	Older	Younger	Mid-age	Older
PF	0.42104	0.42505	0.39753	-0.16728	-0.21184	-0.24505
RP	0.42107	0.31254	0.26911	-0.12072	-0.07672	-0.07208
BP	0.40355	0.37490	0.37008	-0.10649	-0.14692	-0.21559
GH	0.21642	0.27666	0.24270	0.06805	-0.03099	-0.03739
VT	0.02994	0.02174	0.13676	0.24627	0.23619	0.11487
SF	-0.00666	-0.02547	0.02453	0.27640	0.28803	0.24621
RE	-0.21297	-0.19674	-0.22946	0.37987	0.41369	0.52697
MH	-0.14783	-0.19583	-0.27163	0.37566	0.43151	0.58489

The SAS code the component scores is:

```
/*************************************************************
 *                    COMPUTE Z SCORES                       *
*************************************************************
 *    MEAN AND SD FROM THE FACTOR ANALYTIC SAMPLE OF THE    *
 *    AUSTRALIAN POPULATION AGED 18 TO 24 YEARS (YOUNGER),  *
 *    45 TO 54 YEARS (MID-AGE) & 65+ YEARS (OLDER)          *
 *    REF: STEPHENSON                                      -*
*************************************************************/
/* YOUNG */;
PF_ZA=(PF-90.9)/17.5;
RP_ZA=(RP-86.7)/28.7;
BP_ZA=(BP-82.1)/20.8;
GH_ZA=(GH-73.9)/19.5;
VT_ZA=(VT-63.4)/18.9;
SF_ZA=(SF-84.0)/20.0;
RE_ZA=(RE-84.6)/29.9;
MH_ZA=(MH-73.0)/15.8;
/* MID */;
PF_ZA=(PF-83.5)/21.4 ;
RP_ZA=(RP-84.2)/32.4 ;
BP_ZA=(BP-77.8)/23.5 ;
GH_ZA=(GH-73.5)/20.0 ;
VT_ZA=(VT-64.8)/18.3 ;
SF_ZA=(SF-86.5)/20.8 ;
RE_ZA=(RE-86.9)/29.0 ;
MH_ZA=(MH-75.2)/15.4 ;
/* OLD */;
PF_ZA=(PF-57.3)/28.8 ;
RP_ZA=(RP-56.0)/42.8 ;
BP_ZA=(BP-65.4)/28.6 ;
GH_ZA=(GH-61.1)/22.4 ;
VT_ZA=(VT-57.4)/21.4 ;
SF_ZA=(SF-77.3)/27.7 ;
RE_ZA=(RE-72.1)/37.0 ;
MH_ZA=(MH-75.3)/17.3 ;
```

```
/*********************************************************
*   MEAN AND SD FROM THE ALSWH SAMPLE (AUSTRALIA)          *
*   SEPARATELY FOR EACH AGE COHORT                         *
*********************************************************/
/* YOUNG */;
PF_ZB=(PF-90.19)/15.42;
RP_ZB=(RP-82.82)/30.35;
BP_ZB=(BP-74.18)/21.47;
GH_ZB=(GH-68.34)/20.56;
VT_ZB=(VT-56.64)/19.81;
SF_ZB=(SF-76.03)/23.16;
RE_ZB=(RE-69.98)/37.40;
MH_ZB=(MH-67.91)/18.27;
/* MID */;
PF_ZB=(PF-85.08)/18.66;
RP_ZB=(RP-79.57)/35.22;
BP_ZB=(BP-70.65)/23.80;
GH_ZB=(GH-71.90)/20.60;
VT_ZB=(VT-58.08)/20.94;
SF_ZB=(SF-81.38)/23.72;
RE_ZB=(RE-76.96)/36.33;
MH_ZB=(MH-72.12)/18.00;
/* OLD */;
PF_ZB=(PF-63.35)/25.94;
RP_ZB=(RP-57.39)/43.24;
BP_ZB=(BP-65.09)/26.68;
GH_ZB=(GH-65.36)/22.04;
VT_ZB=(VT-60.02)/20.90;
SF_ZB=(SF-81.09)/25.58;
RE_ZB=(RE-75.80)/37.87;
MH_ZB=(MH-76.52)/17.21;

/*********************************************************
 *    MEAN AND SD FROM AUSTRALIAN ADULT POPULATION        *
 * THE NATIONAL HEALTH SURVEY:SF-36 POPULATION NORMS 1995  *
*********************************************************/
PF_ZC=(PF-83.46290)/23.22864;
```

```
RP_ZC=(RP-80.28166)/34.83783;
BP_ZC=(BP-76.94163)/24.83714;
GH_ZC=(GH-71.81575)/20.35165;
VT_ZC=(VT-64.47694)/19.77187;
SF_ZC=(SF-85.05929)/22.29047;
RE_ZC=(RE-83.19165)/32.15215;
MH_ZC=(MH-75.97772)/16.96210;

/***********************************************************
 *    MEAN AND SD FROM US ADULT POPULATION                 *
 * SF-36 Physical & Mental Health Summary Scales:          *
 * A User's Manual                                         *
***********************************************************/
PF_ZD=(PF-84.52404)/22.89490;
RP_ZD=(RP-81.19907)/33.79729;
BP_ZD=(BP-75.49196)/23.55879;
GH_ZD=(GH-72.21316)/20.16964;
VT_ZD=(VT-61.05453)/20.86942;
SF_ZD=(SF-83.59753)/22.37642;
RE_ZD=(RE-81.29467)/33.02717;
MH_ZD=(MH-74.84212)/18.01189;

/*****************************************************************
 *  COMPUTE SAMPLE RAW FACTOR SCORES WHEN ALL 8 SCALES NON-MISSING *
*****************************************************************/
 *    Z SCORES ARE FROM ABOVE WITH SCORING COEFFICIENTS FROM       *
 *    A. AUSTRALIAN POPULATION ╦ AGE SPECIFID pg 76 McCALLUM       *
 *    B. ALSWH SAMPLE AT SURVEY 1                                 *
 *    C. AUSTRALIAN ADULT POPULATION                              *
 *    D. US POPULATION                                            *
*****************************************************************/
/* YOUNG, MID AND OLD */;
prawa =(PF_ZA * .44)+ (RP_ZA * .41) + (BP_ZA * .32) + (SF_ZA * 0.02)+
       (MH_ZA * -.31)+(RE_ZA * 0.004) +(VT_ZA * -.08)+(GH_ZA * 0.14);

mrawa =(PF_ZA * -.20) +(RP_ZA * -.17) +(BP_ZA * -.08) +(SF_ZA * .24)+
       (MH_ZA * .54) +(RE_ZA * .22) +(VT_ZA * 0.34) +(GH_ZA * 0.11) ;
```

```
/* YOUNG */;
prawb = (PF_ZB * 0.42104) + (RP_ZB * 0.42107) + (BP_ZB * 0.40355) +
        (SF_ZB * -0.00666) + (MH_ZB * -0.14783) + (RE_ZB * -0.21297)+
        (VT_ZB * 0.02994) + (GH_ZB * 0.21642) ;

mrawb = (PF_ZB * -0.16728) + (RP_ZB * -0.12072) + (BP_ZB *-0.10649) +
        (SF_ZB * 0.27640) + (MH_ZB * 0.37566) + (RE_ZB * 0.37987) +
        (VT_ZB * 0.24627) + (GH_ZB * 0.06805) ;

/* MID */;
prawb = (PF_ZB * 0.42505)  + (RP_ZB * 0.31254)  + (BP_ZB * 0.37490) +
        (SF_ZB * -0.02547) + (MH_ZB * -0.19583) + (RE_ZB * -0.19674)+
        (VT_ZB * 0.02174)  + (GH_ZB * 0.27666) ;

mrawb = (PF_ZB * -0.21184) + (RP_ZB * -0.07672) + (BP_ZB *-0.14692 )+
        (SF_ZB * 0.28803)  + (MH_ZB * 0.43151)  + (RE_ZB * 0.41369) +
        (VT_ZB * 0.23619)  + (GH_ZB * -0.03099) ;

/* OLD */;
prawb = (PF_ZB * 0.39753) + (RP_ZB * 0.26911)  + (BP_ZB * 0.37008)  +
        (SF_ZB * 0.02453) + (MH_ZB * -0.27163) + (RE_ZB * -0.22946) +
        (VT_ZB * 0.13676) + (GH_ZB * 0.24270) ;

mrawb = (PF_ZB * -0.24505) + (RP_ZB * -0.07208) + (BP_ZB *-0.21559 )+
        (SF_ZB * 0.24621)  + (MH_ZB * 0.58489)  + (RE_ZB * 0.52697) +
        (VT_ZB * 0.11487)  + (GH_ZB * -0.03739) ;

/* YOUNG, MID AND OLD */;
prawc =(PF_ZC * 0.47268)+ (RP_ZC * 0.38210) + (BP_ZC * 0.36750) +
         (GH_ZC * 0.18993) + (VT_ZC * -0.01883) + (SF_ZC * -0.01324) +
         (RE_ZC * -0.14971) + (MH_ZC * -0.27145);

mrawc =(PF_ZC * -0.24358)+ (RP_ZC * -0.13410) + (BP_ZC * -0.12414) +
       (GH_ZC * 0.05271) + (VT_ZC * 0.27100) + (SF_ZC * 0.26460) + (RE_ZC *
        0.35922) + (MH_ZC * 0.48753);

prawd =(PF_ZD * 0.42402)+ (RP_ZD * 0.35119) + (BP_ZD * 0.31754) + (GH_ZD *
```

```
        0.24954) + (VT_ZD * 0.02877) + (SF_ZD * -0.00753) + (RE_ZD * -
        0.19206) + (MH_ZD * -0.22069);


mrawd =(PF_ZD * -0.22999)+ (RP_ZD * -0.12329) + (BP_ZD * -0.09731) + (GH_ZD
        * -0.01571) + (VT_ZD * 0.23534) + (SF_ZD * 0.26876) + (RE_ZD *
        0.43407) + (MH_ZD * 0.48581);


/*****************************************************************
 *            CALCULATE PCS AND MCS                              *
*****************************************************************/
 *    A. AUSTRALIAN POPULATION ╤ AGE SPECIFID pg 76 McCALLUM      *
 *    B. ALSWH SAMPLE AT SURVEY 1                                 *
 *    C. AUSTRALIAN ADULT POPULATION                              *
 *    D. US POPULATION                                            *
*****************************************************************/
/* YOUNG, MID AND OLD */;
 PCSA = (prawa*10) + 50 ;
 MCSA = (mrawa*10) + 50 ;


PCSWHA = (prawb*10) + 50 ;
MCSWHA = (mrawb*10) + 50 ;


PCS_ABS = (prawc*10) + 50 ;
MCS_ABS = (mrawc*10) + 50 ;


PCS_US = (prawd*10) + 50 ;
MCS_US = (mrawd*10) + 50 ;
```

The SAS code the component scores is:

```
/*************************************************************
 *                    COMPUTE Z SCORES                       *
*************************************************************
 *    MEAN AND SD FROM THE FACTOR ANALYTIC SAMPLE OF THE    *
 *    AUSTRALIAN POPULATION AGED 18 TO 24 YEARS (YOUNGER),  *
 *    45 TO 54 YEARS (MID-AGE) & 65+ YEARS (OLDER)          *
 *    REF: STEPHENSON                                      -*
*************************************************************/
/* YOUNG */;
PF_ZA=(PF-90.9)/17.5;
RP_ZA=(RP-86.7)/28.7;
BP_ZA=(BP-82.1)/20.8;
GH_ZA=(GH-73.9)/19.5;
VT_ZA=(VT-63.4)/18.9;
SF_ZA=(SF-84.0)/20.0;
RE_ZA=(RE-84.6)/29.9;
MH_ZA=(MH-73.0)/15.8;
/* MID */;
PF_ZA=(PF-83.5)/21.4 ;
RP_ZA=(RP-84.2)/32.4 ;
BP_ZA=(BP-77.8)/23.5 ;
GH_ZA=(GH-73.5)/20.0 ;
VT_ZA=(VT-64.8)/18.3 ;
SF_ZA=(SF-86.5)/20.8 ;
RE_ZA=(RE-86.9)/29.0 ;
MH_ZA=(MH-75.2)/15.4 ;
/* OLD */;
PF_ZA=(PF-57.3)/28.8 ;
RP_ZA=(RP-56.0)/42.8 ;
BP_ZA=(BP-65.4)/28.6 ;
GH_ZA=(GH-61.1)/22.4 ;
VT_ZA=(VT-57.4)/21.4 ;
SF_ZA=(SF-77.3)/27.7 ;
RE_ZA=(RE-72.1)/37.0 ;
MH_ZA=(MH-75.3)/17.3 ;
```

```
/*********************************************************
*   MEAN AND SD FROM THE ALSWH SAMPLE (AUSTRALIA)          *
*   SEPARATELY FOR EACH AGE COHORT                         *
*********************************************************/
/* YOUNG */;
PF_ZB=(PF-90.19)/15.42;
RP_ZB=(RP-82.82)/30.35;
BP_ZB=(BP-74.18)/21.47;
GH_ZB=(GH-68.34)/20.56;
VT_ZB=(VT-56.64)/19.81;
SF_ZB=(SF-76.03)/23.16;
RE_ZB=(RE-69.98)/37.40;
MH_ZB=(MH-67.91)/18.27;
/* MID */;
PF_ZB=(PF-85.08)/18.66;
RP_ZB=(RP-79.57)/35.22;
BP_ZB=(BP-70.65)/23.80;
GH_ZB=(GH-71.90)/20.60;
VT_ZB=(VT-58.08)/20.94;
SF_ZB=(SF-81.38)/23.72;
RE_ZB=(RE-76.96)/36.33;
MH_ZB=(MH-72.12)/18.00;
/* OLD */;
PF_ZB=(PF-63.35)/25.94;
RP_ZB=(RP-57.39)/43.24;
BP_ZB=(BP-65.09)/26.68;
GH_ZB=(GH-65.36)/22.04;
VT_ZB=(VT-60.02)/20.90;
SF_ZB=(SF-81.09)/25.58;
RE_ZB=(RE-75.80)/37.87;
MH_ZB=(MH-76.52)/17.21;

/*********************************************************
 *    MEAN AND SD FROM AUSTRALIAN ADULT POPULATION        *
 * THE NATIONAL HEALTH SURVEY:SF-36 POPULATION NORMS 1995  *
*********************************************************/
PF_ZC=(PF-83.46290)/23.22864;
```

```
RP_ZC=(RP-80.28166)/34.83783;
BP_ZC=(BP-76.94163)/24.83714;
GH_ZC=(GH-71.81575)/20.35165;
VT_ZC=(VT-64.47694)/19.77187;
SF_ZC=(SF-85.05929)/22.29047;
RE_ZC=(RE-83.19165)/32.15215;
MH_ZC=(MH-75.97772)/16.96210;

/***********************************************************
 *    MEAN AND SD FROM US ADULT POPULATION                 *
 * SF-36 Physical & Mental Health Summary Scales:          *
 * A User's Manual                                         *
***********************************************************/
PF_ZD=(PF-84.52404)/22.89490;
RP_ZD=(RP-81.19907)/33.79729;
BP_ZD=(BP-75.49196)/23.55879;
GH_ZD=(GH-72.21316)/20.16964;
VT_ZD=(VT-61.05453)/20.86942;
SF_ZD=(SF-83.59753)/22.37642;
RE_ZD=(RE-81.29467)/33.02717;
MH_ZD=(MH-74.84212)/18.01189;

/*****************************************************************
 *  COMPUTE SAMPLE RAW FACTOR SCORES WHEN ALL 8 SCALES NON-MISSING *
*****************************************************************/
 *    Z SCORES ARE FROM ABOVE WITH SCORING COEFFICIENTS FROM       *
 *    A. AUSTRALIAN POPULATION ╦ AGE SPECIFID pg 76 McCALLUM       *
 *    B. ALSWH SAMPLE AT SURVEY 1                                 *
 *    C. AUSTRALIAN ADULT POPULATION                              *
 *    D. US POPULATION                                            *
*****************************************************************/
/* YOUNG, MID AND OLD */;
prawa =(PF_ZA * .44)+ (RP_ZA * .41) + (BP_ZA * .32) + (SF_ZA * 0.02)+
       (MH_ZA * -.31)+(RE_ZA * 0.004) +(VT_ZA * -.08)+(GH_ZA * 0.14);

mrawa =(PF_ZA * -.20) +(RP_ZA * -.17) +(BP_ZA * -.08) +(SF_ZA * .24)+
       (MH_ZA * .54) +(RE_ZA * .22) +(VT_ZA * 0.34) +(GH_ZA * 0.11) ;
```

```
/* YOUNG */;
prawb = (PF_ZB * 0.42104) + (RP_ZB * 0.42107) + (BP_ZB * 0.40355) +
        (SF_ZB * -0.00666) + (MH_ZB * -0.14783) + (RE_ZB * -0.21297)+
        (VT_ZB * 0.02994) + (GH_ZB * 0.21642) ;

mrawb = (PF_ZB * -0.16728) + (RP_ZB * -0.12072) + (BP_ZB *-0.10649) +
        (SF_ZB * 0.27640) + (MH_ZB * 0.37566) + (RE_ZB * 0.37987) +
        (VT_ZB * 0.24627) + (GH_ZB * 0.06805) ;

/* MID */;
prawb = (PF_ZB * 0.42505)  + (RP_ZB * 0.31254)  + (BP_ZB * 0.37490) +
        (SF_ZB * -0.02547) + (MH_ZB * -0.19583) + (RE_ZB * -0.19674)+
        (VT_ZB * 0.02174)  + (GH_ZB * 0.27666) ;

mrawb = (PF_ZB * -0.21184) + (RP_ZB * -0.07672) + (BP_ZB *-0.14692 )+
        (SF_ZB * 0.28803)  + (MH_ZB * 0.43151)  + (RE_ZB * 0.41369) +
        (VT_ZB * 0.23619)  + (GH_ZB * -0.03099) ;

/* OLD */;
prawb = (PF_ZB * 0.39753) + (RP_ZB * 0.26911)  + (BP_ZB * 0.37008)  +
        (SF_ZB * 0.02453) + (MH_ZB * -0.27163) + (RE_ZB * -0.22946) +
        (VT_ZB * 0.13676) + (GH_ZB * 0.24270) ;

mrawb = (PF_ZB * -0.24505) + (RP_ZB * -0.07208) + (BP_ZB *-0.21559 )+
        (SF_ZB * 0.24621)  + (MH_ZB * 0.58489)  + (RE_ZB * 0.52697) +
        (VT_ZB * 0.11487)  + (GH_ZB * -0.03739) ;

/* YOUNG, MID AND OLD */;
prawc =(PF_ZC * 0.47268)+ (RP_ZC * 0.38210) + (BP_ZC * 0.36750) +
         (GH_ZC * 0.18993) + (VT_ZC * -0.01883) + (SF_ZC * -0.01324) +
         (RE_ZC * -0.14971) + (MH_ZC * -0.27145);

mrawc =(PF_ZC * -0.24358)+ (RP_ZC * -0.13410) + (BP_ZC * -0.12414) +
       (GH_ZC * 0.05271) + (VT_ZC * 0.27100) + (SF_ZC * 0.26460) + (RE_ZC *
        0.35922) + (MH_ZC * 0.48753);

prawd =(PF_ZD * 0.42402)+ (RP_ZD * 0.35119) + (BP_ZD * 0.31754) + (GH_ZD *
```

```
        0.24954) + (VT_ZD * 0.02877) + (SF_ZD * -0.00753) + (RE_ZD * -
        0.19206) + (MH_ZD * -0.22069);


mrawd =(PF_ZD * -0.22999)+ (RP_ZD * -0.12329) + (BP_ZD * -0.09731) + (GH_ZD
        * -0.01571) + (VT_ZD * 0.23534) + (SF_ZD * 0.26876) + (RE_ZD *
        0.43407) + (MH_ZD * 0.48581);


/*****************************************************************
 *            CALCULATE PCS AND MCS                              *
*****************************************************************/
 *    A. AUSTRALIAN POPULATION ╤ AGE SPECIFID pg 76 McCALLUM      *
 *    B. ALSWH SAMPLE AT SURVEY 1                                 *
 *    C. AUSTRALIAN ADULT POPULATION                              *
 *    D. US POPULATION                                            *
*****************************************************************/
/* YOUNG, MID AND OLD */;
 PCSA = (prawa*10) + 50 ;
 MCSA = (mrawa*10) + 50 ;


PCSWHA = (prawb*10) + 50 ;
MCSWHA = (mrawb*10) + 50 ;


PCS_ABS = (prawc*10) + 50 ;
MCS_ABS = (mrawc*10) + 50 ;


PCS_US = (prawd*10) + 50 ;
MCS_US = (mrawd*10) + 50 ;
```

Screening for Depression with the SF-36

Both the MH scores[6] and the MCS[2] have been evaluated as screening tools for depression, with recommended cut-points are shown. The appropriateness of these cut-points has been confirmed for depression but not anxiety in a subsequent analysis[7].

	Cut-point	Area under the ROC curve	Sensitivity	Specificity
MH	52 or below	0.77	73.7%	80.6%
MCS	42 or below	0.76	66.8%	86.2%

References

1. Ware JE, Snow KK, Kosinski M, Gandek, B. *SF-36 Health Survey. Manual and interpretation guide.* Boston: The Health Institute, New England Medical Center, 1993

2. Ware JE, Kosinski M, Keller SD. *SF-36 Physical and Mental Health Summary Scales: A users manual*. The Health Institute, New England Medical Centre, Boston, Massachusetts, December 1994. 4th printing

3. Stevenson C. SF-36: *Interim Norms for Australian data*. Canberra AIHW, 1996

4. McCallum J. The SF-36 physical and mental health summary scales: Australian validation. In: *Health outcomes and quality of life measurements conference proceedings*. Canberra: AIHW; 1995:p76

5. Australian Bureau of Statistics. 1995 National Health Survey – SF-36 Population Norms, Australia, ABS Catalogue No. 4399.0, 1997.

6. Berwick DM, Murphy JM, Goldman PA, Ware JE, Barsky AJ, Weinstein MC. Performance of a 5-item mental health screening test. *Medical Care* 1991;29:169-176

7. Silveira E, Taft C, Sundh V, Waern M, Palsson S, Steen B. Performance of the SF-36 Health Survey in screening for depressive and anxiety disorders in an elderly female Swedish population. *Qual Life Res*. 2005 6;14(5):1263-1274.