Chapter 6 Life satisfaction as a predictor of mortality

As discussed in Chapter 5, a number of factors predicted life satisfaction. Of course, some factors such as physical health may have direct and indirect effects on life satisfaction. However, it is possible a positive feeling to life in which only the strongest people continue to live or be successful, while the others die or fail. This arises quite naturally from consideration of life satisfaction and the dynamics of health and mortality. Chapter 6 will examine the relationship between life satisfaction and mortality, and compare this in the two countries.

6.1 *Introduction*

Quality of life may affect the risk of mortality in old age (Iwasa et al., 2006). As noted in the literature review (Chapter 2), older people may develop many health conditions as they age, for example, arthritis, urinary incontinence, vision or hearing problems (Lassey and Lassey, 2001). These health problems may affect their daily lives, including their level of social engagement, and these changes may have an impact on their life satisfaction in old age. A lower life satisfaction may then lead to a higher risk of death, because most eventual death are largely a consequence of disease rather than a simple result of ageing – as discussed in Section 2.6. If health can be maintained effectively, the human body can continue functioning well to very late in life, and this may enhance life satisfaction linked to longevity. Based on the previous work in this thesis, i.e., in chapter 5, various factors may affect life satisfaction, and there may be a complex relationship with mortality. For example, health problems may affect life satisfaction; however, they can also have direct and indirect effects on mortality. Therefore, life satisfaction may have a relationship with mortality. Some age-related changes, for example deteriorating health, do not interfere with life satisfaction if older people can maintain their own health and well-being, and this can significantly improve life satisfaction and decrease the risk of mortality. Therefore, this chapter will explore the relationship between life satisfaction and mortality within the two samples.

The main aim of this chapter is to examine the relationship between life satisfaction, and mortality in older people in the UK and Taiwan. The major aim was addressed by seeking answers to the following specific questions:

- What is the relationship, if any, between life satisfaction and mortality among older people?
- What is the relationship, if any, between change in life satisfaction and mortality among older people?
- Can these relationships be explained by other factors?
- What is the relationship, if any, between individual items on the life satisfaction index and the risk of mortality among older people?
- Are there differences between the UK and Taiwan in life satisfaction as a predictor of mortality?

In addressing these questions, the analyses also consider the following question:

- Is there a difference in the mortality rate between the UK and Taiwan?

This chapter is divided into five sections. Section 6.2 provides a description of the research methods used in the analyses, while Section 6.3 presents the research findings. Sections 6.4 and 6.5 present the discussion and conclusion respectively. These sections are closely linked, as the research findings will be interpreted, discussed and will help to determine the conclusion.

6.2 *Methods*

In this chapter, all data analyses were performed using SPSS statistical software package, version 14.0 (SPSS Inc., 2005). First, the Kaplan-Meier survival curves analyses were computed for comparing mortality among older people in the UK and Taiwan. Next, Cox regression analyses were used to answer the research questions concerning relationships between life satisfaction and mortality.

6.2.1 Kaplan-Meier survival curve

The Kaplan-Meier survival curves were developed to show the survival curve for the two samples according to the levels of life satisfaction of participants (high, low) in 1989. The Kaplan-Meier method of analysis is a nonparametric technique for estimating the time-to-event (e.g., for analyzing death as an outcome). The survival can be illustrated graphically so as to identity observable differences between survival curves (Kaplan and Meier, 1958). The survival curve is useful to see when participants do not experience the event and are censored. The curves are more

precise in the earlier periods (left hand side of the survival curves) than in the later periods (right hand side of the survival curves) as the number of participants decreases over time.

The Kaplan-Meier survival analysis computes the mean and median survival with their confidence intervals. The mean survival time is defined as the mean time that participants are alive. The median survival time is defined as the time at which half of participants have died and half are still alive. Additionally, the Log-rank test can be used to compare the equality of two or more survival distributions and to test for differences between different groups (Kaplan and Meier, 1958). The null hypothesis for this research was that there is no difference in survival between people with high and low levels of life satisfaction in the two samples. Therefore, the Kaplan Meier method was used to estimate survival probabilities and to compare the survival of those with high and low levels of life satisfaction according to the median score of LSI (see Section 5.3.2.1) in the two countries (UK and Taiwan).

6.2.2 Cox regression analysis

Cox regression, also called *Cox proportional hazards regression*, is important for analysing independent variables as potential risk factors for mortality (Cox, 1972; Altman, 1991). In other words, one or more factor variables, called *covariates*, are used to predict a status (event) variable (SPSS Inc., 2005), the dependent variable.

In this chapter, Cox regression analysis was used to observe the relationship between life satisfaction and fourteen-year and ten-year mortality in old age, first in unadjusted models and then whilst controlling for demographic characteristics, physical and mental health, and social engagement. There are three parts in this section:, first, using the life satisfaction index as a measure of life satisfaction to determine whether it is a predictor of mortality; second, using change the life satisfaction index (from 1989 to 1993) as a measure of life satisfaction to determine whether this is a predictor of mortality; finally, using the individual items from the life satisfaction index to determine whether these are predictors of mortality.

Data on deaths among participants within the two samples were available up until the 31st December 2003. Over the 14-year period from 1989 to 31st December 2003, the NLSAA received notification of 418 deaths and the SHLSET received notification of 601 deaths. During the ten-year period from 1993 to 31st December 2003, there were

232 reported deaths in the NLSAA study and 420 deaths in the SHLSET study. For the analyses, the dependent variable was the survival time in days from when the person was interviewed in 1989 (and 1993) until the date on which they died, or for participants who had not died by 31st December 2003, the time from when the person was interviewed in 1989 (or 1993) until the date of censorship, i.e., 31st December 2003.

First, relationships between life satisfaction and other predictors and the event were assessed using Cox proportional hazards regression models, with the status variable (also called the event or censoring variable) as the dependent variable. The independent variables in the successive models were as follows:

- Model 1: Standardised LSI score;
- Model 2: Standardised LSI score and demographic variables (i.e., age, gender, marital status, living arrangements, satisfaction with income etc.);
- Model 3: Standardised LSI score, demographic variables, and physical health (i.e., self-rated health, perceived health relative to peers, smoking, diseases etc.);
- Model 4: Standardised LSI score, demographic variables, physical health, and psychological well-being (i.e., loneliness, standardised SAD score);
- Model 5: Standardised LSI score, demographic variables, physical health, psychological well-being, and social engagement (i.e., attending religious group, attending a club, or organization, having a TV or radio, having friends).

Second, Cox regression analysis was used to assess change in life satisfaction as a risk factor among older people in the UK (NLSAA) and Taiwan (SHLSET). The dependent variable – change in life satisfaction score – was calculated as the difference between 1989 and 1993, i.e., by subtracting the 1989 score from the 1993 score such that a negative value represented a decrease in LSI over the four years, and a positive value an increase. The descriptive statistics for the change in life satisfaction score and other covariates is shown in Section 5.3.2.1.

For participants in this study, the dependent variable was the time, in days, from when the person was interviewed in 1993 until the date they died, or for participants who had not died by 31st December 2003, the time from when the person was interviewed in 1993 until the date of censorship; i.e., 31st December 2003. The relationships between change in life satisfaction score and other predictors were assessed in Cox

proportional hazards regression models with the status variable (also called the event or censoring variable) as the dependent variable.

Finally, Cox regression was used to analyze the individual items in the life satisfaction index (LSI) scale to determine if there was an association between any of these items and the risk of mortality, from the time of the interview in 1989/1993 to the censored and uncensored outcomes recorded in 2003. There were thirteen items in the LSI used in the NLSAA questionnaire study in 1989 and 1993 and ten items in the LSI used in the SHLSET questionnaire in 1989, four items in the LSI used in the SHLSET questionnaire in 1993. All items were treated as individual independent variables in separate Cox regression models. The dependent variable selected was the survival time from when the person was interviewed in 1989 or 1993 until the date of death or censorship, i.e., 31st December 2003.

6.3 *Results*

Section 6.3.1 compares the survival time of older people with high and low standardised life satisfaction score in the two samples (NLSAA vs. SHLSET) using Kaplan-Meier survival analysis. Section 6.3.2 assesses life satisfaction as a predictor of mortality; next, change in life satisfaction is evaluated as a predictor of mortality (Section 6.3.3); then, each item of the life satisfaction scale is examined as a predictor of mortality (Section 6.3.4).

6.3.1 Comparing life satisfaction as a predictor of mortality between the UK and Taiwan

1989

A Kaplan-Meier curve was used to illustrate the survivorship of the two samples and to examine for possible differences in the survival curves for the different groups (NLSAA: low life satisfaction vs. SHLSET: low life satisfaction and NLSAA: high life satisfaction vs. SHLSET: high life satisfaction). See Section 5.3.1.2 for a description of how high and low life satisfaction was calculated for the samples.

Figure 6.1 presents the survival curves for people with high and low levels of life satisfaction in the NLSAA and SHLSET from 1989 to 2003.

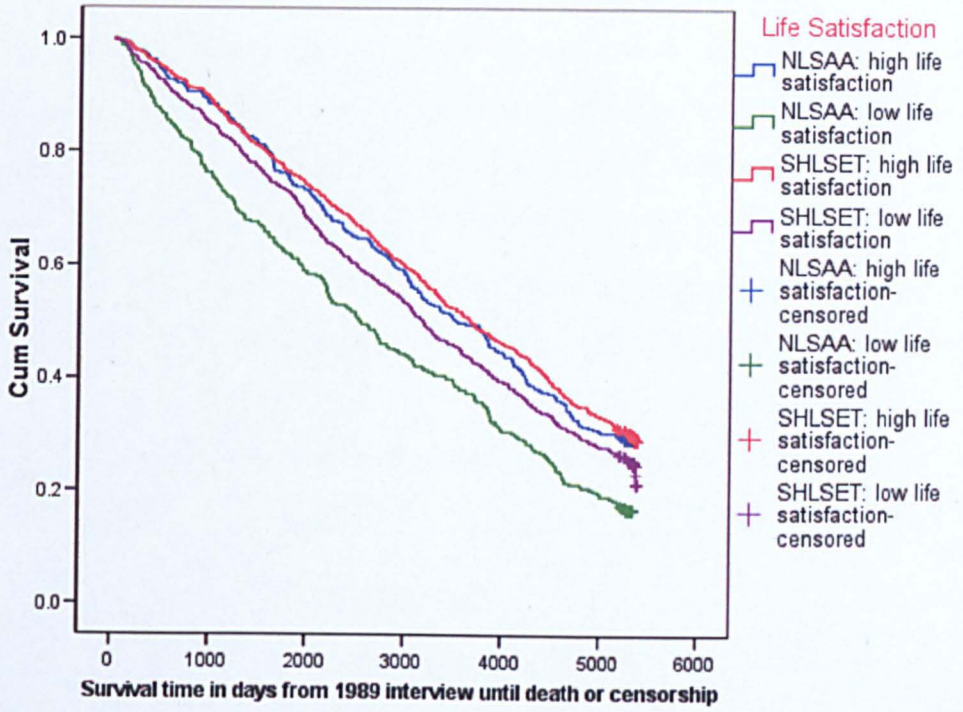

Figure 6.1: Kaplan-Meier survival curves of high and low life satisfaction (1989) in the NLSAA and SHLSET to 2003.

The Kaplan-Meier survival curve is often illustrated graphically. It looks like a poorly designed staircase, with vertical steps downward at the time of death of each individual participant, a steeper line indicating a higher rate of mortality. The vertical axis shows the probability of survival. The horizontal axis shows the survival time in days from the 1989 interview to 31st December 2003.

Comparing the plots for people in Taiwan with high life satisfaction (red line) and low life satisfaction (purple line), there was a clear gap, suggesting a clear difference between people with high life satisfaction and people with low life satisfaction. In the NLSAA study, there was a larger gap between the survival curve for people with high life satisfaction (blue line) and those with low life satisfaction (green line), suggesting again that older people with high life satisfaction had a long survival time compared with their counterparts with low life satisfaction. This set of curves clearly suggests that older people with higher life satisfaction had better long-term survival than older people with low life satisfaction in the two countries.

Comparing the curves for people in Taiwan with high life satisfaction (red line) and in the UK with high life satisfaction (blue line), there was some crossover between the two lines, particularly in the early years, although this was less in later years, suggesting possibly no significant difference between the two groups. On the other

hand, the plot for the older people from the NLSAA with low life satisfaction (green line) was below that of the older people from SHLSET with low life satisfaction (purple line) throughout most of the follow-up period, which suggested that older people in the UK with low life satisfaction might have a lower probability of survival than older people with low life satisfaction in Taiwan.

Table 6.1 presents the mean and median survival times for comparing older people with high and low life satisfaction in the two samples from the UK and Taiwan in 1989.

Table 6.1: Mean and median survival time of high and low life satisfaction in the NLSAA and SHLSET in 1989.

	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
NLSAA: low life satisfaction	2754.70	101.57	2555.62–2953.79	2545.00	189.20	2174.15–2915.84	10,700
NLSAA: high life satisfaction	3391.37	95.56	3204.07–3578.68	3546.00	209.14	3136.08–3955.91	
SHLSET: low life satisfaction	3193.53	70.71	3054.93–3332.13	3194.00	133.21	2932.89–3455.10	10,772
SHLSET: high life satisfaction	3477.02	40.14	3347.57–3606.47	3678.00	152.89	3378.33–3977.66	

1. Estimation is limited to the largest survival time if it is censored.
2. Standard error.
3. Total survival time in days.

There was a significant difference in the mean and median survival times between people with high and low life satisfaction in the NLSAA (χ^2=19.863; p<0.001); people with high life satisfaction lived longer than people with low life satisfaction. As well, there was not a significant difference in the mean and median survival times between people with high and low life satisfaction in SHLSET (χ^2=7.039; p=0.008); people with high life satisfaction lived longer than people with low life satisfaction.

The Log-rank (Mantel-Cox) test, comparing older people with high life satisfaction in SHLSET and NLSAA showed that the χ^2 statistic was 0.294 (p=0.588), i.e., there was not a statistically significant difference in the mean survival time between the two countries for people with high life satisfaction. On the other hand, the χ^2 statistic for comparing older people with low life satisfaction in SHLSET and NLSAA was 12.922 (p<0.001) showing that there was a significant difference in survival among people with low life satisfaction in the two studies.

1993

Figure 6.2 presents the survival curves for people with high and low levels of life satisfaction in the NLSAA and SHLSET from 1993 to 2003.

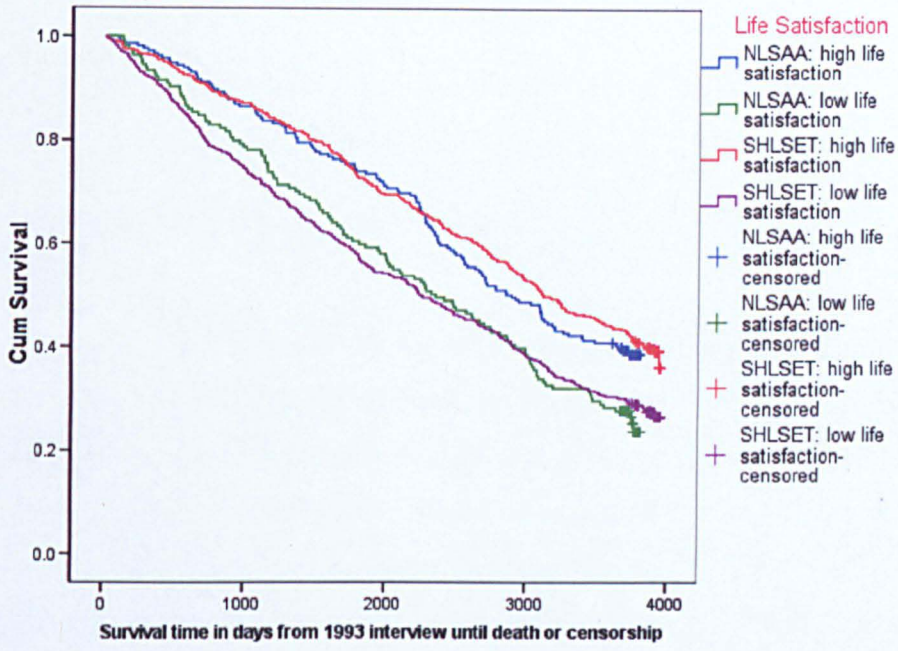

Figure 6.2: Kaplan-Meier survival curves of high and low life satisfaction (1993) in the NLSAA and SHLSET to 2003.

The survival curves for older people with high and low life satisfaction in each of the two studies were clearly separate, suggesting a significant difference in survival between people with high and low life satisfaction in both countries.

As can be seen in Figure 6.2, the blue line indicating people with high life satisfaction in the NLSAA, crossed over with the red line (SHLSET sample with high life satisfaction), suggesting that there was not a significant difference in survival between the people with high life satisfaction in the two studies. Similarly, the green line (older people with low life satisfaction from the NLSAA) was close to, and crossed over with, the purple line (older people with low life satisfaction in the NLSAA), again suggesting that there was not a significant difference in survival between the people with low life satisfaction in the two studies. These curves suggest that older people with low/high life satisfaction in the UK had similar survival to their counterparts in Taiwan.

Table 6.2 shows the mean and median survival times for older people with high and low life satisfaction in the two samples from the UK and Taiwan in 1993.

Table 6.2: Mean and median survival times of high and low life satisfaction in the NLSAA and SHLSET in 1993.

	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
NLSAA: low life satisfaction	2304.56	98.82	2110.86-2498.27	2358.00	233.47	1900.38-2815.61	7,625
NLSAA: high life satisfaction	2669.82	80.13	2512.77-2826.88	2893.00	165.88	2567.87-3218.12	
SHLSET: low life satisfaction	2285.52	58.50	2170.85-2400.18	2259.00	153.40	1958.33-2559.67	7,904
SHLSET: high life satisfaction	2786.39	59.83	2669.11-2903.67	3119.00	148.73	2827.47-3410.52	

1. Estimation is limited to the largest survival time if it is censored.
2. Standard error.
3. Total survival time in days.

There was a significant difference in the mean and median survival times between people with high and low life satisfaction in the NLSAA (χ^2=8.563; p=0.003); people with high life satisfaction lived longer than people with low life satisfaction. As well, there was not a significant difference in the mean and median survival times between people with high and low life satisfaction in SHLSET (χ^2=26.421; p<0.001); people with high life satisfaction lived longer than people with low life satisfaction.

Using the Kaplan-Meier Survival Analysis procedure, the mean and median survival time was computed for each level of the life satisfaction scale. The mean and median values presented the survival time in days between people with high and low life satisfaction. The Log-rank (Mantel-Cox) test showed that the χ^2 test statistic was 0.065 (p=0.799) for people with low satisfaction in the two studies. In other words, there was not a statistically significant difference in the mean survival time between the two countries with respect to people with low life satisfaction. In addition, the χ^2 was 0.596 (p=0.44) in survival, showing that there was not a significant difference between the two studies for people with high life satisfaction.

6.3.2 Life satisfaction as a predictor of mortality

14-year mortality in the NLSAA study

Table 6.3 shows the results of the Cox regression analysis for life satisfaction and other variables as predictors of 14-year mortality in the NLSAA dataset, from 1989 to 2003. The overall model (χ^2=184.743; df=33; p<0.001), with all independent variables entered, was significant.

Model 1 presents a logit estimate for every one-unit increase in the 1989 standardised life satisfaction score, which is a 0.990 decrease in the log-odds of mortality. In other words, for every increase in the standardised life satisfaction score by one point (HR=0.991; 95% CI=0.986–0.995; $p<0.01$), the risk of mortality in the time period decreased by 0.009.

The relationship between life satisfaction and 14-year mortality remained significant in Model 2 (demographic variables were included; HR=0.990; 95% CI=0.985–0.995; $p<0.001$), Model 3 (demographic and physical health variables were included; HR=0.995; 95% CI=0.990–1.000; $p=0.049$), and Model 4 (demographics, physical health, and psychological well-being variables were included; HR=0.993; 95% CI=0.987–0.999; $p=0.019$).

There was a significant association between life satisfaction and mortality when demographic variables, physical and mental health factors, and social engagement factors were included in the final model (Model 5) (HR=0.993; 95% CI=0.987–1.000; $p=0.036$). As with models 1-4, an increase in the standardised life satisfaction score was associated with a decreased risk of mortality.

In the final model, other independent variables were risk factors for mortality, i.e., the hazard ratio of 1.081 for age indicates that each one-year increase in age was associated with a 0.081 (8.1%) increase in the hazard rate. The risk of mortality for females was only 0.703 times the level for males, while controlling for all other covariates in the model. Those who rated their health as poor (HR=3.704), fair (HR=1.700), average (HR=1.516), or good (HR=1.608) experienced an increased risk of mortality compared with those who rated their health as excellent. Increased risk also was evident for smokers (HR=1.469) and those with self-reported heart problems (HR=1.400) and those using a walking aid (HR=1.328).

Table 6.3: Life satisfaction as a predictor for 14-year mortality in the NLSAA study.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.991***	0.986–0.995	0.990***	0.985–0.995	0.995*	0.990–1.000	0.993*	0.987–0.999	0.993*	0.987–1.000
Age				1.073***	1.053–1.093	1.081***	1.060–1.103	1.081***	1.060–1.102	1.081***	1.059–1.103
Gender (Male)	Female			0.651***	0.526–0.805	0.679**	0.535–0.862	0.702**	0.551–0.894	0.703**	0.549–0.899
Marital status (Married)	Single			1.142	0.674–1.934	1.003	0.572–1.759	0.983	0.559–1.726	0.984	0.556–1.740
	Widowed			1.398	0.969–2.017	1.326	0.903–1.948	1.336	0.905–1.974	1.340	0.905–1.982
	Separated/ Divorced			1.104	0.588–2.074	1.073	0.564–2.039	1.100	0.578–2.094	1.098	0.574–2.101
Living status (Living alone)	Living with someone			1.065	0.755–1.503	1.053	0.736–1.507	1.044	0.727–1.500	1.024	0.709–1.477
Satisfied with income (No)	Yes			1.182	0.920–1.519	1.188	0.919–1.535	1.197	0.925–1.547	1.187	0.915–1.539
Social class (Professional/intermediate)	Skilled/manual & non-manual			1.213	0.906–1.623	1.267	0.932–1.722	1.281	0.942–1.742	1.247	0.914–1.701
	Semiskilled/ unskilled/others			1.079	0.775–1.503	1.146	0.808–1.628	1.147	0.808–1.629	1.107	0.775–1.581
Self-rated health (Excellent)	Poor					3.429***	1.889–6.227	3.598***	1.973–6.562	3.704***	1.999–6.865
	Fair					1.546*	1.008–2.370	1.628*	1.055–2.512	1.700*	1.096–2.637
	Average					1.458	0.983–2.162	1.490*	1.004–2.213	1.516*	1.018–2.260
	Good					1.577**	1.141–2.181	1.595**	1.153–2.207	1.608**	1.157–2.235
Perceived health relative to peers (More healthy)	Less healthy					1.155	0.725–1.841	1.198	0.750–1.914	1.168	0.728–1.876
	About as healthy					1.144	0.906–1.444	1.141	0.903–1.441	1.136	0.898–1.436

(Continued overleaf)

Table 6.3 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes					1.511**	1.190–1.919	1.502**	1.181–1.910	1.469**	1.151–1.875
Arthritis (No)	Yes					0.898	0.716–1.126	0.901	0.718–1.130	0.912	0.725–1.146
Heart (No)	Yes					1.426**	1.115–1.823	1.405**	1.097–1.800	1.400**	1.089–1.800
Stomach (No)	Yes					1.056	0.833–1.337	1.060	0.835–1.345	1.044	0.821–1.327
Dizziness (No)	Yes					0.984	0.786–1.232	1.003	0.799–1.259	1.015	0.808–1.275
High blood pressure (No)	Yes					0.940	0.735–1.203	0.946	0.739–1.211	0.941	0.735–1.206
Urinary incontinence (No)	Yes					1.013	0.791–1.296	1.003	0.783–1.285	1.002	0.781–1.286
Walking difficulties (No)	Yes					0.893	0.695–1.147	0.917	0.712–1.179	0.928	0.719–1.197
Walking aid use (No)	Yes					1.379*	1.063–1.790	1.349*	1.038–1.754	1.328*	1.019–1.729
Loneliness (No)	Yes							1.028	0.798–1.324	1.019	0.791–1.313
Standardised SAD score								0.993	0.981–1.004	0.993	0.981–1.004
Newspaper or journal (No)	Yes									0.994	0.704–1.402
Religious group (No)	Yes									0.972	0.764–1.237
Club or organization (No)	Yes									0.890	0.715–1.109
Pets (No)	Yes									1.044	0.815–1.336
TV or radio (No)	Yes									0.798	0.531–1.199
Friends (No)	Yes									1.076	0.820–1.412

P.S.: * <0.05; ** <0.01; *** <0.001

14-year mortality in the SHLSET study

Table 6.4 presents Cox regression estimates for life satisfaction and other predictors of 14-year mortality in the SHLSET study. The overall model (χ^2=196.610; df=33; p<0.001), with all independent variables entered, was significant.

Model 1 shows that there was a significant association between life satisfaction in 1989 and fourteen-year mortality (HR=0.994; 95% CI=0.990–0.997; p<0.001) in the unadjusted model. That is to say, those participants with higher life satisfaction scores had a decreased risk of mortality.

As can be seen in Model 2, there was also a significant association between life satisfaction and mortality when demographic variables were included as covariates (HR=0.996; 95% CI=0.992–0.999; p=0.019), but was no longer predictive when physical health predictors (Model 3), mental health factors (Model 4), and social engagement were included (Model 5).

This final model showed no significant association between life satisfaction and mortality (HR=1.000; 95% CI=0.996–1.004; p=0.950). However, being older (HR=1.052), being separated or divorced (HR=1.944), having poor (HR=2.492), fair (HR=1.731), average (HR=1.496) or good (HR=1.414) self-rated health, having high blood pressure (HR=1.236), urinary incontinence (HR=1.364) and having walking difficulties (HR=1.334) was associated with an increased risk of mortality in this model. Being female (HR=0.639) and reading a newspaper or a journal (HR=0.785) were associated with decreased mortality risk. Psychological factors were not associated with 14-year mortality. Health and social engagement variables appeared to modify, and explain, the relationship between life satisfaction and mortality of older people in the SHLSET study.

Table 6.4: Life satisfaction as a predictor for 14-year mortality in the SHLSET study.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.994***	0.990–0.997	0.996*	0.992–0.999	1.000	0.996–1.004	1.000	0.995–1.004	1.000	0.996–1.004
Age				1.064***	1.048–1.080	1.057***	1.040–1.073	1.057***	1.041–1.074	1.052***	1.035–1.070
Gender (Male)	Female			0.688***	0.574–0.825	0.688**	0.556–0.851	0.690**	0.558–0.853	0.639***	0.511–0.799
Marital status (Married)	Single			1.186	0.686–2.050	1.338	0.765–2.341	1.317	0.748–2.316	1.425	0.802–2.532
	Widowed			0.982	0.819–1.178	1.103	0.916–1.328	1.096	0.909–1.322	1.077	0.892–1.301
	Separated/Divorced			1.742	1.064–2.854	2.012**	1.220–3.317	1.992**	1.207–3.288	1.944*	1.175–3.218
Living status (Living alone)	Living with someone			0.625	0.087–4.477	1.058	0.143–7.839	1.151	0.154–8.604	1.200	0.156–9.227
Satisfied with income (No)	Yes			0.891	0.745–1.066	0.975	0.811–1.172	0.972	0.809–1.169	0.980	0.814–1.181
Social class (Professional/intermediate)	Skilled/manual & non-manual			0.964	0.704–1.321	1.015	0.739–1.395	1.009	0.734–1.387	0.986	0.712–1.363
	Semiskilled/ unskilled/others			1.159	0.894–1.501	1.170	0.901–1.521	1.161	0.893–1.510	1.060	0.798–1.407
Self-rated health (Excellent)	Poor					2.620**	1.490–4.608	2.766**	1.552–4.929	2.492**	1.380–4.499
	Fair					1.760**	1.203–2.575	1.789**	1.221–2.621	1.731**	1.179–2.540
	Average					1.522*	1.105–2.095	1.530**	1.111–2.107	1.496*	1.085–2.064
	Good					1.434*	1.038–1.982	1.446*	1.045–2.001	1.414*	1.021–1.958
Perceived health relative to peers (More healthy)	Less healthy					1.095	0.814–1.472	1.091	0.812–1.468	1.052	0.781–1.417
	About as healthy					1.080	0.876–1.333	1.075	0.870–1.326	1.049	0.847–1.298

(Continued overleaf)

Table 6.4 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes					1.204	0.980–1.480	1.199	0.976–1.474	1.177	0.956–1.449
Arthritis (No)	Yes					0.906	0.757–1.084	0.916	0.764–1.097	0.900	0.750–1.079
Heart (No)	Yes					1.048	0.857–1.281	1.052	0.860–1.287	1.074	0.876–1.317
Stomach (No)	Yes					0.929	0.759–1.137	0.939	0.766–1.151	0.931	0.758–1.144
Dizziness (No)	Yes					1.172	0.795–1.729	1.155	0.782–1.706	1.124	0.760–1.662
High blood pressure (No)	Yes					1.195	0.989–1.444	1.199	0.992–1.449	1.236*	1.019–1.499
Urinary incontinence (No)	Yes					1.361**	1.079–1.717	1.378**	1.090–1.741	1.364**	1.079–1.725
Walking difficulties (No)	Yes					1.347**	1.091–1.663	1.360**	1.101–1.681	1.334**	1.077–1.653
Walking aid use (No)	Yes					1.191	0.907–1.565	1.181	0.897–1.556	1.189	0.901–1.568
Loneliness (No)	Yes							1.045	0.848–1.288	1.045	0.847–1.288
Standardised SAD score								0.997	0.990–1.004	0.998	0.991–1.005
Newspaper or journal (No)	Yes									0.785*	0.625–0.986
Religious group (No)	Yes									0.936	0.710–1.234
Club or organization (No)	Yes									1.064	0.758–1.492
Pets (No)	Yes									0.840	0.643–1.097
TV or radio (No)	Yes									0.867	0.630–1.193
Friends (No)	Yes									1.191	0.831–1.708

P.S.: * <0.05; ** <0.01; *** <0.001.

14-year mortality in the combined dataset

Table 6.5 shows the Cox regression estimates for life satisfaction and other predictors for 14-year mortality in the combined data set. The overall model (χ^2=347.070; df=34; p<0.001), with all independent variables entered, was significant.

As can be seen in Model 1, there was a significant association between the 1989 standardised life satisfaction score and mortality (HR=0.993; 95% CI=0.990–0.995; p<0.001). For every one-unit increase in the standardised life satisfaction score, there was a 0.007 decrease in the risk of mortality.

There was a significant relationship between life satisfaction and mortality when the study location variable was added to the model (Model 2) (HR=0.993; 95% CI=0.990–0.995; p<0.001). People with a higher level of life satisfaction had a decreased risk of mortality. The study location variable was not significantly associated with mortality and appeared to have no effect on the life satisfaction-mortality relationship.

In model 3, there was a significant relationship between life satisfaction and mortality when demographic variables were included as covariates (HR=0.993; 95% CI=0.990–0.996; p<0.001). Again, higher life satisfaction score were associated with a decreased risk of mortality. However, when physical health (Model 4), psychological well-being variables (Model 5), and social engagement predictors (Model 6) were included, life satisfaction no longer predicted mortality among older people.

In the final model, the same predictor variables were not significantly associated with mortality as Models 3, 4, and 5. However, one additional variable related to physical health became a predictor, with having urinary incontinence being associated with an increased mortality risk compared to not having urinary incontinence.

Table 6.5: Life satisfaction as a predictor for 14-year mortality in the combined data.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.993***	0.990–0.995	0.993***	0.990–0.995	0.993***	0.990–0.996	0.998	0.995–1.001	0.997	0.994–1.000	0.997	0.994–1.001
Location studies (NLSAA)	SHLSET			0.907	0.800–1.029	1.045	0.867–1.258	0.992	0.810–1.216	1.063	0.842–1.342	0.939	0.726–1.214
Age						1.066***	1.054–1.079	1.066***	1.053–1.078	1.066***	1.054–1.079	1.063***	1.050–1.076
Gender (Male)	Female					0.685***	0.598–0.784	0.698***	0.601–0.812	0.706***	0.607–0.821	0.677***	0.580–0.792
Marital status (Married)	Single					0.975	0.688–1.382	0.975	0.684–1.390	0.957	0.670–1.368	0.994	0.692–1.427
	Widowed					1.061	0.905–1.244	1.140	0.970–1.340	1.135	0.965–1.334	1.118	0.951–1.315
	Separated/ Divorced					1.230	0.840–1.801	1.400	0.953–2.055	1.403	0.955–2.061	1.397	0.949–2.055
Living status (Living alone)	Living with someone					0.840	0.667–1.058	0.910	0.722–1.146	0.896	0.704–1.141	0.865	0.676–1.107
Satisfied with income (No)	Yes					0.981	0.851–1.131	1.014	0.877–1.171	1.012	0.876–1.169	1.022	0.883–1.183
Social class (Professional/intermediate)	Skilled/manual & non-manual					1.092	0.889–1.343	1.129	0.917–1.390	1.132	0.919–1.394	1.100	0.891–1.357
	Semiskilled/ unskilled/others					1.126	0.922–1.375	1.133	0.926–1.387	1.125	0.919–1.378	1.057	0.857–1.304
Self-rated health (Excellent)	Poor							3.047***	2.053–4.523	3.246***	2.174–4.848	3.123***	2.082–4.684
	Fair							1.755***	1.329–2.319	1.806***	1.365–2.390	1.793***	1.353–2.376
	Average							1.567***	1.232–1.994	1.583***	1.244–2.016	1.575***	1.235–2.008
	Good							1.506***	1.201–1.888	1.516***	1.208–1.902	1.494***	1.190–1.876
Perceived health relative to peers (More healthy)	Less healthy							1.093	0.861–1.387	1.099	0.866–1.394	1.074	0.846–1.364
	About as healthy							1.095	0.938–1.279	1.088	0.931–1.270	1.074	0.918–1.256

(Continued overleaf)

Table 6.5 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes							1.305**	1.122–1.518	1.304**	1.121–1.516	1.282**	1.101–1.493
Arthritis (No)	Yes							0.875	0.763–1.005	0.885	0.771–1.017	0.888	0.773–1.020
Heart (No)	Yes							1.196*	1.026–1.394	1.199*	1.028–1.398	1.198*	1.026–1.399
Stomach (No)	Yes							0.969	0.835–1.126	0.975	0.839–1.133	0.975	0.838–1.133
Dizziness (No)	Yes							1.012	0.839–1.222	1.020	0.845–1.232	1.042	0.864–1.257
High blood pressure (No)	Yes							1.064	0.918–1.232	1.072	0.925–1.242	1.090	0.940–1.264
Urinary incontinence (No)	Yes							1.175	0.993–1.390	1.182	0.999–1.400	1.184*	1.000–1.400
Walking difficulties (No)	Yes							1.122	0.959–1.313	1.138	0.972–1.332	1.129	0.964–1.322
Walking aid use (No)	Yes							1.299**	1.078–1.566	1.285**	1.066–1.550	1.290**	1.069–1.556
Loneliness (No)	Yes									1.023	0.885–1.183	1.016	0.878–1.176
Standardised SAD score										0.995	0.990–1.001	0.996	0.990–1.001
Newspaper or journal (No)	Yes											0.863	0.724–1.030
Religious group (No)	Yes											0.938	0.786–1.119
Club or organization (No)	Yes											0.898	0.750–1.075
Pets (No)	Yes											0.937	0.785–1.119
TV or radio (No)	Yes											0.838	0.659–1.066
Friends (No)	Yes											1.133	0.922–1.393

P.S.: * <0.05; ** <0.01; *** <0.001.

Ten-year mortality in the NLSAA study

Table 6.6 presents the results of Cox regression analysis of life satisfaction and other variables as predictors of ten-year mortality in the NLSAA dataset. The overall model (χ^2=95.452; df=33; p<0.001), with all independent variables entered, was significant.

Life satisfaction predicted ten-year mortality in the unadjusted model (Model 1). For every one-unit increase in the standardised life satisfaction score, there was a 0.013 decrease in the risk of mortality (HR=0.987; 95% CI=0.981–0.993; p<0.001).

There was a significant relationship between life satisfaction and mortality when demographic factors were included as covariates in Model 2 (HR=0.989; 95% CI=0.983–0.995; p=0.001). For each one unit increase in life satisfaction score, the log-odds of mortality decreased by 0.989 units when all other variables in the model were held constant. Model 3 shows that there was a significant association between life satisfaction and mortality when demographic and health variables were included (HR=0.990; 95% CI=0.982–0.997; p=0.006). Life satisfaction still predicted mortality when mental health and social engagement variables were included as covariates in Models 4 and 5 (HR=0.991; 95% CI=0.982–0.999; p=0.024).

In the final model, as with Model 3 and Model 4, age (HR=1.103) was associated with an increase in the risk of mortality. People who smoked had an increased mortality risk (HR=1.751). People with self-reported urinary incontinence problems appeared to have a decreased mortality risk (HR=0.651). Interestingly, loneliness was associated with an in increased risk of mortality (HR=1.503).

Table 6.6: Life satisfaction as a predictor for ten-year mortality in the NLSAA study.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.987***	0.981–0.993	0.989**	0.983–0.995	0.990**	0.982–0.997	0.991*	0.982–0.999	0.991*	0.983–1.000
Age				1.093***	1.062–1.126	1.103***	1.068–1.140	1.104***	1.068–1.141	1.103***	1.066–1.140
Gender (Male)	Female			0.840	0.628–1.123	0.882	0.641–1.213	0.872	0.628–1.209	0.871	0.623–1.217
Marital status (Married)	Single			1.208	0.631–2.312	1.195	0.612–2.334	1.159	0.590–2.273	1.279	0.638–2.564
	Widowed			0.897	0.606–1.328	0.814	0.544–1.218	0.762	0.506–1.148	0.775	0.513–1.169
	Separated/ Divorced			0.915	0.429–1.950	0.831	0.379–1.821	0.925	0.417–2.052	0.910	0.408–2.033
Living status (Living alone)	Living with someone			0.927	0.641–1.341	0.877	0.600–1.284	0.906	0.618–1.328	0.907	0.615–1.336
Satisfied with income (No)	Yes			1.131	0.769–1.663	1.134	0.761–1.692	1.105	0.739–1.652	1.165	0.774–1.753
Social class (Professional/intermediate)	Skilled/manual & non-manual			1.234	0.845–1.802	1.201	0.808–1.785	1.150	0.773–1.710	1.083	0.723–1.622
	Semiskilled/ unskilled/others			1.119	0.728–1.720	1.091	0.688–1.730	1.056	0.666–1.674	1.011	0.633–1.614
Self-rated health (Excellent)	Poor					1.630	0.786–3.377	1.503	0.716–3.155	1.528	0.723–3.229
	Fair					1.557	0.860–2.818	1.444	0.795–2.623	1.512	0.828–2.761
	Average					1.521	0.870–2.658	1.442	0.821–2.534	1.525	0.862–2.697
	Good					1.278	0.779–2.097	1.194	0.725–1.966	1.187	0.719–1.959
Perceived health relative to peers (More healthy)	Less healthy					1.099	0.594–2.034	1.125	0.598–2.116	1.061	0.563–2.000
	About as healthy					0.882	0.627–1.241	0.871	0.619–1.227	0.849	0.601–1.198

(Continued overleaf)

Table 6.6 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes					1.790**	1.255–2.554	1.771**	1.240–2.528	1.751**	1.212–2.530
Arthritis (No)	Yes					0.908	0.656–1.256	0.967	0.695–1.346	1.025	0.729–1.442
Heart (No)	Yes					1.071	0.766–1.496	1.088	0.778–1.521	1.163	0.825–1.640
Stomach (No)	Yes					1.062	0.763–1.479	1.089	0.781–1.518	1.078	0.773–1.503
Dizziness (No)	Yes					0.903	0.663–1.229	0.966	0.708–1.318	0.948	0.693–1.295
High blood pressure (No)	Yes					0.979	0.708–1.354	0.967	0.698–1.340	0.985	0.706–1.374
Urinary incontinence (No)	Yes					0.677*	0.485–0.946	0.674*	0.483–0.940	0.651*	0.463–0.913
Walking difficulties (No)	Yes					1.340	0.932–1.929	1.316	0.917–1.890	1.291	0.893–1.866
Walking aid use (No)	Yes					1.009	0.727–1.401	1.060	0.764–1.469	1.038	0.745–1.446
Loneliness (No)	Yes							1.459*	1.083–1.963	1.503**	1.114–2.027
Standardised SAD score								0.993	0.976–1.010	0.993	0.977–1.010
Newspaper or journal (No)	Yes									0.810	0.524–1.252
Religious group (No)	Yes									0.791	0.566–1.105
Club or organization (No)	Yes									0.904	0.677–1.207
Pets (No)	Yes									1.084	0.751–1.565
TV or radio (No)	Yes									–	–
Friends (No)	Yes									0.893	0.596–1.338

P.S.: * <0.05; ** <0.01; *** <0.001.

Ten-year mortality in the SHLSET study

Table 6.7 presents Cox regression estimates for life satisfaction and other predictors of ten-year mortality in the SHLSET dataset, from 1993 to 2003. The overall model (χ^2=144.016; df=33; p<0.001), with all independent variables entered, was significant.

There was a significant association between life satisfaction in 1993 and ten-year mortality (HR=0.997; 95% CI=0.994−1.000; p=0.026) in the Model 1. For every one-unit increase in the standardised life satisfaction score, there was a 0.003 decrease in the risk of mortality. When demographic variables (Model 2), physical health (Model 3), psychological well-being (Model 4), and social engagement variables (Model 5) were included as covariates, life satisfaction no longer predicted ten-year mortality among older people in SHLSET.

In the final model, demographic variables (i.e., age, gender) and physical health (i.e., smoking, walking difficulties) had a significant association with life satisfaction in relation to mortality, as with Model 4. Psychological variables did not show any association with mortality. With respect to social engagement variables, older people in SHLSET who had access to a TV or radio (HR=0.500), or had more friends (HR=0.772) showed a decreased risk of mortality.

Table 6.7: Life satisfaction as a predictor for ten-year mortality in the SHLSET study.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.997*	0.994–1.000	0.998	0.995–1.001	1.001	0.998–1.004	1.001	0.997–1.004	1.002	0.999–1.006
Age				1.056***	1.037–1.076	1.045***	1.024–1.066	1.046***	1.025–1.067	1.042***	1.020–1.064
Gender (Male)	Female			0.773*	0.623–0.958	0.837	0.654–1.070	0.840	0.656–1.075	0.769*	0.594–0.996
Marital status (Married)	Single			0.747	0.314–1.778	0.789	0.328–1.895	0.789	0.328–1.897	0.782	0.323–1.893
	Widowed			0.946	0.758–1.182	0.971	0.773–1.221	0.974	0.775–1.225	0.924	0.734–1.163
	Separated/ Divorced			1.419	0.789–2.553	1.409	0.772–2.571	1.436	0.782–2.637	1.370	0.730–2.571
Living status (Living alone)	Living with someone			1.356	0.955–1.926	1.338	0.941–1.901	1.323	0.927–1.887	1.447	0.999–2.094
Satisfied with income (No)	Yes			0.821	0.667–1.009	0.827	0.669–1.022	0.821	0.664–1.017	0.889	0.714–1.106
Social class (Professional/intermediate)	Skilled/manual & non-manual			0.883	0.609–1.262	0.910	0.624–1.329	0.912	0.625–1.331	0.932	0.638–1.362
	Semiskilled/ unskilled/others			1.073	0.792–1.454	1.033	0.759–1.405	1.027	0.755–1.398	0.970	0.702–1.340
Self-rated health (Excellent)	Poor					1.860	1.015–3.408	1.889	1.021–3.494	1.799	0.964–3.358
	Fair					1.351	0.879–2.077	1.349	0.877–2.075	1.340	0.871–2.062
	Average					1.191	0.827–1.715	1.187	0.824–1.710	1.182	0.817–1.709
	Good					1.407	0.975–2.029	1.406	0.975–2.028	1.341	0.929–1.936
Perceived health relative to peers (More healthy)	Less healthy					0.984	0.672–1.442	0.998	0.679–1.467	0.967	0.657–1.423
	About as healthy					0.978	0.758–1.263	0.983	0.761–1.271	1.026	0.792–1.329

(Continued overleaf)

Table 6.7 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes					1.552**	1.198–2.009	1.549**	1.196–2.007	1.524**	1.173–1.979
Arthritis (No)	Yes					0.880	0.692–1.119	0.885	0.695–1.126	0.905	0.709–1.157
Heart (No)	Yes					1.107	0.857–1.430	1.113	0.861–1.438	1.105	0.850–1.435
Stomach (No)	Yes					0.930	0.663–1.303	0.936	0.667–1.313	0.958	0.680–1.350
Dizziness (No)	Yes					0.800	0.110–5.808	0.788	0.108–5.725	0.902	0.124–6.574
High blood pressure (No)	Yes					1.138	0.910–1.424	1.143	0.913–1.430	1.167	0.927–1.468
Urinary incontinence (No)	Yes					1.358	0.982–1.877	1.361	0.985–1.881	1.342	0.968–1.859
Walking difficulties (No)	Yes					1.661**	1.273–2.167	1.660***	1.272–2.168	1.739***	1.328–2.277
Walking aid use (No)	Yes					1.250	0.940–1.662	1.244	0.935–1.657	1.128	0.840–1.515
Loneliness (No)	Yes							0.936	0.721–1.216	0.982	0.754–1.279
Standardised SAD score								1.000	0.993–1.007	0.999	0.992–1.006
Newspaper or journal (No)	Yes									0.897	0.684–1.177
Religious group (No)	Yes									0.890	0.612–1.296
Club or organization (No)	Yes									0.778	0.482–1.256
Pets (No)	Yes									1.125	0.850–1.490
TV or radio (No)	Yes									0.500***	0.366–0.683
Friends (No)	Yes									0.772*	0.623–0.958

P.S.: * <0.05; ** <0.01; *** <0.001.

Ten-year mortality in the combined dataset

Table 6.8 shows that Cox regression estimates of life satisfaction and other predictors on ten-year mortality in the combined data set. The overall model (χ^2=194.080; df=34; p<0.001), with all independent variables entered, was significant.

As can be seen in Model 1, there was a significant association between life satisfaction and mortality (HR=0.995; 95% CI=0.993–0.998; p<0.001). For every one-unit increase in life satisfaction score, there was a 0.005 decrease in the risk of mortality.

In Model 2, there was a significant relationship between life satisfaction and mortality when the study location variable was included in the model (HR=0.995; 95% CI=0.993–0.998; p<0.001). Location of study did not show any relationship with the risk of mortality.

There was also a significant relationship between life satisfaction and mortality when demographic variables were included in Model 3 (HR=0.996; 95% CI=0.993–0.998; p=0.001). Life satisfaction was no longer predictive of ten-year mortality when physical health (Model 4), psychological well-being (Model 5), and social engagement variables (Model 6) were included as covariates.

In the final model, age, smoking, and having walking difficulties adversely were adversely related to mortality. Psychological factors (e.g., loneliness, depression) did not have any association with mortality risk. However, two additional variables related to social engagement were predictors, having a TV or radio and having friends decreaseding the mortality risk compared with not having a TV or radio and not having friends respectively.

Table 6.8: Life satisfaction as a predictor for ten-year mortality in the combined data set.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Standardised LSI score		0.995***	0.993–0.998	0.995***	0.993–0.998	0.996**	0.993–0.998	0.999	0.996–1.002	0.999	0.996–1.002	1.000	0.997–1.004
Study location (NLSAA)	SHLSET			0.903	0.767–1.064	0.931	0.759–1.143	0.945	0.735–1.214	0.998	0.750–1.327	0.830	0.604–1.140
Age						1.068***	1.052–1.085	1.062***	1.045–1.079	1.061***	1.044–1.078	1.059***	1.042–1.070
Gender (Male)	Female					0.821*	0.694–0.972	0.874	0.726–1.052	0.873	0.724–1.052	0.831	0.685–1.007
Marital status (Married)	Single					0.950	0.588–1.534	0.975	0.601–1.581	0.961	0.592–1.560	0.970	0.596–1.577
	Widowed					0.949	0.785–1.148	0.964	0.796–1.168	0.954	0.786–1.156	0.913	0.752–1.107
	Separated/ Divorced					1.116	0.707–1.761	1.096	0.689–1.744	1.105	0.692–1.765	1.089	0.677–1.751
Living status (Live alone)	Live with someone					1.053	0.842–1.317	1.081	0.861–1.356	1.104	0.878–1.389	1.100	0.873–1.386
Satisfied with income (No)	Yes					0.935	0.783–1.116	0.928	0.775–1.112	0.928	0.774–1.112	0.992	0.825–1.194
Social class (Professional/intermediate)	Skilled/manual & non-manual					1.042	0.807–1.344	1.029	0.795–1.332	1.022	0.789–1.324	1.026	0.791–1.331
	Semiskilled/ unskilled/others					1.085	0.851–1.385	1.053	0.822–1.348	1.058	0.826–1.355	1.003	0.775–1.297
Self-rated health (Excellent)	Poor							1.825	1.155–2.883	1.813	1.140–2.885	1.739	1.088–2.778
	Fair							1.476	1.050–2.075	1.469	1.044–2.068	1.429	1.015–2.012
	Average							1.282	0.948–1.732	1.283	0.949–1.734	1.257	0.928–1.703
	Good							1.351	1.012–1.805	1.345	1.007–1.797	1.282	0.959–1.714
Perceived health relative to peers (More healthy)	Less healthy							0.952	0.697–1.299	0.941	0.687–1.289	0.912	0.665–1.252
	About as healthy							0.943	0.775–1.147	0.935	0.768–1.139	0.960	0.788–1.169

(Continued overleaf)

Table 6.8 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Smoking (No)	Yes							1.614***	1.320–1.974	1.606***	1.312–1.964	1.590***	1.297–1.948
Arthritis (No)	Yes							0.845	0.700–1.020	0.845	0.700–1.021	0.866	0.716–1.047
Heart (No)	Yes							1.083	0.886–1.324	1.082	0.885–1.323	1.097	0.895–1.343
Stomach (No)	Yes							1.002	0.794–1.263	1.002	0.794–1.265	1.032	0.817–1.305
Dizziness (No)	Yes							0.986	0.743–1.308	1.004	0.756–1.332	1.027	0.772–1.365
High blood pressure (No)	Yes							1.071	0.897–1.279	1.067	0.893–1.274	1.096	0.916–1.311
Urinary incontinence (No)	Yes							0.967	0.769–1.215	0.965	0.767–1.213	0.966	0.767–1.216
Walking difficulties (No)	Yes							1.577***	1.277–1.947	1.591***	1.287–1.965	1.629***	1.317–2.016
Walking aid use (No)	Yes							1.138	0.922–1.406	1.151	0.931–1.422	1.075	0.868–1.333
Loneliness (No)	Yes									1.136	0.942–1.368	1.186	0.983–1.431
Standardised SAD score										0.998	0.992–1.005	0.998	0.992–1.004
Newspaper or journal (No)	Yes											0.855	0.684–1.070
Religious group (No)	Yes											0.903	0.712–1.146
Club or organization (No)	Yes											0.915	0.725–1.155
Pets (No)	Yes											1.104	0.887–1.373
TV or radio (No)	Yes											0.558***	0.415–0.751
Friends (No)	Yes											0.777**	0.646–0.936

P.S.: * <0.05; ** <0.01; *** <0.001.

6.3.3 Change in life satisfaction as a predict of mortality

Change in life satisfaction was described in Section 5.3.2 as the difference in life satisfaction score from 1989 to 1992 in the NLSAA (UK) and the SHLSET (Taiwan) studies. This Section will examine the relationship between change in life satisfaction and ten-year mortality, and will compare this in the two counties.

The NLSAA study for ten-year mortality

Table 6.9 shows the Cox regression estimates for change in life satisfaction between 1989 and 1993, and other potential predictors of ten-year mortality among the NLSAA participants. The overall model (χ^2=88.861; df=33; p<0.001), with all independent variables entered, was significant.

There was not a statistically significant association between change in life satisfaction and mortality in any of the models in unadjusted or adjusted models.

In the final model, age, smoking, urinary incontinence, and loneliness predicted ten-year mortality although the baseline change in life satisfaction variable did not have a significant relationship with mortality. The hazard ratio for age was 1.103, indicating a 10.3% increase in the hazard rate for each year of age. The risk of death was 1.677 times as high among smokers as among non-smokers. The risk of mortality was a 34.3% less among those with compared to without urinary incontinence. There was 1.602 times increased mortality risk among those who felt lonely compared to those who did not.

Table 6.9: Change in life satisfaction as a predictor of ten-year mortality in the NLSAA.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Change Standardised LSI score 1989-1993		0.997	0.990–1.004	1.000	0.993–1.007	1.001	0.994–1.008	1.002	0.995–1.009	1.001	0.994–1.009
Age in 1993				1.097***	1.065–1.130	1.102***	1.067–1.139	1.104***	1.068–1.141	1.103***	1.066–1.141
Gender (Male)	Female			0.788	0.587–1.057	0.805	0.586–1.106	0.781	0.566–1.078	0.787	0.566–1.095
Marital status (Married)	Single			1.212	0.631–2.329	1.229	0.627–2.412	1.174	0.595–2.316	1.320	0.655–2.660
1989-1993	Widowed			0.941	0.634–1.398	0.869	0.580–1.302	0.787	0.522–1.188	0.804	0.532–1.214
	Separated/Divorced			0.977	0.459–2.077	0.928	0.425–2.026	0.969	0.436–2.156	0.968	0.433–2.165
Living status (Living alone) 1989-1993	Living with someone			0.876	0.606–1.265	0.843	0.577–1.233	0.890	0.608–1.303	0.888	0.603–1.307
Satisfied with income (No) 1989-1993	Yes			1.072	0.729–1.577	1.049	0.706–1.558	1.021	0.687–1.517	1.078	0.722–1.610
Social class in 1993 (Professional/intermediate)	Skilled/manual & non-manual			1.297	0.889–1.893	1.235	0.829–1.840	1.170	0.785–1.742	1.102	0.735–1.654
	Semiskilled/ unskilled/others			1.128	0.732–1.739	1.038	0.651–1.655	1.015	0.638–1.617	0.973	0.606–1.563
Self-rated health (Excellent)	Poor					2.123	1.025–4.396	1.805	0.853–3.817	1.822	0.857–3.877
1989-1993	Fair					1.772	0.976–3.218	1.590	0.872–2.897	1.658	0.905–3.037
	Average					1.630	0.923–2.880	1.561	0.881–2.765	1.648	0.924–2.939
	Good					1.363	0.824–2.255	1.263	0.762–2.094	1.257	0.756–2.090
Perceived health relative to peers (More healthy)	Less healthy					1.174	0.638–2.160	1.116	0.595–2.093	1.054	0.561–1.980
1989-1993	About as healthy					0.973	0.696–1.360	0.953	0.682–1.331	0.914	0.651–1.283
Smoking (No) 1989-1993	Yes					1.737**	1.219–2.477	1.705**	1.194–2.433	1.677**	1.162–2.421

(Continued overleaf)

Table 6.9 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Arthritis (No) 1989-1993	Yes					0.889	0.643–1.229	0.944	0.678–1.315	1.006	0.715–1.416
Heart (No) 1989-1993	Yes					1.027	0.734–1.438	1.047	0.748–1.466	1.126	0.796–1.592
Stomach (No) 1989-1993	Yes					1.096	0.788–1.526	1.118	0.803–1.557	1.104	0.792–1.539
Dizziness (No) 1989-1993	Yes					0.945	0.694–1.286	0.990	0.725–1.352	0.964	0.704–1.319
High blood pressure (No) 1989-1993	Yes					1.041	0.754–1.438	1.031	0.747–1.423	1.044	0.751–1.451
Urinary incontinence (No) 1989-1993	Yes					0.702*	0.503–0.981	0.686*	0.491–0.958	0.657*	0.467–0.925
Walking difficulties (No) 1989-1993	Yes					1.354	0.938–1.956	1.329	0.922–1.916	1.310	0.904–1.898
Walking aid use (No) 1989-1993	Yes					1.088	0.788–1.504	1.134	0.821–1.566	1.106	0.797–1.535
Loneliness (No) 1989-1993	Yes							1.568**	1.172–2.100	1.602**	1.195–2.147
Standardised SAD score 1989-1993								0.999	0.984–1.015	0.999	0.983–1.015
Newspaper or journal (No) 1989-1993	Yes									0.805	0.519–1.249
Religious group (No) 1989-1993	Yes									0.791	0.566–1.105
Club or organization (No) 1989-1993	Yes									0.890	0.667–1.188
Pets (No) 1989-1993	Yes									1.117	0.773–1.614
TV or radio (No) 1989-1993	Yes									–	–*
Friends (No) 1989-1993	Yes									0.905	0.601–1.363

P.S.: * <0.05; ** <0.01; *** <0.001.

* This value was not calculated properly by SPSS because of the very small numbers without a TV or radio, and so the results are omitted.

Ten-year mortality in the SHLSET study

Table 6.10 presents the Cox regression estimates for the relationship between change in life satisfaction and ten-year mortality among Taiwanese older people in the SHLSET study. The overall model (χ^2=138.017; df=33; p<0.001), with all independent variables entered, was significant.

Change in life satisfaction did not have a significant relationship with the risk of mortality in any of the models.

In the final model, some demographic, physical health, and social engagement variables predicted mortality among older people. The risk of death was 4.2% higher with each increase in the number of years; the level of mortality in females was 77.2% of that in males; 63.0% higher in smokers than non-smokers; and 74.6% greater among older people with walking difficulties. The risk of death was less than half as high (HR=0.486) among older people with having a TV or radio than in those without. In addition, the risk of mortality for those people who had some friends was 73.2% that of those people that did not have friends.

Table 6.10: Change in life satisfaction as a predictor of ten-year mortality in SHLSET.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Change Standardised LSI score 1989-1993		0.998	0.995–1.001	0.999	0.996–1.001	1.001	0.998–1.004	1.001	0.998–1.004	1.002	0.999–1.005
Age in 1993				1.054***	1.034–1.074	1.042***	1.021–1.063	1.043***	1.022–1.065	1.042***	1.020–1.065
Gender (Male)	Female			0.769*	0.620–0.954	0.837	0.654–1.073	0.842	0.657–1.079	0.772*	0.596–0.999
Marital status (Married)	Single			0.741	0.312–1.761	0.736	0.307–1.764	0.738	0.308–1.769	0.692	0.286–1.672
1989-1993	Widowed			0.948	0.757–1.187	0.974	0.773–1.226	0.977	0.776–1.231	0.909	0.720–1.147
	Separated/ Divorced			1.443	0.804–2.589	1.341	0.735–2.445	1.382	0.752–2.538	1.280	0.681–2.404
Living status 1989-1993 (Living alone)	Living with someone			1.274	0.898–1.809	1.261	0.886–1.795	1.243	0.870–1.777	1.374	0.946–1.997
Satisfied with income (No)	Yes			0.789*	0.646–0.964	0.824	0.670–1.013	0.814	0.660–1.004	0.909	0.731–1.130
Social class in 1993 (Professional/intermediate)	Skilled/manual & non-manual			0.938	0.642–1.372	0.947	0.644–1.393	0.952	0.648–1.400	0.971	0.659–1.429
	Semiskilled/ unskilled/others			1.151	0.843–1.571	1.088	0.794–1.492	1.084	0.790–1.486	1.039	0.745–1.447
Self-rated health (Excellent)	Poor					1.656	0.898–3.055	1.708	0.915–3.189	1.600	0.849–3.017
1989-1993	Fair					1.310	0.855–2.008	1.315	0.857–2.017	1.320	0.860–2.025
	Average					1.173	0.814–1.691	1.171	0.812–1.689	1.187	0.820–1.720
	Good					1.367	0.944–1.980	1.370	0.946–1.984	1.353	0.933–1.962
Perceived health relative to peers (More healthy)	Less healthy					0.964	0.658–1.412	0.984	0.669–1.448	0.926	0.629–1.363
1989-1993	About as healthy					0.953	0.735–1.236	0.960	0.740–1.246	0.968	0.744–1.259
Smoking (No) 1989-1993	Yes					1.608***	1.239–2.086	1.606***	1.238–2.084	1.630***	1.252–2.123

(Continued overleaf)

Table 6.10 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Arthritis (No) 1989-1993	Yes					0.866	0.680–1.103	0.872	0.684–1.111	0.890	0.696–1.139
Heart (No) 1989-1993	Yes					1.123	0.869–1.451	1.130	0.874–1.460	1.126	0.866–1.463
Stomach (No) 1989-1993	Yes					0.966	0.689–1.354	0.975	0.695–1.368	0.990	0.703–1.396
Dizziness (No) 1989-1993	Yes					0.763	0.105–5.539	0.752	0.103–5.458	0.846	0.116–6.160
High blood pressure (No) 1989-1993	Yes					1.130	0.902–1.417	1.136	0.906–1.424	1.154	0.916–1.455
Urinary incontinence (No) 1989-1993	Yes					1.370	0.989–1.899	1.378	0.994–1.909	1.317	0.948–1.831
Walking difficulties (No) 1989-1993	Yes					1.661***	1.270–2.172	1.658***	1.267–2.171	1.746***	1.331–2.292
Walking aid use (No) 1989-1993	Yes					1.245	0.934–1.660	1.242	0.931–1.657	1.090	0.808–1.472
Loneliness (No) 1989-1993	Yes							0.926	0.713–1.201	0.973	0.747–1.267
Standardised SAD score 1989-1993								0.999	0.992–1.006	0.999	0.992–1.006
Newspaper or journal (No) 1989-1993	Yes									0.915	0.697–1.201
Religious group (No) 1989-1993	Yes									0.905	0.621–1.318
Club or organization (No) 1989-1993	Yes									0.762	0.471–1.231
Pets (No) 1989-1993	Yes									1.079	0.813–1.432
TV or radio (No) 1989-1993	Yes									0.486***	0.354–0.668
Friends (No) 1989-1993	Yes									0.732**	0.587–0.913

P.S.: * <0.05; ** <0.01; *** <0.001.

6.3.4 Cox regression analyses for individual LSI items

Cox regression unadjusted models were used to analyze individual life satisfaction items in the 14-year and ten-year period in the two studies. Each item of life satisfaction index was assessed as an independent predictor of mortality in separate unadjusted models.

For the five items that were negative questions in the NLSAA study, the original responses were 'Yes, agree = 0', 'Do not know = 1', and 'No, disagree = 2' for these five items. To be consistent with the other items, the responses were re-coded to 'Yes, agree = 2', 'Do not know = 1', and 'No, disagree = 0'. The descriptive analyses of the individual items from the NLSAA and SHLSET in 1989 and 1993 are shown in Appendix E-H (pp. 410-413).

14-year mortality in the NLSAA study

Table 6.11 presents Cox regression estimates for all 13 items on the life satisfaction inventory used in the NLSAA to identify potential predictors of 14-year mortality in the 1989 NLSAA dataset. In these separate unadjusted models, seven items of the Life Satisfaction Index were significantly associated with mortality: items #3 (p=0.001), #4 (p=0.002), #6 (p<0.001), #7 (p<0.001), #9 (p=0.025), #10 (p=0.001), and #11 (p=0.032).

Table 6.11: Item of LSI as a predictor of 14-year mortality in the NLSAA (separate unadjusted models).

Item of life satisfaction scale (reference category)	Category	Hazard ratio	95% CI	*P* value
1. As I grow older, things seem better than I thought they would be.				0.065*
(No, disagree)	Yes, agree	0.790	0.649–0.963	0.020
	Do not know	0.883	0.663–1.176	0.394
2. I have had more chances in life than most of the people I know.				0.129*
(No, disagree)	Yes, agree	1.218	1.006–1.476	0.043
	Do not know	1.114	0.862–1.439	0.409
3. This is the dreariest time of my life.				0.001*
(No, disagree)	Yes, agree	1.420	1.172–1.719	<0.001
	Do not know	0.896	0.582–1.381	0.620
4. I am just as happy as when I was younger.				0.002*
(No, disagree)	Yes, agree	0.722	0.601–0.868	0.001
	Do not know	0.861	0.576–1.288	0.466
5. These are the best years of my life.				0.106*
(No, disagree)	Yes, agree	0.848	0.694–1.036	0.107
	Do not know	0.763	0.553–1.052	0.099
6. Most of the things I do are boring or monotonous.				<0.001*

(No, disagree)	Yes, agree	1.630	1.321–2.012	<0.001
	Do not know	2.303	1.521–3.488	<0.001
7. The things I do are as interesting to me as they ever were.				<0.001*
(No, disagree)	Yes, agree	0.547	0.445–0.674	<0.001
	Do not know	0.802	0.541–1.191	0.274
8. As I look back on my life, I am fairly well satisfies.				0.227*
(No, disagree)	Yes, agree	0.799	0.609–1.050	0.107
	Do not know	0.715	0.431–1.187	0.195
9. I have made plans for things I will be doing in a month or a year from now.				0.025*
(No, disagree)	Yes, agree	0.774	0.643–0.931	0.007
	Do not know	0.964	0.360–2.585	0.942
10. When I think back over my life, I did not get most of the important things I wanted.				0.001*
(No, disagree)	Yes, agree	1.399	1.163–1.683	<0.001
	Do not know	1.317	0.954–1.817	0.094
11. Compared with other people, I get down in the dumps too often.				0.032*
(No, disagree)	Yes, agree	1.347	1.078–1.684	0.009
	Do not know	1.109	0.715–1.721	0.645
12. I have pretty much what I expected out of life.				0.749*
(No, disagree)	Yes, agree	1.072	0.807–1.424	0.631
	Do not know	1.176	0.747–1.787	0.448
13. In spite of what people say, the life of the average person is getting worse, not better.				0.055*
(No, disagree)	Yes, agree	1.214	0.998–1.477	0.052
	Do not know	1.290	0.995–1.674	0.055

* overall p value.

The risk of mortality was increased for these who answered 'yes, this is the dreariest time of my life' (HR=1.420; CI=1.172–1.719; $p<0.001$) compared with those who responded 'disagree'. People who answered 'yes, I am just as happy as when I was younger' (HR=0.722; CI=0.601–0.868; $p=0.001$) had a decreased risk of mortality in comparison with their counterparts who answered 'disagree'. With respect to the item 'most of the things I do are boring or monotonous', older people who responded 'agree' (HR=1.630; CI=1.321–2.012; $p<0.001$) and 'do not know' (HR=2.303; CI=1.521–3.488; $p<0.001$) showed an increased risk of mortality versus their peers who answered 'disagree'. Older people who responded 'agree' to 'the things I do are as interesting to me as they ever were' (HR=0.547; CI=0.445–0.674; $p<0.001$) and 'agree' to 'I have made plans for things I will be doing in a month or a year from now' (HR=0.774; CI=0.643–0.931; $p=0.007$) showed a decreased risk of mortality compared with those people responded 'disagree'. People who answered 'agree' to questions: 'when I think back over my life, I

did not get most of the important things I wanted' (HR=1.399; CI=1.163–1.683; $p<0.001$) and 'compared with other people, I get down in the dumps too often' (HR=1.347; CI=1.078–1.684; $p=0.009$) had higher levels of mortality risk compared to those people answered 'disagree'.

To summarise, older people in the NLSAA study in 1989 who were happy in younger age and did interesting things had a decreased risk of mortality. In contrast, people who felt that this was the dreariest time of their life, did boring things, did not have most of the important things, and get down in the dumps too much had a increased mortality risk.

14-year mortality in the SHLSET study

Table 6.12 presents the results of Cox regression analyses for the 10 individual items of the life satisfaction index used in the SHLSET study, as potential predictors of 14-year mortality in Taiwanese older people in 1989. Items #1 ($p=0.017$), #7 ($p=0.007$), and #9 ($p=0.005$) had a statistically significant association with mortality risk.

Table 6.12: Item of LSI as a predictor of 14-year mortality in SHLSET (separate unadjusted models).

Item of life satisfaction scale (reference category)	Category	Hazard ratio	95% CI	*P* value
1. I have had more breaks in life than most of the people I know. (compared to elderly neighbors and relatives)				0.017*
(No, disagree)	Yes, agree	0.832	0.731–0.947	0.005
	Do not know	1.440	0.359–5.783	0.607
2. As I look back on my life, I am fairly well satisfied.				0.286*
(No, disagree)	Yes, agree	0.897	0.781–1.032	0.129
	Do not know	1.269	0.316–5.099	0.737
3. My life could be happier than it is now.				0.197*
(No, disagree)	Yes, agree	1.603	0.936–1.206	0.346
	Do not know	3.075	0.765–12.359	0.113
4. I would not change my past even if I could.				0.355*
(No, disagree)	Yes, agree	0.957	0.843–1.068	0.493
	Do not know	3.464	0.486–24.696	0.215
5. These are the best years of my life.				0.096*
(No, disagree)	Yes, agree	0.864	0.757–0.986	0.031
	Do not know	0.872	0.217–3.502	0.847
6. Most of the things I do are boring or monotonous.				0.109*
(No, disagree)	Yes, agree	1.123	0.981–1.286	0.092
	Do not know	3.697	0.519–26.334	0.192
7. I have always felt interested in the things I have done.				0.007*
(No, disagree)	Yes, agree	0.795	0.689–0.918	0.002
	Do not know	0.519	0.073–3.701	0.513

8. I expect some interesting and pleasant things to happen to me in the future.				0.105*
(No, disagree)	Yes, agree	0.873	0.765–0.996	0.044
	Do not know	1.474	0.367–5.922	0.584
9. I feel old and somewhat tired.				0.005*
(No, disagree)	Yes, agree	1.228	1.075–1.403	0.002
	Do not know	4.043	0.567-28.844	0.164
10. I've become pretty much what I expected out of life.				0.059*
(No, disagree)	Yes, agree	0.874	0.768–0.996	0.043
	Do not know	3.245	0.455–23.145	0.240

* overall *p* value.

The risk of mortality was decreased for people who answered 'agree' to 'I had more breaks in life than most of the people I know' (HR=0.832; CI=0.731–0.947; p=0.005) compared with those who responded 'disagree'. People who agreed with 'I have always felt interested in things I have done' (HR=0.795; CI=0.689–0.918; p=0.002) had a reduced risk of mortality in comparison with their counterparts who disagreed. With respect to the item of 'I feel old and somewhat tired', older people who responded 'agree' showed an increased risk of mortality versus their peers who answered 'disagree' (HR=1.228; CI=1.075–1.403; p=0.002). Therefore, people in Taiwan in 1989 who had more chances in life, had done interested things, and who did not feel old and tired had a decreased risk of mortality.

Ten-year mortality in the NLSAA study

Table 6.13 displays the results of Cox regression for the 13 individual items on the life satisfaction index as a predictor on ten-year mortality in the 1993 NLSAA database. As can be seen in Table 6.13, items #3 (p<0.001), #4 (p<0.001), #5 (p=0.010), #6 (p<0.001), #7 (p=0.001), and #11 (p=0.007) had a statistically significant association with mortality risk.

Table 6.13: Item of LSI as a predictor of ten-year mortality in the NLSAA.

Item of life satisfaction scale (reference category)	Category	Hazard ratio	95% CI	*P* value
1. As I grow older, things seem better than I thought they would be.				0.263*
(No, disagree)	Yes, agree	0.805	0.619–1.047	0.105
	Do not know	0.924	0.607–1.406	0.712
2. I have had more chances in life than most of the people I know.				0.487*
(No, disagree)	Yes, agree	1.053	0.816–1.359	0.689

	Do not know	0.774	0.465–1.288	0.324
3. This is the dreariest time of my life.				<0.001*
(No, disagree)	Yes, agree	1.640	1.273–2.114	<0.001
	Do not know	1.665	0.875–3.168	0.120
4. I am just as happy as when I was younger.				<0.001*
(No, disagree)	Yes, agree	0.608	0.473–0.783	<0.001
	Do not know	0.601	0.304–1.185	0.421
5. These are the best years of my life.				0.010*
(No, disagree)	Yes, agree	0.806	0.602–1.080	0.149
	Do not know	0.343	0.161–0.729	0.005
6. Most of the things I do are boring or monotonous.				<0.001*
(No, disagree)	Yes, agree	1.656	1.247–2.199	<0.001
	Do not know	2.554	1.130–5.774	0.024
7. The things I do are as interesting to me as they ever were.				0.001*
(No, disagree)	Yes, agree	0.586	0.427–0.805	0.001
	Do not know	1.200	0.607–2.372	0.601
8. As I look back on my life, I am fairly well satisfies.				0.094*
(No, disagree)	Yes, agree	0.824	0.536–1.265	0.376
	Do not know	1.650	0.763–3.571	0.203
9. I have made plans for things I will be doing in a month or a year from now.				0.249*
(No, disagree)	Yes, agree	0.806	0.609–1.040	0.097
	Do not know	1.030	0.329–3.230	0.960
10. When I think back over my life, I did not get most of the important things I wanted.				0.846*
(No, disagree)	Yes, agree	1.080	0.825–1.413	0.576
	Do not know	1.073	0.567–2.033	0.828
11. Compared with other people, I get down in the dumps too often.				0.008*
(No, disagree)	Yes, agree	1.650	1.187–2.294	0.003
	Do not know	1.593	0.707–3.588	0.262
12. I have pretty much what I expected out of life.				0.563*
(No, disagree)	Yes, agree	0.968	0.664–1.412	0.866
	Do not know	1.268	0.702–2.291	0.431
13. In spite of what people say, the life of the average person is getting worse, not better.				0.305*
(No, disagree)	Yes, agree	1.176	0.901–1.536	0.233
	Do not know	0.911	0.630–1.316	0.618

* overall *p* value.

The risk of mortality was increased with these who answered 'yes' to 'this is the dreariest time of my life' (HR=1.640; CI=1.273–2.114; $p<0.001$) compared with those who responded 'disagree'. People who answered 'yes, I am just as happy as when I was younger' (HR=0.608; CI=0.473–0.783; $p<0.001$) had a decreased risk of mortality in comparison with their counterparts who answered 'disagree'. Older people who

responded 'do not know' for the item 'these are the best yearsours of my life' (HR=0.343; CI=0.161–0.729; p=0.005) had decreased mortality risk compared with those people who responded 'disagree'.

With respect to the item of 'most of the things I do are boring or monotonous', older people who responded 'agree' (HR=1.656; CI=1.247–2.199; p<0.001) and 'do not know' (HR=2.554; CI=1.130–5.774; p=0.024) showed an increased risk of mortality versus their peers who answered 'disagree'. Older people who responded 'agree, the things I do are as interesting to me as they ever were' (HR=0.586; CI=0.427–0.805; p<0.001) showed a decreased risk of mortality compared with those people responded 'disagree'. Moreover, people who answered 'yes' into the question 'compared with other people, I get down in the dumps too often' (HR=1.650; CI=1.187–2.294; p=0.003) had a higher risk of death compared to those people answered 'disagree'.

In summary, older people in the NLSAA study in 1993 that were happy when they were younger and did not know whether this was the best time of their life had a decreased risk of mortality. In contrast, people who rated this as the dreariest time of their life, did boring things, and got down in the dumps too often had an increased risk of mortality.

Ten-year mortality in the SHLSET dataset

Table 6.14 shows the results for the relationship between the four individual SHLSET items on the life satisfaction index in 1993 and ten-year mortality. There were two items, i.e., #5 (p=0.019), and #8 (p=0.001) that were significant predictors of the risk of mortality.

Table 6.14: Item of LSI as a predictor of ten-year mortality in SHLSET.

Item of life satisfaction scale (reference category)	Category	Hazard ratio	95% CI	*P* value
1. I have had more breaks in life than most of the people I know. (Compared to elderly neighbours and relatives).				0.213*
(No, disagree)	Yes, agree	0.860	0.727–1.018	0.079
	Do not know	0.917	0.583–1.441	0.706
2. As I look back on my life, I am fairly well satisfied.				0.180*
(No, disagree)	Yes, agree	0.857	0.728–1.011	0.067
	Do not know	1.020	0.454–2.291	0.962
5. These are the best years of my life.				0.019*
(No, disagree)	Yes, agree	0.791	0.672–0.931	0.005
	Do not know	0.885	0.220–3.555	0.863

8. I expect some interesting and pleasant things to happen to me in the future.				0.001*
(No, disagree)	Yes, agree	0.718	0.600–0.859	<0.001
	Do not know	0.527	0.234–1.191	0.124

* overall *p* value.

In the Cox regression unadjusted models, all four items had a relationship with mortality. Older people who responded 'agree' to 'These are the best years of my life' (HR=0.791; CI=0.672–0.931; p=0.005) and 'I expect some interesting and pleasant things to happen to me in the future' (HR=0.718; CI=0.600–0.859; p<0.001) had a decreased risk of mortality in comparison with those people who responded 'disagree'. Therefore, those people who felt that these were the best years of their life and expected interesting and pleasant things in the future had an associated with decreased risk of mortality.

6.4 *Discussion*

The life satisfaction scale as a predictor of mortality

The results presented in Section 6.3 suggest that life satisfaction appears important in predicting survival in old age. The findings – from the Kaplan-Meier survival analyses and the unadjusted Cox regression models – that higher life satisfaction was consistently associated with improved survival in both studies across two time periods demonstrates the importance of this aspect of later life. These findings were consistent with those from the study by Iwasa et al. (2006), described in the literature review (Section 2.6), in which subjective well-being was found to be a reliable predictor of all-cause mortality among older people. Their study showed lower levels of subjective well-being, as measured by predicted mortality in men and women. Similarly, Maier and Smith (1999) used Cox proportional hazards regression to examine the association between functioning on 17 indices of psychological functioning and the subsequent risk of mortality and found that dissatisfaction with life was associated with an increased risk of dying as discussed in Section 2.6.

Each increase in life satisfaction was associated with a small increase in survival (i.e., the hazard rate was significant but was only just below 1.00). However, this increase was for the standardised score (re-scaled to 0-100 for comparative purpose), and if translated back into the original 0-39 (NLSAA) and 0-30 (SHLSET) LSI scales would represent a

larger increase in survival per unit increase in LSI score. In addition, the hazard rate is for each single increment on the scale (whether standardised or not); although the improved survival may seem small for each unit increase (i.e., 0.009 in the NLSAA for 14-year mortality), over the range of the scale (e.g., from 0-39 or 0-100) this would represent substantial improvements in survival, for example, a ten-point increase on the standardised scale would be associated with a 0.09 improvement in survival.

The life satisfaction scale *as a whole* had an important influence on mortality. Lower levels of life satisfaction were found to be associated with an increased risk of death. Every increase in the LSI score was shown to be associated with living longer, irrespective of the items on the scale for which the person had positive responses. This suggests that no matter what aspect of life satisfaction was rated as positive, having a higher score was better for survival. However, the disadvantage of using the overall scale score was that it did not provide any information about the relative contribution of different items, whether in fact all items had a similar impact, or whether some were more protective than others. The analyses of the relative contributions of the individual items are discussed later.

One possible explanation for the relationship between life satisfaction and mortality could be that, for example, older people who were healthier (both physical and mental health) had higher levels of life satisfaction (as demonstrated in Chapter 5) and it was because they were healthier that they lived longer. Similarly, it might be that specific groups with high life satisfaction lived longer; e.g., being a woman, people in the younger age group, and it might be because they were women or were younger that they lived longer, not because they had high life satisfaction. Cohen and Brody (1981) reviewed psychosocial factors affecting longevity and found that on measures of life satisfaction, older women had higher life satisfaction because they had better health behaviours and had more, and stronger, social networks. Older women tended to use these social networks longer than men, and lived longer. These possible explanations for the observed relationships were examined further when adjusting for these possible explanatory factors.

In the adjusted models, there appeared to be differences across the two studies and time periods in the relationship between life satisfaction and mortality. The finding that, in the

NLSAA, life satisfaction remained a significant predictor for ten-year and 14-year mortality throughout all models when adjusting for demographic, health and social engagement variables suggests that life satisfaction itself has an important impact on survival in older people in the UK. However, the relationship between life satisfaction and mortality was no longer significant in the SHLSET when health (ten-year) and demographics (14-year), and subsequent variables were added to models. This suggests that it is being in particular demographic groups (e.g., being younger or being a woman) or having better health that is why older people in Taiwan with better life satisfaction lived longer, rather than because a better life satisfaction is in itself protective. However, these results clearly confirmed the importance of age, gender (e.g., older females), health conditions (e.g., smoking, walking difficulties), and social engagement (e.g., having a TV or radio, friends) as crucial factors in longevity. This finding is supported by previous research, as well as the results described in Chapter 5 that explored the link between life satisfaction and health. For example, Smith et al. (2002) showed that chronic illness, functional health, and subjective health had effect on life satisfaction. Thus, dissatisfaction with life was associated with an increased hazard of dying because of associated physical illnesses, perhaps especially those having severe symptoms.

The predictors identified in the SHLSET mortality analyses apparently had greater predictive effect on mortality than life satisfaction, especially the social engagement variables in the Taiwanese older people. This finding suggests that low social engagement, associated with lower life satisfaction, had the most important effect on mortality. This result corresponded with that of Bennett et al.'s study (2002), in which a low level of social engagement predicted mortality in old age in the NLSAA, although in Bennett et al.'s study, life satisfaction was not included as a control variable. As discussed in the literature review – the relationship between quality of life and mortality – social engagement is related to improved life satisfaction, and older people engaged with society might be assumed to have better health than people with low levels of social engagement. Bath and Deeg (2005) also emphasized that social engagement was good for older people's health and well-being. In these analyses, reading a newspaper or journal (ten-year) and having a television or radio had a beneficial effect on survival when demographic and health variables etc. were controlled. Why one of these variables should

be more important than the other at different times and over different time periods is not clear. It may be that having access to external media was the important issue here in the SHLSET, rather than the precise format of the media. It is possible that sensory impairment influenced the older people's reading, watching, and listening, and access to these media acted as a proxy for sensory impairment and other co-morbid conditions, as suggested by Appollonio et al. (1996), which may explain the association between these variables and survival. Another possible reason is that if older people had economic problems it was considered poverty condition. Income needed for ongoing living expenses is obviously more important than buying a TV or radio for older people.

These results indicate a difference in the effect of life satisfaction, and therefore life satisfaction on mortality, in the two studies. One possible explanation for these differences might be the different number of items included in the scales in the two studies. The lower number of items in the version of the LSI used in the SHLSET (1989, n=10; 1993, n=4) compared with the NLSAA (n=13) may have reduced the predictive/discriminating ability of the scale, even though these had been standardised, such that when co-variates were added to the model, this reduced the *p*-value below the level of significance. However, this is unlikely to explain all of the differences between the two studies and if representative of the populations of older people in the two countries, these results suggest real differences in the impact of life satisfaction. One possible explanation for these differences between the two countries is that although life satisfaction is important in both countries, its overall impact is not as great in Taiwan – possible because of such cultural differences as older Taiwanese are either more resilient, or can compensate better for having a low life satisfaction than older people in the UK.

Other differences between the two countries were clear in the predictive effect of other independent variables on mortality that were included in the models. For example, heart problems appeared to increase the risk of longer-term mortality among older people in the NLSAA, whereas urinary incontinence appeared to be a significant predictor of mortality among older Taiwanese in this period. People reporting problems with walking in SHLSET had increased mortality and people using a walking aid had increased mortality in the NLSAA over the 14-year period. These results were consistent with the

literature review that poor health was related to life satisfaction linking to mortality (Zuckerman et al., 1984).

It can be understood that most older people have health problems that relate to their physical condition in later life in the two countries. However, different diseases and physical health problems were apparent among the older people in the two countries. It is probable that health differences are related to different standards of living (e.g., hygiene) and lifestyle (e.g., food, exercise, health behaviours) between the UK and Taiwan. It is surprising that social engagement (the reading a newspaper or journal factor) seemed to decrease the risk of death among older people in SHLSET for 14-year mortality. This result was in agreement with a previous study in which social engagement was associated with mortality (Bennett, 2002). On the other hand, less education would be another problem among Taiwanese older people. According to Knodel and colleagues' study (2002), in 1970 Taiwan approximately half of men and more than 90% of women aged 60 and over were unable to read or write. However, reading a newspaper or journal may become an important factor influencing mortality because a better education and literacy can improve health knowledge leading to improved health and well-being. Although education did not use as an indicator to measure life satisfaction, the lower literacy level might reflect older people not having educational opportunities, which might affect their occupation and their knowledge of health; moreover, it could affect their life satisfaction (as discussed in Section 2.5.5.4) and mortality. As Bartlett and Phillips (2000, p. 175) said: "The UK population varies in longevity and morbidity according to social factors relating to occupation, education, housing, and nutrition, among others." That may explain why life expectancy is quite different between the UK and Taiwan.

To conclude, health and social engagement variables that acted as a role in intermediate between life satisfaction and mortality had a greater influence on people in Taiwan than on those people in the UK. These findings clearly pointed out the value of enhancing social engagement. It was important to provide older people with opportunities of engaging in society, which would improve quality of life for older people; and contribute to successful ageing.

Change in life satisfaction as a predictor of mortality

In the Cox regression unadjusted and adjusted models, change in life satisfaction did not predict the risk of mortality in the ten-year period in either of the two studies. The results found that a change in life satisfaction over the four-year period (1989-1993) was not associated with mortality. With regard to change in life satisfaction as a predictor, this aspect of mortality research has not been explained. A possible explanation for this might be that measuring change in life satisfaction by using only two time points four years apart is not sensitive enough to detect an impact on mortality, especially when there are so many other factors that could have an impact in that period. Change takes time and changes generally accumulate over time, due to the complex nature of such dynamic states as age and health; a four-year period might be too close together for change to be meaningful. Conversely, the four-year period might be too long, so that the effect of any changes in life satisfaction would be hidden by other more important changes, e.g., in health. Accepting the null hypothesis that 'change in life satisfaction had no effect on mortality' could therefore be misleading. However, this would require further investigation.

In the adjusted models, the results showed that change in age, smoking, urinary incontinence, and loneliness had more effect on mortality than life satisfaction itself in the NLSAA study. In contrast, change in age, smoking, walking difficulties, having a TV or radio, and having friends were independent predictors of mortality in the SHLSET study. This suggests an increased risk of death due to changes in health with advancing age, insofar as health problems affect older people's lives, including engaging with society. Therefore, maintaining good levels of health and satisfactory physical and social activity in old age may help to improve quality of life and reduce overall mortality in later life.

Individual LSI items as predictor of mortality

Cox regression was used in the unadjusted models to analyze individual life satisfaction items as predictors of mortality. Table 6.15 summarises the individual LSI items that were examined separately as predictors of mortality in the two studies. The results suggested that items #3, #4, #5, #6, #7, #9, #10, and #11 were associated with mortality

in the NLSAA study and items #1, #5, #7, #8, and #9 were associated with mortality in the SHLSET study.

Table 6.15: Comparing individual LSI items as predictors of mortality in the two studies.

	UK		Taiwan	
14-year period	3	**This is the dreariest time of my life.**	1	*I have had more breaks in life than most of the people I know. (Compared to elderly neighbors and relatives)*
	4	*I am just as happy as when I was younger.*	7	*I have always felt interested in the things I have done.*
	6	**Most of the things I do are boring or monotonous.**	9	*I feel old and somewhat tired.*
	7	*The things I do are as interesting to me as they ever were.*		
	9	*I have made plans for things I will be doing in a month or a year from now.*		
	10	**When I think back over my life, I did not get most of the important things I wanted.**		
	11	**Compared with other people, I get down in the dumps too often.**		
Ten-year period	3	**This is the dreariest time of my life.**	5	*These are the best years of my life.*
	4	*I am just as happy as when I was younger.*	8	*I expect some interesting and pleasant things to happen to me in the future.*
	5	*These are the best years of my life.*		
	6	**Most of the things I do are boring or monotonous.**		
	7	*The things I do are as interesting to me as they ever were.*		
	11	**Compared with other people, I get down in the dumps too often.**		

Note: Those in bold are associated with an increase in mortality and those in *italics* with a decrease in mortality. Those in blue words are the same question in the two countries.

The result showed that items #3, #6, #10, and #11 were associated with increased mortality; while #4, #7, and #9 tended to decrease the risk of mortality in the UK in 1989. Conversely, items #1, #7, and #9 decreased the risk of mortality in Taiwan. Obviously, items #3, #6, #10, and #11 are negative questions (e.g., 'This is the dreariest time of my life', 'Most of the things I do are boring or monotonous.') which indicated that these older people had lower levels of life satisfaction in the UK. This might imply that these people did boring things that were not the things they wanted to do or they suffered from depression that they could not enjoy anything, so that they probably experienced difficulties or unhappiness in their past lives that affected their assessment of their present life – this is the dreariest time of life. This is a possible reason why older people who agreed items #3, #6, #10, and #11 tended to have increase mortality risk. On the

other hand, consider older people who had a positive attitude and outlook on life, for example they were happy when they were younger, they did interesting things, or they were making plans for a month or year from now. A possible explanation is that feeling that this is the best time of life is a continuous feeling from the earlier part of one's life and these people were doing very well. Moreover, they might adapt themselves better to the changing world. Thus, older people who agreed with these three questions had a strong decreased risk of mortality.

Compared with people in the UK, older people in Taiwan who felt that they had done better were more likely to have a decreased risk of mortality because they had had more chances and had done interesting things. The important chances these older people got in their lives may have led to success in accomplishing what they wanted and were interested in doing. It can be assumed that item 7 is a similar question and an important factor affecting decreasing mortality among older people in the two countries. These older people might think 'doing interesting things' is meaningful to life and contributes a lot of to their own life satisfaction.

The difference between the two studies is that only one item of LSI was associated with increasing mortality risk in the SHLSET study. One probable explanation is that older Taiwanese tended to hold a positive attitude towards their lives because older people in general perceive high esteem in Confucian societies. Another possible explanation is that there were fewer negative statements in the LSI in the SHLSET study, so that older Taiwanese had a positive evaluation related to decreasing the risk of mortality. In contrast, British older people who had more varied perspectives about assessing their life satisfaction might be likely to conceal wide discrepancies between older people of different income, social class, or ethnicity – depending on the societies concerned – and of course between the situations of men and women. Further research is therefore required to examine the different responses on each item of the LSI, for example gender, socioeconomic class.

In 1993, items #3, #6, and #11 were related to an increased risk of mortality and items #4, #5, and #7 tended to decrease mortality risk among older people in the UK. Conversely, there are #5 and #8, which decreased the risk of mortality in older people in Taiwan. Item

#5 is the common option among older people in the two countries. It is obvious that 'These are the best years of my life' might not only that these people had a positive attitude towards being old and felt happy in their lives but also that they expressed real life satisfaction. Perhaps these older people obtained and enjoyed their success and achievements after working hard. However, older people between the two countries showed differences similar in 1989 as discussed earlier. The large gap between the two countries is that the 4-item LSI was used in the SHLSET study, so older Taiwanese did not have more choices to express their opinion. Thus, this is a potential limitation that may have affected the results of the relationship between the items of LSI and mortality for comparing the two countries.

When comparing older people between 1989 and 1993 in the UK, item #5 became important to older people as age increasing – as discussed in the above paragraph. However, items #9 and #10 no longer showed their effect on the risk of mortality in 1993. One possible reason is that these older people did not make long-term plans due to health limitations or environment changes. Another possible reason is that, although these people did not get most of the important things they wanted, on the other hand, they had still done some valuable things, albeit fewer. That is why this item may not have been relevant to the risk of mortality.

It is difficult to compare older people between 1989 and 1993 in Taiwan due to the different item number in the LSI. It is clear that two items (e.g., #1, #7, and #9) were more likely to show past life related to a decreased mortality risk in 1989, whereas, the present life (#5) and future life (#8) tended to decrease the risk of mortality in 1993. In 1993, the four questions of LSI are positive statements and relate to the past life (e.g., #1 and #2), present life (e.g., #5), and future life (e.g., #8). Although the fewer number of items is a main reason, these older people were more likely to pay more attention to the present and future life.

The limitation of this section was the lack of predictors for analyzing the relationship between individual LSI items and mortality because this research only examined the association between each item of LSI and mortality. As discussed in the literature review, life satisfaction refers to an assessment process, by which individual judgement of the

quality of one's life was based on their perceived life circumstances with outside conditions. The Cox regression analyses did not include other variables to examine the relationship between each item of LSI and death. Therefore, it might be valuable and interesting if further research were to explore the association between each item of LSI and mortality in the adjusted models.

6.5 *Conclusion*

The research literature on the association between life satisfaction and longevity among older people were rather limited. Well-defined samples of older people who were later assessed for survival, continue to hold the most promise of adding to gerontological knowledge of life satisfaction as a predictor of mortality. This chapter answered the specific research questions as described in Section 6.1.

This chapter contributed to the debate about the importance of life satisfaction in determining how older people live. This was a long-term prospective study of the association between life satisfaction and mortality. This research found an independent association between life satisfaction and mortality in older people, even when a wide set of physical and psychological health and social engagement variables were included to models. This relationship seemed to be partially mediated through age, gender, and physical and mental health among older people in the UK, although the relationship remained significant when these variables were included. As expected, age, gender, smoking, and health status were also strong predictors of mortality. In addition, it was found that social engagement played an important role in determining longevity and could explain mortality variations across the older population in Taiwan. Furthermore, it was confirmed that loneliness is associated with increased mortality in the UK older people. These findings provided some answers to the questions: what is the relationship between life satisfaction and change in life satisfaction and mortality, and what are the differences between the UK and Taiwan in life satisfaction predicting mortality?

Previous research has identified individual LSI items as a predictor that could potentially increase the risk of mortality. A new contribution in this thesis has been to test whether individual life satisfaction items predicting mortality made older people live longer.

Importantly, however, some questions of the life satisfaction scale were identified to be crucial in quality to life association with decreasing risk of mortality; for example, the item 'the things I do are as interesting to me as they ever were' and 'these are the best years of my life'. In this research, both life satisfaction scales in the two studies involved a series of items, not just one sentence. Therefore, a measure of life satisfaction is far better if it contains more than one question. This research suggested that the life satisfaction index could be considered a reliable predictor of mortality.

To conclude, these evidences showed that high level of life satisfaction has a positive effect on people live longer. This research also increases knowledge of gerontology in the relationship between life satisfaction and mortality. Intervention, to improve or maintain life satisfaction in old age may increase survival and overall quality of life. In addition, assessment of life satisfaction might help in the early detection of older people with cumulative risk factors for mortality. The next chapter will focus on examining the patterns of life satisfaction and the relationship between patterns of life satisfaction and mortality.

Chapter 7 Patterns of life satisfaction among older people

Chapter 6 provided contexts for the analyses that follow here by examining the relationship between life satisfaction and mortality, the relationship between change in life satisfaction and mortality, and the items of life satisfaction that are associated with mortality. This chapter uses the survey data sets from the two countries to identify patterns of life satisfaction among older people, and examine the relationship of these with other variables.

7.1 *Introduction*

This chapter examines patterns of life satisfaction in old age, identifying different patterns of life satisfaction that may be associated with other attributes, including mortality, in the two longitudinal studies. As discussed in Chapter 5 and 6, for example, physical health can detract from or enhance an older person's life satisfaction. Physical factors might potentially modify risk factors that exist between life satisfaction and mortality. In order to build a better picture of life satisfaction, therefore, a further understanding the patterns of life satisfaction and the relationship between patterns of life satisfaction and mortality will be examined and discussed in this chapter.

The aim of this chapter is to examine patterns of life satisfaction among older people. The chapter has the following three objectives:

- To identify patterns of life satisfaction among groups of older people in the UK and Taiwan;
- To identify any differences in other attributes in older people between these groups;
- To examine whether there are differences in mortality among groups of older people characterised by their life satisfaction.

This chapter presents three separate sets of analyses. Section 7.3.1 reports the use of cluster analysis to group together people with similar assessments of their life satisfaction, and then to identify differences between groups from their profile. The scale used to measure life satisfaction in the two studies, i.e., the Life Satisfaction Index, allows analysis and comparison of the overall score that individuals achieve,

but does not include any information on how individuals with similar scores have responded to individual questions. Cluster analysis enables individuals to be grouped together according to their responses to individual items, as well as, indirectly, the overall score. These groups are then compared in order to assess any other differences between the groups.

Section 7.3.2 describes the use of Kaplan-Meier survival curves to examine possible differences in survival time between clusters in the two studies, for 14-year and ten-year mortality. Section 7.3.3 reports the use of Cox regression analysis to examine whether groups of people with similar characteristics have different risks of mortality. As pointed out in Chapter 6, life satisfaction may affect mortality in old age. Thus, the purpose of this section is to determine whether groups of similar individuals have an increased or decreased risk of mortality compared to other groups, in the NLSAA and SHLSET samples of older people over a fourteen-year (1989-2003) and ten-year (1993-2003) period. Similar people with higher life satisfaction who were in the same group might live longer because they had other associated features that contributed to health and well-being, compared with their counterparts in other groups.

7.2 *Methods*

7.2.1 Cluster analysis

Cluster analysis is a name for a variety of mathematical methods, used to divide data into clusters or groups (Everitt, 1979; Everitt et al., 2001). It is useful for researchers to find out which individuals (or variables) in a data set are similar and dissimilar. Furthermore, researchers in many fields seek to predict people's behaviour or objects' properties based on group membership, all of whom share similar properties. For example, in this study classifying older people based on responses concerning life satisfaction may help to improve understanding of life satisfaction in old age. Thus, cluster analysis can be used to help create different 'groups' or 'types' which play an important role in the development of many areas of science.

Clustering procedure is divided into two types: clustering hierarchical procedures and clustering non-hierarchical procedures. Hierarchical clustering is one form of cluster analysis available in statistical packages; it uses agglomerative methods (meaning that groups are merged), and the most popular methods are single linkage (nearest neighbour approach), complete linkage (furthest neighbour), average linkage, Ward's

method, and the Centroid method (Everitt et al., 2001; Chan, 2005; SPSS Inc., 2005). Non-hierarchical clustering is partitioning of the sample; and each cluster has a beginning point and all observations within a prescribed distance are included in that cluster (Everitt et al., 2001). In this research, there is not a starting point so that hierarchical cluster will be used to identify and classify objects individuals.

Ward's method is one of the hierarchical clustering procedures. In this section, Ward's method was used because it uses an analysis of variance approach to evaluate the distances between clusters. In other words, it attempts to minimize the Sum of Squares (SS) of any two clusters that can be formed at each step; and it usually uses the distance which increase the sum of squares within the clusters, after fusion, summed over all the variables (Everitt et al., 2001). In general, this method is regarded as very efficient; however, it tends to create clusters of small size. Therefore, Ward's method of cluster analysis was performed using SPSS (v. 14) to identify different sub-groups within the sample on the basis of the responses to the life satisfaction scale question.

Ward's method, as well as other clustering methods, also generates a graphic clustering which is the dendrogram that shows the sequential union of objects and clusters together with the similarity value leading to this union (SPSS Inc., 2005). For displaying the dendrogram better, and the linkage between clusters of individuals, Clustan Graphics (v. 6) software will be used to produce dendrogram graphics in this section (Wishart, 2006). Descriptive statistics using SPSS were then used to describe the frequency of each item on the Life Satisfaction Index and other variables (e.g., demographic, health, and social variables) for each cluster, creating a sub-profile, i.e. its profile of life satisfaction and of other attributes in common within the cluster.

In cluster analysis, the researcher does not have a preconceived idea of who, or what, belongs in which group. However, it is important to make a label for each cluster according to all the information about membership in group after the grouping obtained from cluster analysis. Cluster analysis was performed on the basis of responses to the life satisfaction scale items. Labels were used to identify and characterise the clusters, based on the similarities among the individuals in the cluster. The label was assigned according to the mean score of life satisfaction: 80 and above being a 'highly positive' profile, with 60-79 'fairly good', 40-60 'medium', and 40 and below 'poor'. The profile of each cluster is outlined, in terms of the reported

levels of life satisfaction and in terms of other variables (not included in the cluster analysis process). Subsequent to this, further analyses were undertaken in order to test for differences in other variables among the clusters.

The cluster analysis was undertaken separately on the two study samples, because of the differences in the items in the life satisfaction scales used in the studies.

7.2.2 Kaplan-Meier survival curve analysis

Kaplan-Meier survival curves were used to examine differences in the survival curves between the clusters within the two samples. As discussed in Section 6.2.1 on methods, the Kaplan-Meier curves analysis is a nonparametric technique for estimating time-to-event (analyzing death as an outcome). It is often illustrated graphically and it is easy to look for gaps between these curves in a horizontal or vertical direction (Kaplan and Meier, 1958; SPSS Inc., 2005). The K-M survival analysis can compute the estimate mean and median survival time. Additionally, the Log-rank test can be used to compare the equality of survival distributions and test for differences that fit the proportional hazards model, i.e., it works well as a starting point for subsequent Cox regression. Therefore, it will be used to estimate survival probabilities and to compare survival among the clusters in the two countries (UK and Taiwan).

7.2.3 Cox regression analysis

Cox regression analyses were used to identify risk factors for fourteen-year mortality among the clusters of older people in the NLSAA and SHLSET datasets. The dependent variable for the model was whether a given person was alive or dead by a certain date, i.e., 31st December 2003, and the number of days from the 1989 interview until death, or until censorship for those people still alive on 31st December 2003, to identify whether membership of specific clusters was a risk factor for mortality.

With regard to the death certificate information, this was described in Section 6.2. For participants in this study, the dependent variable was the time in days from when the person was interviewed in 1989 (and in 1993) until the date on which they died; or, for participants who had not died by 31st December 2003, the time from when the person was interviewed in 1989 (or 1993) until the date of censorship, i.e., 31st

December 2003. Relationships between clusters and other predictors and the event were assessed in Cox proportional hazards regression models, with the status variable (also called the event or censoring variable) as the dependent variable.

'Cluster' was one of the independent variables; with the cluster having the highest mean life satisfaction score being coded as the reference category. Clusters were also a baseline variable in all models to examine their relationship with mortality. Independent variables used as covariates in the models were as follows:

- Model 1: Cluster;
- Model 2: Cluster, demographic variables (i.e., age, gender, marital status, living arrangements, satisfaction with income etc.);
- Model 3: Cluster, demographic variables, physical health (i.e., self-rated health, perceived health relative to peers, smoking, diseases etc.);
- Model 4: Cluster, demographic variables, physical health, psychological well-being (i.e., loneliness, standardised SAD score);
- Model 5: Cluster, demographic variables, physical health, psychological well-being, and social engagement (i.e., attending religious group, club, or organization, having a TV or radio, friends).

7.3 *Results*

Section 7.3.1 shows the patterns of life satisfaction among older people produced using cluster analysis. Section 7.3.2 compares clusters as a predictor of mortality for the two studies using Kaplan-Meier survival analysis. Finally, Section 7.3.3 assesses the clusters as predictors of mortality using Cox regression.

7.3.1 Cluster analysis

As described in the Section 7.2.1, the clusters were generated in four parts from the cluster analyses: the NLSAA and the SHLSET studies in 1989 and 1993.

The NLSAA study in 1989

Ward's method was used in the initial hierarchical cluster analysis. Figure 7.1 shows the dendrogram produced by Clustan Graphic (v. 6) using the Ward's method.

The left axis is that respondent's number and vertical lines show the joined clusters. The black line is the first vertical lines, corresponding to the smallest rescaled

distance that is each individual (total 690 respondents) in the NLSAA study. The 15 yellow clusters were selected in this section for further examination.

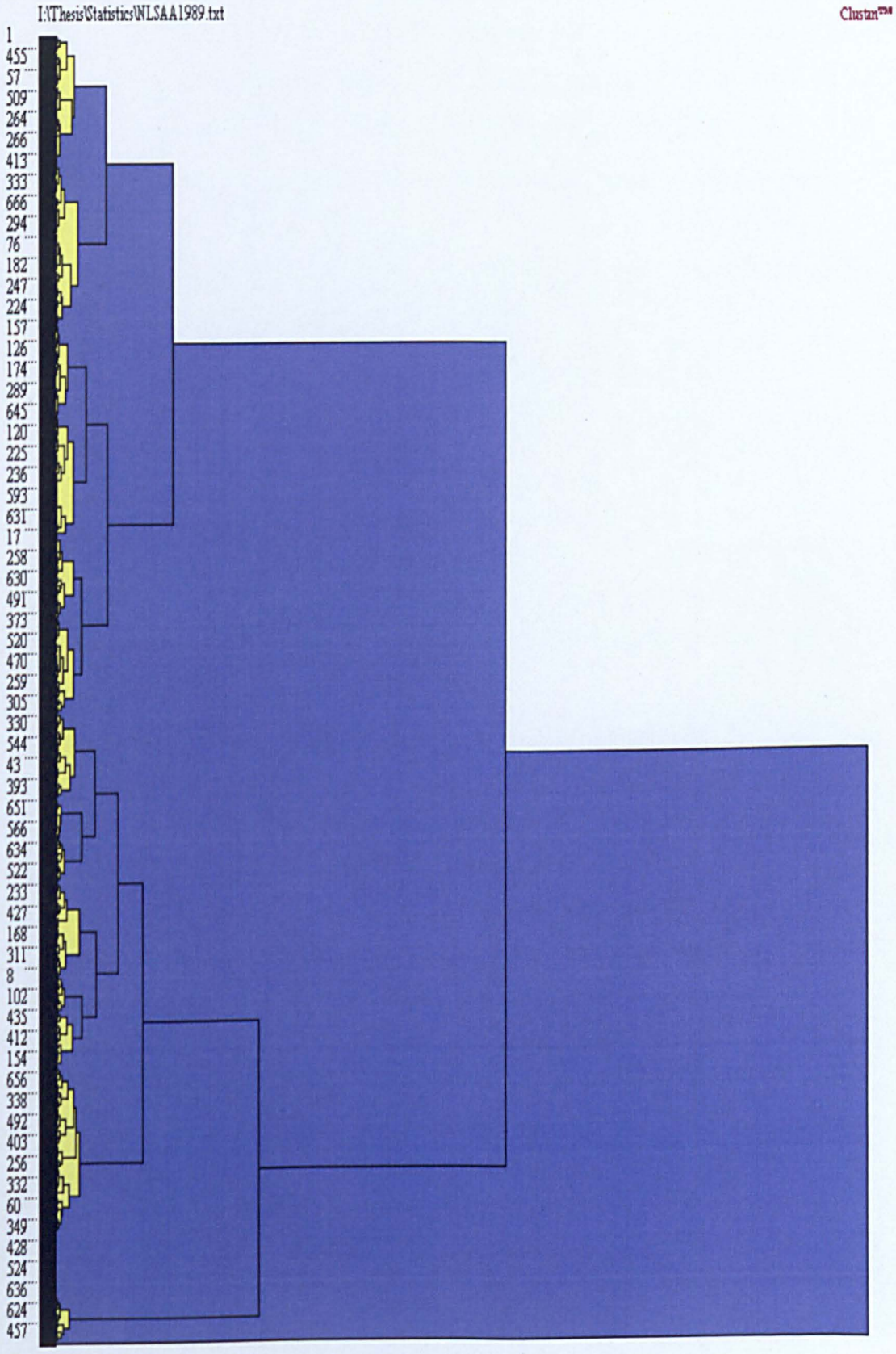

Figure 7.1: The dendrogram figure shows all clusters in the NLSAA study in 1989.

Table 7.1 shows the 15 subgroups extracted from cluster analysis and provides an overview of the proportion and membership size in the NLSAA sample from 1989 (n=690). Clusters 2, 10, 11, and 13 could be viewed as representing higher-level life satisfaction; clusters 1, 3, 4, 6, 7, 9, 12, and 14 characterize participants with medium levels of life satisfaction; and clusters 5, 8, and 15 represent lower levels of life satisfaction (see Appendix I, pp. 414-416 for the details of the clusters).

Table 7.1: Cluster analysis provides an overview of the membership size and the mean score of life satisfaction in the NLSAA in 1989.

Cluster	Labelled name	n	Std. LSI* mean score
1	Fairly good profile: relatively healthy and independent	60	62.22
2	Fairly good profile: healthy fit but feeling lonely	56	78.78
3	Medium profile: medium health	30	56.03
4	Medium profile: physically fit but more arthritis or rheumatism	31	51.36
5	Highly negative profile: more health problems, lower life satisfaction	57	35.43
6	Medium profile: meddle class and smoker	40	59.71
7	Fairly good profile: good health and high proportion males	66	61.19
8	Highly negative profile: poor health and high depression	26	17.01
9	Fairly good profile: good health in general, non-smoker	41	66.32
10	Highly positive profile: good health, satisfied with life	49	83.99
11	Highly positive profile: excellent health, attends religious group	50	89.92
12	Fairly good profile: healthy fit, younger age, more married people	49	69.23
13	Highly positive profile: healthy fit, satisfaction with income	50	81.77
14	Medium profile: about as healthy, older age	29	57.56
15	Highly negative profile: fair health with some diseases, living alone	16	38.94

* Std. LSI mean score = Standardized Life Satisfaction Index mean score.

The first subgroup, in terms of the mean score for life satisfaction ($\bar{x}$=66.22), was labelled as *fairly good profile: relatively healthy and independent.* Cluster 1 (n=60, 8.70% of the NLSAA sample) included most of the participants who thought they agreed they had done interesting things; on the other hand, they did not do tedious or monotonous things and they disagreed that they experienced 'the dumps' too often when relative to their peers. As can be seen in Appendix J (pp. 417-419), cluster 1 had the largest proportion of participants in this group reporting that they read newspapers or journals (98.3%).

The second subgroup (Cluster 2: n=56, 8.12% of the NLSAA sample), was labelled *fairly good profile: healthy fit but feeling lonely.* Members of this group had a high level of life satisfaction; and, even though they felt that youth was the best time in their life, nonetheless they were satisfied with their life, did not feel they did mostly boring things, and also did not get down in the dumps too often. This subgroup's

profile was such that in comparison with other groups it had the greatest proportion of people in the professional/intermediate class (30.4%), who felt lonely (89.3%), and who did not have arthritis or rheumatism (55.4%), high blood pressure (92.9%), and who attended a club or organisation (50.0%).

Cluster 3 exhibited a *medium profile: medium health* (Cluster 3: n=30; 4.35% of the sample). The majority of people in Cluster 3 reported that they did not have more chances in their life, but they had had a good time when they were young. However, most were satisfied with their life. This group had the highest proportion of females (80.0%), single (13.3%), in semiskilled/unskilled/others class (40.0%), rating their health as average (33.3%), not having a heart problem (90.0%), not attending a club or organisation (80.0%), and having a TV or radio (100%).

The fourth cluster group was labelled *medium profile: physically fit but with more arthritis or rheumatism* (Cluster 4: n=31; 4.50% of the sample). This cluster contained the largest proportion of older people who did not agree that old age was the best time in life; they did not do extremely boring things but also did not partake in really interesting things that they wanted to do. This group had the highest proportion of people who had not made plans for the future. A higher proportion were separated or divorced (9.7%) than in other clusters.

Cluster 5 (n=57; 8.26% of the sample) was named *highly negative profile: more health problems, lower life satisfaction.* This group contained the highest frequency for items 3 (This is the dreariest time of my life; 93% agreed.) and 4 (These are the best years of my life; 94.7% disagreed). The cluster had the largest proportion of people who rated themselves about as healthy as their peers (57.9%), did not read newspapers or journals (24.6%), did not attend religious groups (82.5%), did not have friends (36.8%), and had walking problems (52.6%) compared to all the other clusters.

Cluster 6 was *medium profile: middle class and smoker* (n=40; 5.80% of the sample). Individuals in this group gave somewhat conflicting responses, in that a large proportion disagreed with the statement – 'these are the best years of my life' – but all members of this group expressed being very satisfied when they looked back on their life. They also reported they had pretty much what they expected out of life. This cluster contained the highest proportion of older people from the skilled-non manual/skilled-manual class (72.5%) and who were smokers (35.0%) compared to

other clusters, and 100% of them reported having a TV or radio (as in Clusters 3 and 15).

The largest subgroup, cluster 7, was labelled *fairly good profile: good health and high proportion of males* (n=66; 9.57% of the sample). It can be seen in Appendix I (pp. 414-416) that all participants in this group had not made plans for things, they did not think they did monotonous things, but they also thought that these things were not important. However, they looked back on their life; they were fairly well satisfied (90.9%). This group contained the highest proportion of males (47.0%).

Cluster 8 had the lowest life satisfaction mean score – 17.01 (n=26; 3.8% of the sample), and was labelled *highly negative profile: poor health and high levels of depression.* Cluster 8 contained most of those people in the NLSAA sample who disagreed with the following four questions in the life satisfaction scale; i.e., they did not feel happy when they were younger, did not do interesting things, did not make plans for things, and their life did not turn out as they had expected. This cluster had the highest proportion who were dissatisfied with their income (50.0%), did not feel lonely (73.1%), but had high sad scores (88.5%), rated their health as poor (38.5%), reported feeling less healthy than their peers (30.8%), had arthritis or rheumatism (76.9%), had giddiness (65.4%), had high blood pressure (42.3%), had urinary incontinence (46.2%), and were more likely to use a walking aid (38.5%) compared with all the other clusters.

The ninth cluster (n=41; 5.94% of the sample) was labelled *fairly good profile: good health in general.* All members in cluster 9 reported that they had not made plans for things a month or a year from the interview and had had less chance in their life. On the other hand, they did not think that this was the dreariest time in their life, and they also thought that their life was getting better. In comparison to other clusters, this cluster contained the highest proportion of non-smokers (87.8%) and the lowest proportion having a TV or radio (14.6%).

The profile of the tenth cluster group was such that they were labelled *highly positive profile: good health, satisfied with life* (n=49; 7.10% of the sample). Participants in this group tended to reflect positive thinking in their life, and to disagree that this was the dreariest time of their life. Everyone in this group (100%) agreed that they did interesting things, they had made plans for things a month or a year from the

interview, and they were very satisfied when they looked back on their life. As can be seen in Appendix J (pp. 417-419), this cluster contained a higher proportion of people who reported good health (57.1%), felt healthier than their counterparts (63.3%), had friends (89.8%), and did not use a walking aid (85.7%) than any other cluster.

Cluster 11 had the highest mean life satisfaction score which was 89.92, and was labelled *highly positive profile: excellent health, attends religious groups* (n=50; 7.25% of the sample). The majority thought that growing older was good, had been happy when they were younger, did interesting things, were satisfied with their life, made plans for most things, and had had lives that had matched their expectations. Furthermore, they did not agree that their present life was the dreariest time of their life or that most things they did were boring. This cluster contained the highest proportion of people who rated their health as excellent (24.0%) and attended religious groups (44.0%) compared to the other clusters.

Cluster 12 was labelled *fairly good profile: healthy fit, younger age, and more married people* (n=49; 7.10% of the sample). The majority of people in this cluster disagreed that their current life was the dreariest time of their life and agreed that they had made plans; however, they also did boring things and reported getting down in the dumps too often. Participants in this cluster agreed strongly that they did interesting things and felt satisfied with life. This group contained the highest proportion of people who were under 80 years old (79.6%), who were married (65.3%), living with someone (75.5%), and without walking problems (81.6%) compared to the other clusters.

Cluster 13 also could be viewed as representing high life satisfaction, and was labelled *highly positive profile: healthy fit, satisfaction with income* (n=50; 7.25% of the sample). People in this cluster, appeared to have a positive and well-balanced life. Most people agreed that growing older seemed better, felt happy when they were younger, did interesting things, were satisfied with their life, and felt that their life was better than they had expected. On the other hand, they disagreed that they did boring things, made plans for things, and got down in the dumps too often. This cluster contained the highest proportion of people who were satisfied with their income (94.0%), who were less depressed (60.0%), who did not have stomach problem (78.0%), who did not have giddiness (80.0%), and who had a pet (32.0%) compare to people in other clusters.

The profile of cluster 14 was *average profile: about as healthy, older age* (n=29; 4.20% of the sample). All (100%) agreed that they get down in the dumps too often compared with their peers. This cluster contained the highest proportion of people who were above 80 years old (51.7%) and did not suffer from urinary incontinence (86.2%) compared with the other clusters.

Cluster 15 was the smallest subgroup and was *highly negative profile: fair health with some diseases, living alone* (n=16; 2.32% of the sample). Interestingly, 100% agreed that they did interesting things, but disagreed that this was the best time of their life. However, most felt satisfied with their life. Surprisingly, this cluster showed the highest proportion of people who were widowed (81.3%) and lived alone (81.3%), rated their health as fair (56.3%), had heart problems (37.5%) and stomach problem (37.5%), did not have a pet (93.8%), and had a TV or radio (100%) compared with the other clusters.

The SHLSET study in 1989

Figure 7.2 presents the clusters in the dendrogram of the SHLSET study in 1989.

The left axis shows the participant's number and the unions with other clusters. The black line is the each individual of sample (1438 participants) of the SHLSET study. The 20 yellow clusters were used for further examination.

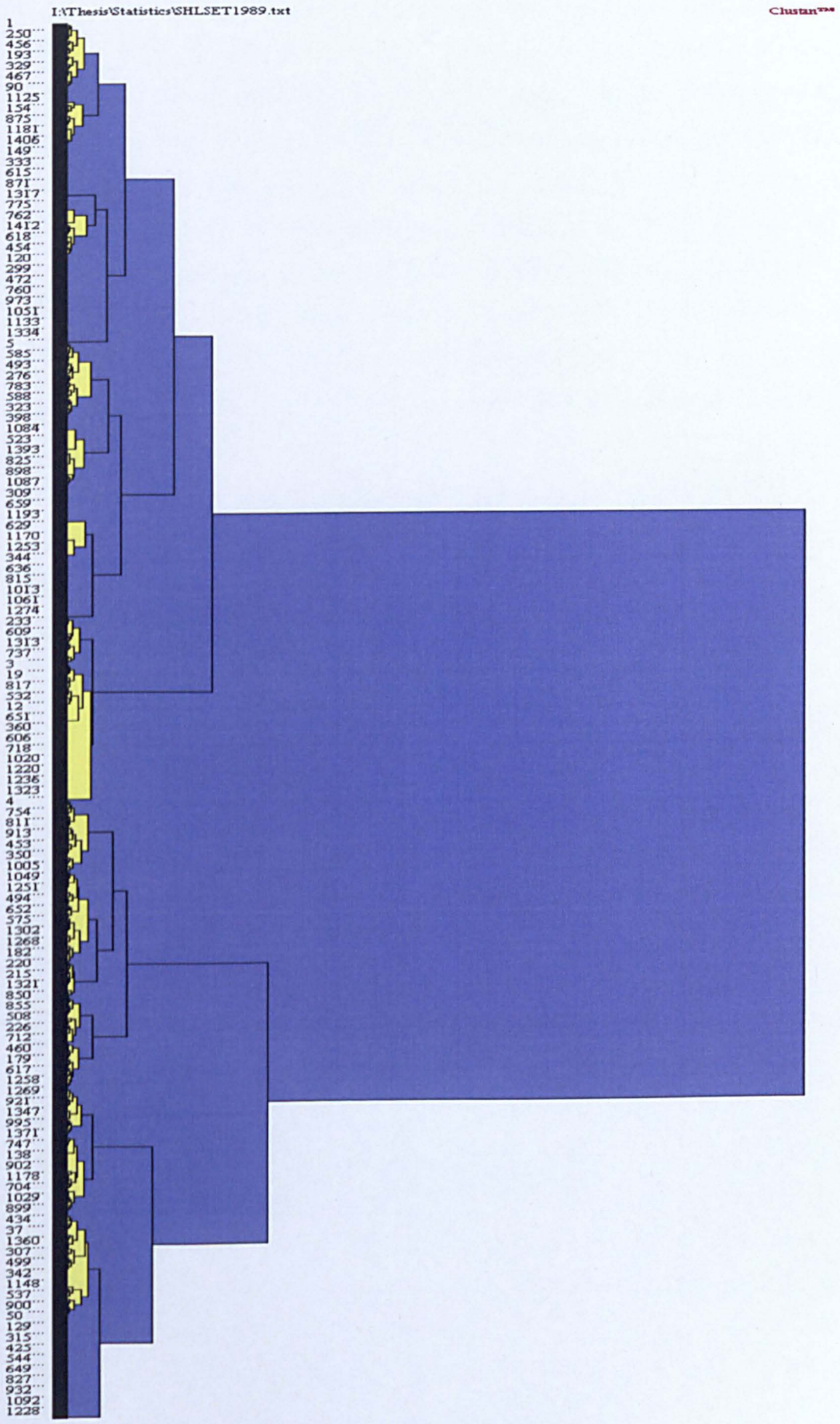

Figure 7.2: The dendrogram figure shows all clusters in the SHLSET study 1in 1989.

Table 7.2 shows the 20 groups that were extracted using cluster analysis on the SHLSET dataset from 1989, and provides an overview of the membership size and the mean score for life satisfaction in Taiwanese older people in 1989 (n=1,438). More details also show in Appendix K (pp. 420-423) and Appendix L (pp. 424-426). As Table 7.2 indicates, clusters 1, 2, 9, 12, 13, 14, 17, and 20 could be viewed as representing high levels of life satisfaction; clusters 3, 5, 7, 15, 16, and 18 characterized participants with medium levels of life satisfaction; and clusters 4, 6, 8, 10, 11, and 19 reported low levels of life satisfaction. The highest proportion of people lived with someone for each cluster, except cluster 7 and 8.

Table 7.2: Cluster analysis provides an overview of the membership size and the mean score of life satisfaction in SHLSET in 1989.

Cluster	Labelled name	n	Std. LSI* mean score
1	Highly positive profile: good health, optimistic	135	85.56
2	Highly positive profile: medium healthy	85	81.76
3	Medium profile: medium healthy but more using walking aid	64	51.09
4	Medium profile: medium health but not attending club or organisation	41	45.85
5	Fairly good profile: elders aged 80 and over, smokers, and some diseases	43	61.40
6	Medium profile: people being separated/divorced and attending club or organisation	81	45.19
7	Fairly good profile: good health and had a pet	54	68.15
8	Medium profile: no friend	64	43.05
9	Fairly good profile: non-smoker but having high blood pressure problems	29	75.17
10	Highly negative profile: poor healthy and feeling lonely	98	28.06
11	Highly negative profile: people being single, dissatisfied with income, and higher levels of depression	55	15.45
12	Fairly good profile: mentally healthy and having more friends	82	70.00
13	Highly positive profile: high life satisfaction	55	100.00
14	Fairly good profile: expected good life in the future	91	75.27
15	Fairly good profile: satisfied with their lives	65	59.46
16	Medium profile: medium health with lower social engagement	33	43.33
17	Fairly good profile: relatively healthy and not lonely	57	77.98
18	Fairly good profile: satisfied with life and higher social engagement	45	63.78
19	Highly negative profile: people being females, widowed, lower socioeconomic class and less social engagement	79	31.46
20	Highly positive profile: good healthy for no using walking aid	64	80.00

* Std. LSI mean score = Standardized Life Satisfaction Index mean score.

The first cluster, the largest group, was labelled *highly positive profile: good health, optimistic* (n=135; 9.34% of the sample). Participants reported a high level of life satisfaction and feeling that they had more chances than their peers; old age was the best time; they did interesting things; and they had positive expectations for the future. Everyone in this cluster (100%) disagreed that they did boring things and felt old and

tired. This cluster contained the highest proportion of people who were males (65.9%) compared to the other clusters.

Cluster 2 presented more positive than negative attributes, and was labelled *highly positive profile: medium health* (n=85; 5.91% of the sample). Everyone agreed that he or she had expected more from life; on the other hand, they disagreed that their life could be happier than it was now. Most reported that they did interesting things, were satisfied with life, and did not want to change if they could. The majority of people in this cluster were married (61.2%), lived with someone in the household (100%), and rated their health as average (49.4%).

The third subgroup was labelled *medium profile: medium health, but more using walking aid* (n=64; 4.45% of the sample). Most members of this group were satisfied with life, but felt old and somewhat tired. This cluster contained the highest proportion of people who used a walking aid (25.0%) compared with the other clusters.

The fourth cluster had a low mean score for life satisfaction. Its label was *medium profile: medium health and not attending club or organisation* (n=41; 2.85% of the sample). The majority of people felt satisfied with their life, but also felt old and tired. However, they disagreed that they did boring things, and felt that they had pretty much obtained what they had expected out of life. The cluster contained the highest proportion (100%) of people who did not attend a club or organisation compared with the other clusters.

Cluster 5 was labelled *fairly good profile: elders aged 80 and over, smokers with some diseases* (n=43; 2.99% of the sample). Individuals in this group presented two different pictures: one was that they were satisfied with their life feeling, that they had more chances, the best time was now, and they have done interesting things. On the other hand, they did not look forward to the future, wanted to change their life if they could, and felt they were growing older. Cluster 5 contained the highest proportion of those individuals in the SHILSET sample who were above 80 years old (34.9%), were in the skilled-non manual/skilled-manual class (20.9%), smoked (44.2%), had arthritis and/or rheumatism (53.5%), and had urinary incontinence (23.3%) compared to the other clusters.

The sixth subgroup, labelled *medium profile: people being separated/divorced and attending clubs or organisations* (n=81; 5.63% of the sample), consisted of

individuals who felt that they did not have more chances than most of the people they knew, and would like to change their past life if they could. This cluster contained the highest proportion of individuals who were separated/ divorced (11.1%), and attended clubs or organisations (14.8%) compared to the other clusters.

The profile of the seventh cluster was named *fairly good profile: good health and had a pet* (n=54; 3.76% of the sample). Everyone in this cluster was satisfied with his or her life. Interestingly, they felt that they did both boring and interesting things. This cluster contained the highest proportion of people who assessed their health as good (37.0%), did not have arthritis or rheumatism (83.3%), and had a pet (25.9%) compared with the other clusters.

The eighth subgroup, which was generally dissatisfied with life, was labelled *medium profile: no friend* (n=64; 4.45% of the sample). Cluster 8 had a high proportion of individuals who disagreed that they were satisfied with their life, and could be happier than they were now. However, they still expected some interesting and pleasant things in the future. This cluster contained the highest proportion of people who did not have a friend (10.9%) compared with the other clusters.

Cluster 9 was the smallest subgroup that was labelled *fairly good profile: non-smoker but having high blood pressure problems* (n=29; 2.02% of the sample). The majority of individuals in cluster 9 reported having had more chances in life, were satisfied with their life, felt that this was the best time of their life, and expected good things in the future. This cluster contained the highest proportion of people who were non-smokers (19.3%), did not have heart problems (89.7%), did not have giddiness (100%), had high blood pressure (44.8%), and did not attend religious groups (96.6%) compared with the other clusters.

The tenth cluster was named *highly negative profile: poor health and feeling lonely* (n= 98; 6.82% of the sample). People in cluster 10 had a higher proportion than the other groups who felt old and somewhat tired, but they disagreed that their life could be happier than it was now. Cluster 10 contained the highest proportion of people who rated their health as poor (15.3%), felt lonely (51.0%), and had walking problems (52.0%) compared with the other clusters.

In contrast to all clusters, cluster 11 had the lowest mean score for life satisfaction that was 15.45, so it was labelled *highly negative profile: people being single, dissatisfied with income, and higher levels of depression* (n=55; 3.82% of the sample).

Participants in this group disproportionately felt that they did not have more chances, were dissatisfied with their life, felt that they could be happier than now, felt that they were not having their best years in old age, and felt old and weary, reflecting much less satisfaction with their life. This cluster contained the highest proportion of people who were single (7.3%), were dissatisfied with their income (89.1%), rated their health as fair (45.5%) and less healthy compared to their peers (56.4%), had heart problems (30.9%), did not have a pet (96.4%), and had higher levels of depression (80.0%) compared with the other clusters.

Cluster 12 was named *fairly good profile: mentally healthy, and having more friends* (n=82; 5.70% of the sample). All (100%) agreed with the ten statements in the life satisfaction scale. Even though participants reported being satisfied with their life, they expressed relative negativity, in terms of not being happy in old age, having done boring or monotonous things, and feeling old and tired. Cluster 12 contained the highest proportion of people who did not have depression (81.7%), did not have stomach problems (87.8%), and had friends (100%) compared to the other clusters.

The largest subgroup, *highly positive profile: high life satisfaction* (Cluster 13: n=55; 3.82% of the sample), on average reflected a positive, well-balanced spread of high-level life satisfaction across all statements (standardized life satisfaction mean score=100). Cluster 13 was characterized by the highest proportion of individuals who were less than 80 years old (87.3%), were in the professional/intermediate class (29.1%), were satisfied with their income (85.5%), rated their own health as excellent (34.5%), felt more healthy than their peers (50.9%), and read newspapers or journals (52.7%), and did not have dizziness (100%) and urinary incontinence (94.5%) compared with the other clusters.

Cluster 14 was labelled *fairly good profile: expected good life in the future* (n=91; 6.33% of the sample). Generally, members in this group presented a positive frame of mind. They were satisfied with their life, would not change their past, did interesting things, and pretty much had attained what they had expected out of life. This cluster contained the highest proportion of people who rated their health as average (49.5%) compared to the other clusters.

The profile of the fifteenth cluster group was such that it was labelled *fairly good profile: satisfied with their lives* (n=65; 4.52% of the sample). One hundred percent disagreed that they did boring things. The cluster also tended to agree that they had

had done fairly well in life, they did interesting things, and they pretty much had achieved what they had expected out of life. However, they felt old and tired. Cluster 15 contained higher proportion of people who were under 80 years old, and rated their health as average than the other clusters.

Cluster 16 was a small group, labelled *medium profile: medium health with lower social engagement* (n=33; 2.29% of the sample). The features of this group were conflicting, as follows: they felt that these were the best years of their life, generally disagreed that they had done no interesting things, and still expected pleasant things to happen in their life; on the other hand, they also felt old and weary. This cluster reported the highest proportion of people who had stomach problems (33.3%) and did not attend clubs or organisations (100%) compared with the other clusters.

Cluster 17 was labelled *fairly good profile: relatively healthy and not lonely* (n=57; 3.96% of the sample). Cluster 17 included participants who agreed that they felt satisfied with their life, but they also felt old and tired. All (100%) disagreed that they expected some pleasant things to happen in the future and that they had done interesting things. This cluster contained the highest proportion of people who did not feel lonely (91.2%), rated themselves about as healthy as their peers (59.6%), did not have high blood pressure (86.0%), and did not have walking difficulties (87.7%) compared with the other clusters.

Cluster 18 was labelled *fairly good profile: satisfied with life and higher social engagement* (n=45; 3.13% of the sample). This cluster presented as being highly satisfied with life in general; for example, they felt they had had more chances and that these were the best years of their life, although they tended to disagree with the statement – "I've attained pretty much what I expected out of life." Cluster 18 contained the highest proportion of people who attended a religious group (17.8%) and had a TV or radio (100%) compared with the other clusters.

Cluster 19 had a low life satisfaction mean score ($\bar{x}$ =31.46) and was assigned the label: *highly negative profile: people being females, widowed, lower socioeconomic class, and less social engagement* (n=79; 5.49% of the sample). Most disagreed that they had more opportunities, and only a minority expected some interesting things to happen in the future. This cluster reported the highest proportion of people who were females (68.4%), were widowed (57.0%), were in semiskilled/unskilled class (79.7%),

reported dizziness (8.9%), did not read newspapers or journals (91.1%), and did not have a TV or radio (22.8%) compared with the other clusters.

The final cluster was assigned the label: *highly positive profile: good healthy for no using walking aid* (Cluster 20: n=64; 4.45% of the sample). Cluster 20 members reported high life satisfaction, despite feeling old and tired and that they could be happier than they were now. Cluster 20 contained the highest proportion of people who were married (68.8%) and did not use a walking aid (98.4%) compared with the other clusters.

The NLSAA study in 1993

Figure 7.3 presents the dendrogram for the NLSAA study in 1993.

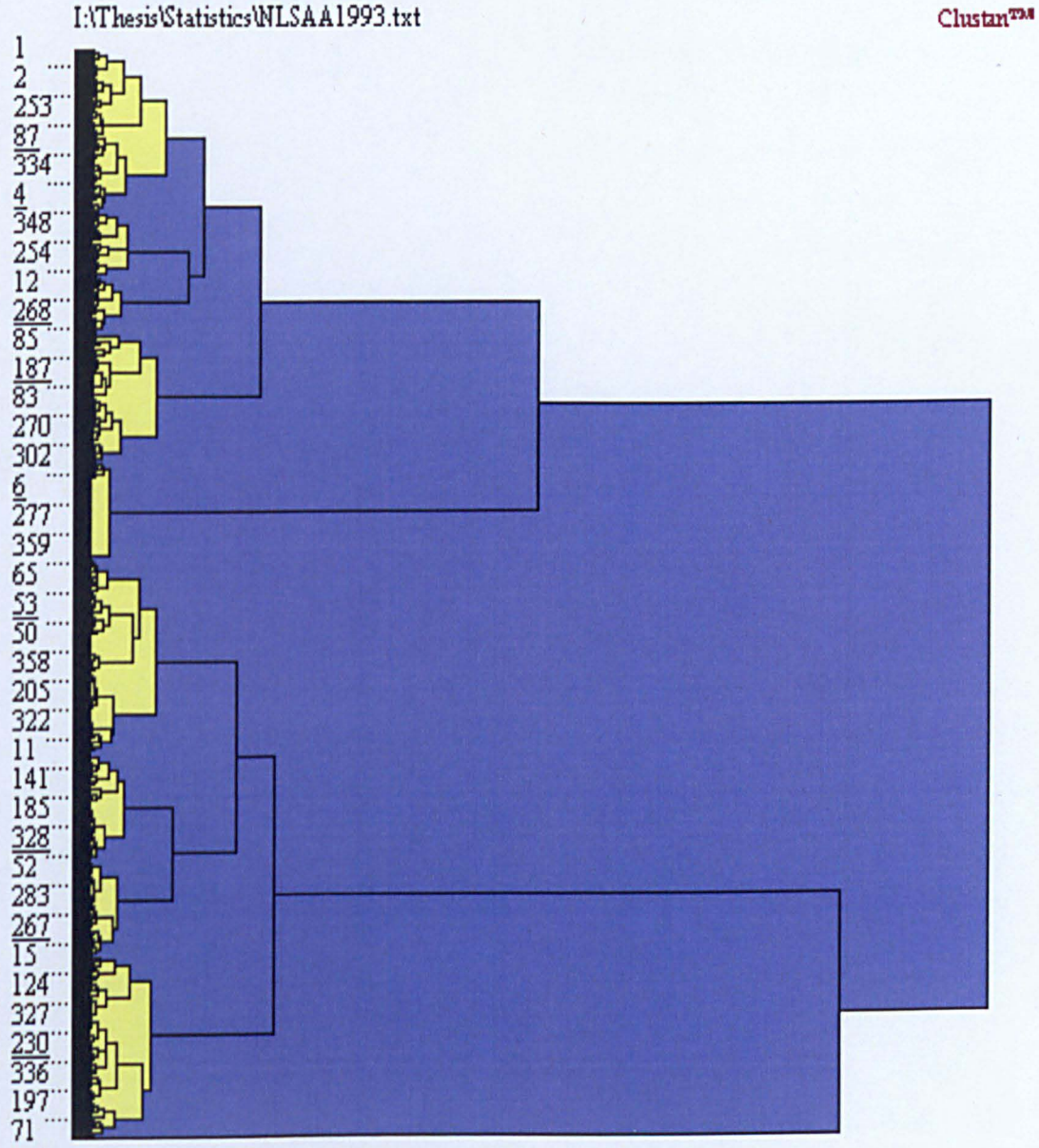

Figure 7.3: The dendrogram figure shows all clusters in the NLSAA study in 1993.

The left axis shows the participant's number and yellow colour that shows 15 merged clusters that were used in this section. The black line is the first cluster that is each individual of sample (410 participants) of the NLSAA study.

Table 7.3 presents the ten subgroups extracted during cluster analysis, and provides an overview of the membership size and the mean score for life satisfaction in the UK NLSAA dataset from 1993 (n=410). As Table 7.3 indicates, clusters 4, 7, 8, and 10 could be viewed as representing higher life satisfaction; clusters 1, 2, 5, 6, and 9 characterized participants with medium levels of life satisfaction; and cluster 3 expressed lower levels of life satisfaction. Appendix M (pp. 427-428) shows the sub-profile of the 10 clusters in all dimensions. The majority of clusters reported having a TV or radio (100%) (except for cluster 4).

Table 7.3: Cluster analysis provides an overview of the membership size and the mean score of life satisfaction in the NLSAA in 1993.

Cluster	Labelled name	n	Std. LSI* mean score
1	Medium profile: medium condition	43	58.50
2	Medium profile: people being males, middle class, having a pet and having heart problems	25	55.69
3	Highly negative profile: poor physical and mental health	25	24.00
4	Highly positive profile: healthy and very fit	65	86.69
5	Medium profile: people being widowed, smoker, living alone and fair health	49	44.35
6	Medium profile: less diseases and having more friends	23	59.20
7	Fairly good profile: younger with not feeling lonely and higher levels of social engagement	36	77.56
8	Highly positive profile: physically and mentally fit, high socioeconomic class	37	81.50
9	Fairly good profile: medium health, lower levels of social engagement	52	63.68
10	Fairly good profile: people being older, females, single, and lower socioeconomic class, but good health and satisfied with income	27	76.78

* Std. LSI mean score = Standardized Life Satisfaction Index mean score.

The first cluster was labelled *medium profile: medium condition* (Cluster 1: n=43; 10.49% of the sample). Most people in this group agreed that old age was the dreariest time of their life, but they still did interesting things and were satisfied with their life. They disagreed that this was the best time. As can be seen in Appendix N (pp. 429-431), most people in this cluster were smokers, satisfied with their income, had heart, giddiness, and high blood pressure problems.

The profile of the second cluster, which was named *medium profile: people being males, middle class, having a pet and having heart problems* (Cluster 2: n=25; 6.10% of the sample), was that the majority disagreed that they had had more chances, that

they had felt happy when younger, and that they were having the best times of their life. They tended to report not doing boring things, also saying that they were satisfied with life and did interesting things. Cluster 2 contained the highest proportion of people who were males (44.0%), were in skilled-non manual or skilled-manual class (76.0%), reported having heart troubles (32.0%), and had a pet (32.0%), but did not have any walking problems (80%), versus all of the other clusters.

Cluster 3 had the lowest mean score for life satisfaction, and was labelled *highly negative profile: poor physical and mental health* (n=25; 6.10% of the sample). Generally, the cluster members revealed a negative sense of well-being spread across all the categories. Individuals in this cluster disagreed that they had more chances and that these were the best times of their life. This cluster contained the highest proportion of people who felt they were lonely (80.0%), had higher levels of depression (84.0%), reported poor health (32.0%), rated themselves as less healthy than their counterparts (28.0%), had stomach problems (48.0%), had urinary incontinence (44.0%), did not read newspapers or journals (24.0%), had walking difficulties (60.0%), and used a walking aid (60.0%) compared to the other clusters.

The largest subgroup also had the highest mean score for life satisfaction (mean score = 86.69). This cluster – *highly positive profile: healthy and very fit* (Cluster 4: n=65; 15.85% of the sample), generally, reflected a positive opinion across all response categories. Members of cluster 4 reported a high sense of having done interesting things. They were satisfied with life and had pretty much attained what they had expected out of it. They did not report doing boring things or getting down in the dumps too often. Cluster 4 contained the highest proportion of people who were married (52.3%) separated/divorced (7.7%), lived with someone (69.2%), and did not have a TV or radio (1.5%) compared with the other clusters.

Cluster 5 was labelled *medium profile: people being widowed, smoker, living alone and fair health* (n=49; 11.95% of the sample). The majority of participants in this subgroup disagreed that these were the best times of their life. However, they agreed that they had pretty much had attained what they expected out of life. This cluster reported the highest proportion of people who were widowed (71.4%), lived alone (61.2%), rated themselves as having fair health (38.8%), reported being about as healthy as their peers (63.3%), smoked (22.4%), and had dizziness (49.0%) compared with the other clusters.

The sixth cluster, named *medium profile: less disease and more friends* (n=23; 5.61% of the sample), was the smallest subgroup. Most of the individuals in this cluster had been happy when they were younger and were satisfied with their life, but did not tend to make plans for things. Cluster 6 contained the highest proportion of people who did not have arthritis of rheumatism (52.2%), did not have high blood pressure (82.6%), and had friends (95.7%) compared with the other clusters.

Cluster 7 was labelled *fairly good profile: younger, not lonely with higher levels of social engagement* (n=36; 8.78% of the sample). A higher than usual proportion agreed that they had been happy when they were younger, did interesting things, was satisfied with life, and made plans for things. On the other hand, a high proportion disagreed that they had more chances that this was the dreariest time of their life, that they did boring things, and that they got down in the dumps too often. This cluster reported the highest proportion of people who were below 80 years old (66.7%), did not feel lonely (69.4%), had arthritis or rheumatism (72.2%), did not have stomach problems (86.1%) , read newspapers or journals (97.2%), attended religious groups (36.1%), and attended clubs or organizations (58.3%) compared with the other clusters.

Cluster 8 exhibited higher levels of life satisfaction, and was labelled *highly positive profile: physically and mentally fit, high socioeconomic class* (n=37; 9.02% of the sample). People in this cluster, similar to the people in cluster 7, tended towards a positive attitude, were satisfied with life, reported making plans, and expected things to work out well in their life. This cluster reported the highest proportion of people who were professional class (37.8%), had no depression (62.2%), reported their health as excellent (27.0%), rated themselves more healthy than their counterparts (59.5%), did not smoke (89.2%), did not report giddiness (81.1%), did not have incontinence of urine (89.2%), did not use a walking aid (81.1%) compared with the other clusters.

The ninth cluster, *fairly good profile: medium health, lower levels of social engagement* (n=52; 12.68% of the sample), characterized individuals who generally felt satisfied with life and had been happy when young; but they disagreed that they had more chances than others and made plans for things. They did not get down in the dumps too often. This cluster contained the highest proportion of people who were dissatisfied with their income (30.8%), rated their health as average (28.8%), had high blood pressure (32.7%), did not attend religious groups (82.7%), did not attend clubs

or organizations (65.4%), and did not have friends (21.2%) compared with the other clusters.

The last cluster was labelled *fairly good profile: people being older, females, single, and lower socioeconomic class, but good health and satisfied with income* (Cluster 10: n=27; 6.59% of the sample). This cluster included the majority of individuals who had consistent agreement on these points: they had more opportunities than their peers, they did interesting things, they were satisfied with their life, and they had pretty much attained what they had expected out of life. All (100%) disagreed that they did tedious things or had made plans for things in a month or year from now. Cluster 10 contained the highest proportion who were above 80 years old (77.8%); females (77.8%); single (14.8%); in semiskilled/unskilled/ others class (37.0%), satisfaction with their income (96.3%); in good health (59.3%); without heart problems (88.9%); and not having a pet (92.6%) compared with the other clusters.

The SHLSET study in 1993

Figure 7.4 presents 12 clusters in the SHLSET study in 1993.

The black line is the first cluster that is each individual of sample (1003 participants) of the SHLSET study in 1993. The left axis shows the respondent's number and yellow colours 12 clusters. However, the 12 clusters do not show very clearly. Therefore, Figure 7.5 shows the base line that is from 100 clusters and presents apparent 12 clusters.

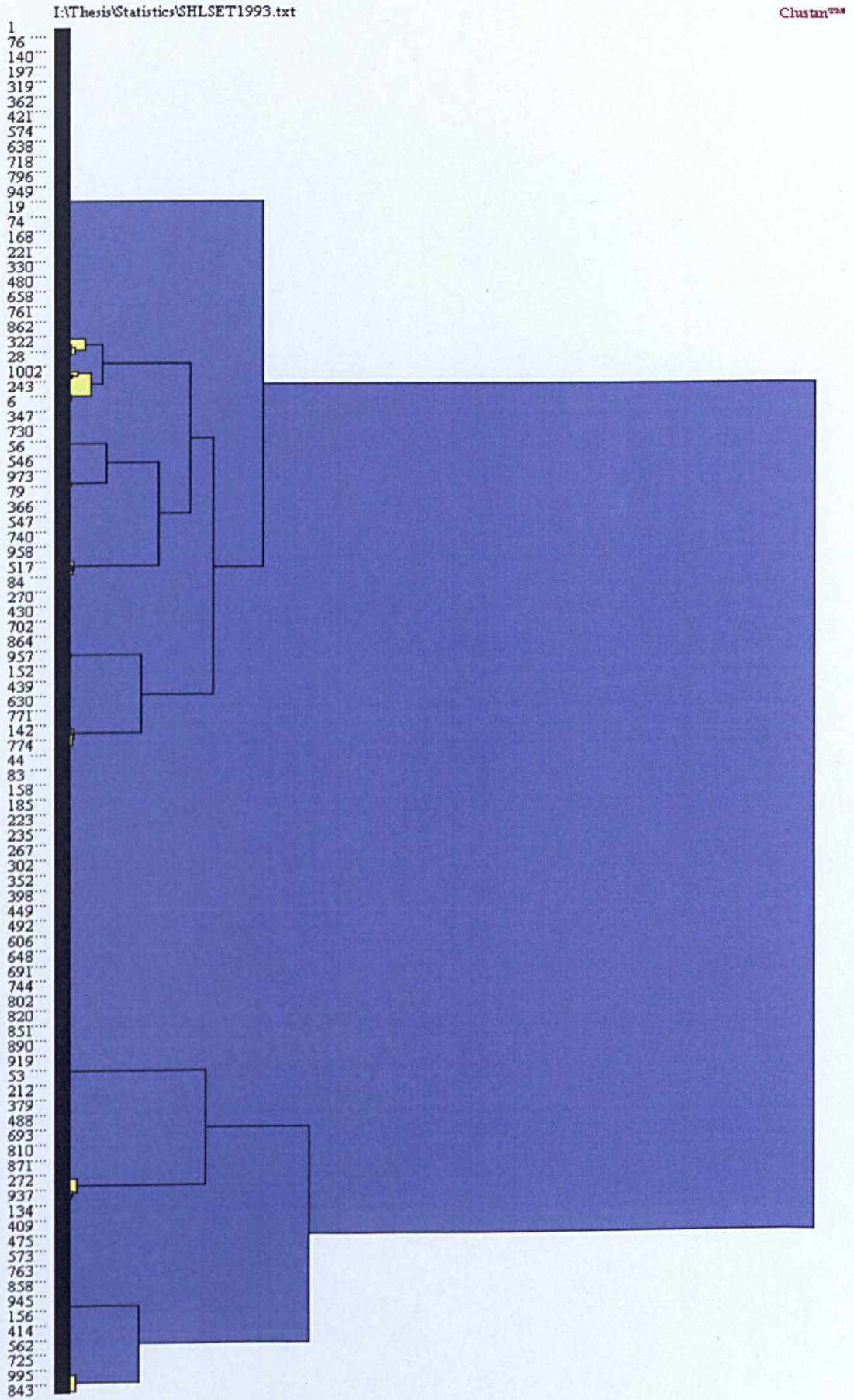

Figure 7.4: The dendrogram figure shows all clusters in the SHLSET study in 1993.

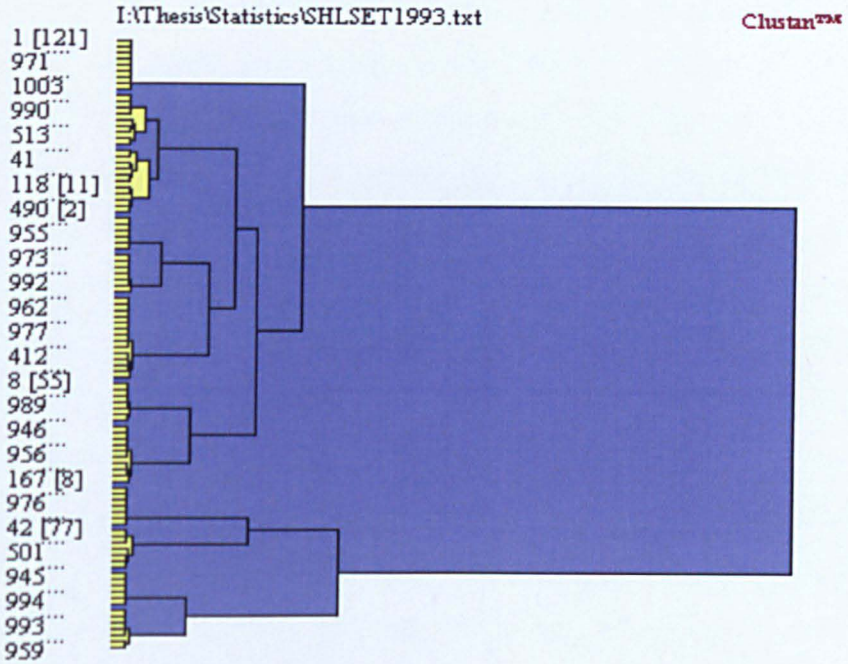

Figure 7.5: The dendrogram figure shows the baseline 100 clusters in the SHLSET study in 1993.

Table 7.4 shows the 12 groups extracted from cluster analysis from the Taiwanese SHLSET database from 1993, and provides an overview of cluster proportions and sizes (total n=1,003). As can be seen from Table 7.4, using four items to assess life satisfaction, clusters 3, 7, 8, and 10 could be viewed as having a higher level of life satisfaction; whereas clusters 11 and 12 were medium; and clusters 1, 2, 4, 5, 6, and 9 had lower life satisfaction. Appendix O (p. 432) shows the profiles of the 12 clusters in all dimensions. In the SHLSET study, most people did not have giddiness problem except cluster 5, 6, and 9.

Table 7.4: Cluster analysis provides an overview of the membership size and the mean score of life satisfaction in SHLSET in 1993.

Cluster	Labelled name	n	Std. LSI* mean score
1	Totally negative profile: poor health and feeling lonely	129	0.00
2	Medium profile: people being older, widowed, and having lower levels of social engagement	112	47.99
3	Fairly good profile: medium health and not using walking aid	42	72.32
4	Highly negative profile: fair health with a higher levels of depression	61	24.59
5	Fairly good profile: people being females with certain diseases	57	49.34
6	Highly negative profile: people being single and less reading	64	25.00
7	Totally positive profile: excellent physical and mental health	239	100.00
8	Fairly good profile: middle class with good health	80	75.00
9	Medium profile: medium health with giddiness problems	34	41.54
10	Fairly good profile: less physical problems and more friends	88	76.28
11	Medium profile: professional class with higher levels of social engagement	28	50.00
12	Medium profile: people being younger with medium health	69	52.54

* Std. LSI mean score = Standardized Life Satisfaction Index mean score.

The first cluster had a life satisfaction score of zero, and was labelled: *totally negative profile: poor health and feeling lonely* (Cluster 1: n=129; 12.86% of the SHLSET sample). Participants in cluster 1 answered negatively for all four statements and reflected individuals who not only believed that they had not had chances in the past; they also did not expect good things to occur in the future. As can be seen in Appendix P (p. 433-435), this cluster contained the highest proportion of people who lived alone (25.6%), felt lonely (54.3%), reported poor health (17.1%), rated themselves less healthy than their counterparts (45.7%), and had stomach problems (14.0%) compared with the other clusters.

Cluster 2 was named *medium profile: people being older, widowed, and having lower levels of social engage*ment (n =112; 5.49% of the sample). Participants in this cluster seemed perplexed by the dilemma of whether to agree or disagree with all of the questions, so they tended to respond that they did not know. This cluster could reflect those with less desire to express their own feelings and attitudes and also reflected these older people's profile, described as follows. Another possible explanation is that these people represented those with no life alternatives. This cluster reported the highest proportion of people who were aged 80 years old and older (52.7%), were widowed (56.3%), had urinary incontinence (33.9%), had walking problems (61.6%), used a walking aid (34.8%), did not attend a club or organisation (98.2%), and did not have a TV or radio (31.3%) compared with the other clusters.

The profile of the third cluster group was such that it was labelled *fairly good profile: medium health and not using walking aid* (n=79; 11.79% of the sample). Most of the participants in this group felt that these were their best times and they also expected interesting things in the future. However, they disagreed they were satisfied with life. They might have some regrets, but still were hopeful for the future. This cluster contained the highest proportion of people reporting no dizziness (100%) and not using a walking aid (92.9%) compared with the other clusters.

Cluster 4 had a low mean score for life satisfaction and was named *highly negative profile: fair health with higher levels of depression* (n=42; 4.19% of the sample). This group was distinguished by individuals reporting not having more opportunities, not having a quality life in the past, and not expecting pleasant things to happen in the future. However, these people reflected a much more undesirable picture of old age. This cluster contained the highest proportion of people who were dissatisfied with

their income (83.6%), had high levels of depression (96.7%), reported fair health (34.4%), and did not have a pet (95.1%) compared with the other clusters.

Cluster 5 was called *fairly good profile: people being females with certain diseases* (n=57; 5.68% of the sample), and included older people who felt they lacked future chances and had been dissatisfied with life in general when they were young. However, they thought that these were their best times and expected pleasant things in the future. This cluster contained the highest proportion of people who were females (54.4%), reported average health (47.4%), had arthritis or rheumatism (33.3%), had hypertension (43.9%), but did not have a heart problem (84.2%) compared with the other clusters.

Cluster 6 had a *highly negative profile: people being single, less reading* (n=64; 6.38% of the sample). Although relatively negative in their evaluation of life satisfaction, as per the life satisfaction index, cluster 6 individuals nevertheless had high expectations for life, in general. This cluster reported the highest proportion of people who were single (6.3%) and did not read newspapers or journals (87.5%) compared with the other clusters.

The largest cluster with the highest mean score for life satisfaction was labelled *totally positive profile: excellent physical and mental health* (Cluster 7: n=239; 23.83% of the sample). These individuals exhibited a positive outlook, and all (100%) agreed with all of the statements in the life satisfaction scale. Cluster 7 contained the highest proportion of people who were married (68.6%), satisfied with their income (75.3%), did not report loneliness (89.5%) and depression (20.5%), reported excellent health (25.5%), attended club or organisation (10.0%), and had a TV or radio (95.8%) compared with the other clusters.

The eighth cluster group was labelled *fairly good profile: middle class with good health* (n=80; 7.98% of the sample). It was the same as cluster 7, in that all (100%) answered questions for the life satisfaction scale positively, except for the item: 'these are the best years of my life.' Cluster 8 contained the highest proportion of people in skilled-non manual/skilled-manual class (18.8%), rating their own health as good (30.0%), feeling more healthy than their peers (45.0%), and not attending religious group (97.5%) compared with the other clusters.

Cluster 9 had a lower degree of life satisfaction. It was labelled *medium profile: medium health, with giddiness problems* (n=34; 3.39% of the sample). The majority

of people in this group were satisfied with their life when they looked back on it. In comparison with the other clusters, cluster 9 contained the highest proportion of people in semiskilled/unskilled/others class (79.4%) and reporting giddiness (2.9%).

Cluster 10 had a *fairly good profile: less physical problems and more friends* (n=88; 8.77% of the sample). Cluster 10 individuals were highly satisfied with life in general, although they did not report having had more chances than other people. This cluster contained the highest proportion of people who did not have high blood pressure (78.4%), did not have urinary incontinence (96.6%), did not have walking problem (87.5%), and had friends (79.5%) compared with the other clusters.

The smallest group was named *medium profile: professional class with higher levels of social engagement* (Cluster 11: n=28; 2.79% of the sample). Compared with participants in other clusters, those in Cluster 11 were highly dissatisfied with their life and disagreed that old age was the best time of life. However, they also felt that they had had more chances than other people and expected to partake of interesting things in the future. Cluster 11 contained the highest proportion of people who were more males (64.3%), separated/divorced (14.3%), professional/intermediate class (25.0%), non-smokers (89.3%) free of arthritis or rheumatism (85.7%), having heart problem (25.0%), no stomach problem (100%), reading newspapers or journals (42.9%), attending religious groups (17.9%), and not having friend (46.4%) compared with the other clusters.

Cluster 12 was called *medium profile: people being younger with medium health* (n=69; 6.88% of the sample). This group was negative in some ways and positive in others. A high proportion of people felt that old age was not the best time for them, but they also expected enjoyable things to occur in the future. They also still tended to be satisfied with life. Cluster 12 contained the highest proportion of people who were less than 80-year old (78.3%), lived with someone (95.7%), reported feeling as healthy as their peers (60.9%), were smokers (37.7%), had arthritis or rheumatism (33.3%), and had a pet (29.0%) compared with the other clusters.

7.3.2 Kaplan-Meier Survival Analysis

The Kaplan-Meier survival analysis was used to examine the distribution of survival time from the interview date to the censor date (e.g., 31st December 2003) among the clusters in the two studies. A graphical presentation of the time-to-event data is

presented in a Kaplan-Meier plot. The null hypothesis was that there was no difference in the survival among the clusters in the two studies or for each of the two studies.

14-year mortality in the NLSAA study

The Kaplan-Meier curve describes the survivorship of the clusters and illustrates a difference between the survival curves of clusters.

Figure 7.6 presents that survival curves for 15 clusters of the NLSAA sample in the 14-year mortality. The Kaplan-Meier survival curve looks like a poorly designed staircase, with vertical steps downward at the time of death of each individual participant. The vertical axis shows the probability of survival. The horizontal axis shows the survival time in days to 31 December 2003. Comparing the plots for 15 clusters, it shows that cluster 15 (black line) had the lowest survival probability and there was a large gap between it and the lines for clusters 1 (blue), 2 (bright green), 9 (sky blue), 10 (green), 11 (orange), 12 (lavender), 13 (indigo), and 14 (light turquoise).

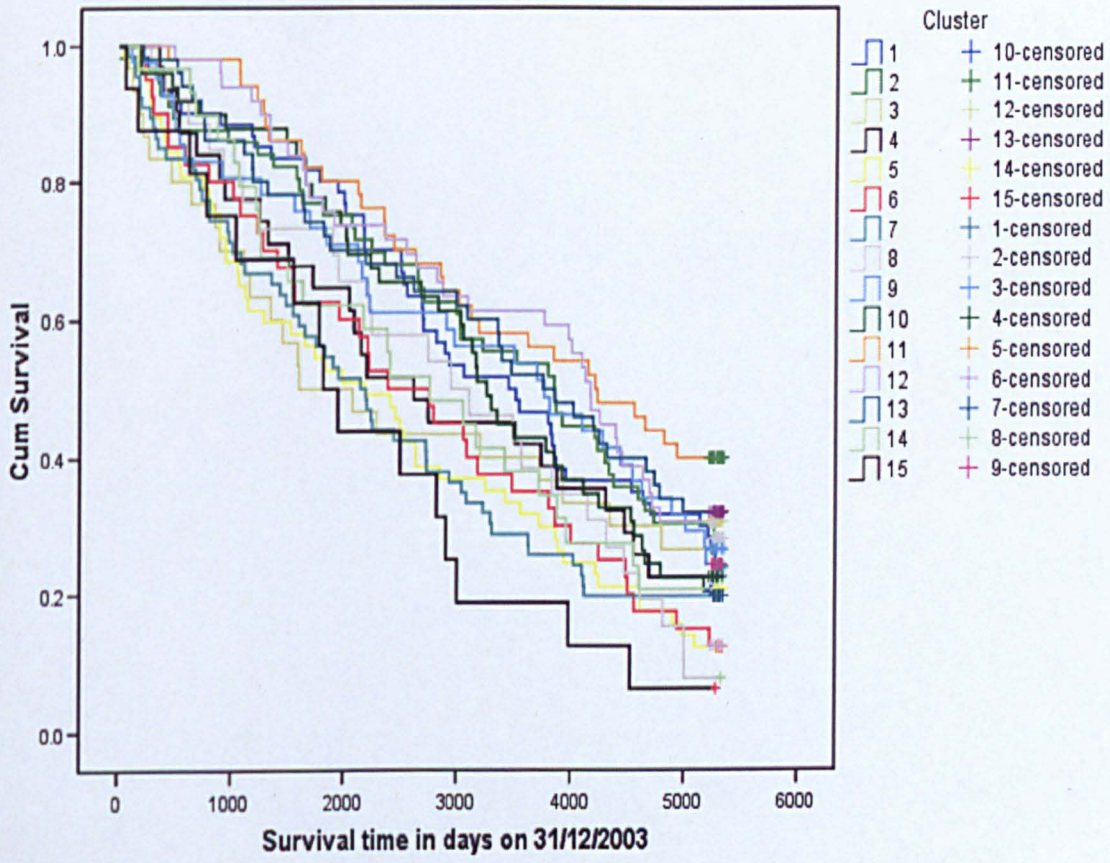

Figure 7.6: Kaplan-Meier estimated survival curves for the 15 clusters in the NLSAA study (14-year mortality).

Table 7.5 presents the mean and median survival time for the 15 clusters in the NLSAA study for 14-year mortality.

Table 7.5: The mean and median survival time for the 15 clusters in the NLSAA study for 14-year mortality.

Cluster	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
1	3352.013	219.403	2921.983–3782.044	3453.000	589.339	2297.896–4608.104	5349
2	3403.703	236.497	2940.170–3867.236	3851.000	435.279	2997.852–4704.148	5350
3	2638.867	372.873	1908.035–3369.699	1605.000	573.739	480.471–2729.529	5350
4	2917.581	326.017	2278.588–3556.574	2613.000	791.324	1062.005–4163.995	5338
5	2455.526	237.731	1989.574–2921.479	2184.000	452.381	1297.333–3070.667	5345
6	2700.025	275.928	2159.207–3240.843	2390.000	461.693	1485.083–3294.917	5344
7	2457.273	222.085	2021.986–2892.559	2145.000	255.907	1643.422–2646.578	5344
8	2938.577	322.730	2306.027–3571.127	2949.000	792.898	1394.921–4503.079	5329
9	3296.073	291.041	2725.633–3866.514	3767.000	719.497	2356.786–5177.214	5336
10	3251.408	230.309	2800.002–3702.814	3257.000	157.467	2948.364–3565.636	5315
11	3756.920	230.925	3304.306–4209.534	4214.000	610.469	3017.481–5410.519	5348
12	3646.571	230.139	3195.499–4097.644	4173.000	171.464	3836.930–4509.070	5342
13	3439.200	253.451	2942.436–3935.964	3758.000	489.671	2798.244–4717.756	5348
14	2874.724	320.128	2247.272–3502.176	2757.000	598.295	1584.342–3929.658	5344
15	2172.125	370.136	1446.658–2897.592	1815.000	173.000	1475.920–2154.080	5282

4. Estimation is limited to the largest survival time if it is censored.
5. Standard error.
6. Total survival time in days.

The Log-rank (Mantel-Cox) showed that the Chi-square statistic was 37.71 (df=14) with an associated p=0.001 for comparing the overall clusters. There was a statistically significant difference in the mean survival time between the 15 clusters. Cluster 11 had the highest mean of survival days and was significantly different from clusters 3, 4, 5, 6, 7, and 8. Conversely, cluster 15 had the lowest mean survival tine that was significantly different from clusters 1, 2, 9, 10, 11, 12, and 13.

14-year mortality in the SHLSET study

Figure 7.7 shows the survival plots for the 20 clusters in the SHLSET study for 14-year mortality.

The plot below compared survival time of 20 clusters. Visually, these line were relatively close and there was quite a lot of crossover between the lines although some lines were clearly separate, e.g., cluster 9 (pale blue), and cluster 16 (grey line). The longitudinal survival in cluster 9 was noticeably good. However, cluster 16 (grey line) had the lowest line and there was large gap between this line and the lines for clusters 1 (blue line), 2 (bright green), 6 (red line), and 9 (pale blue).

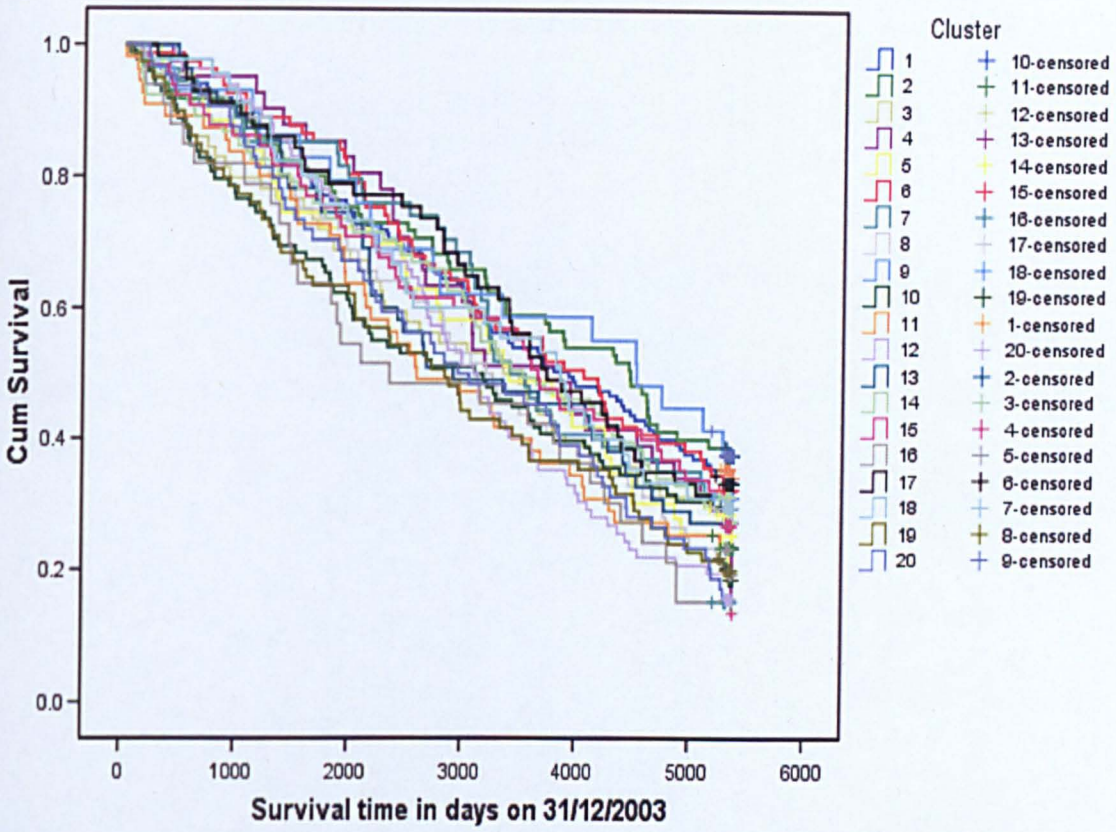

Figure 7.7: Kaplan-Meier estimated survival curves for the 20 clusters in the SHLSET study (14-year mortality).

Table 7.6 shows the mean and median survival time for the 20 clusters in the SHLSET study for 14-year mortality.

Table 7.6: The mean and median survival time for the 20 clusters in the SHLSET study for 14-year mortality.

Cluster	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
1	3575.745	153.035	3275.797–3875.694	3931.000	397.744	3151.421–4710.579	5386
2	3700.098	195.032	3317.834–4082.361	4478.000	377.975	3737.169–5218.831	5385
3	3186.898	234.416	2727.442–3646.354	3355.000	527.000	2322.080–4387.920	5380
4	3599.598	246.913	3115.649–4083.547	3856.000	562.667	2753.172–4958.828	5380
5	3313.643	264.585	2795.056–3832.231	3404.000	452.341	2517.412–4290.588	5377
6	3680.665	182.289	3323.379–4037.950	4065.000	387.470	3305.558–4824.442	5385
7	3555.981	224.553	3115.858–3996.105	3416.000	256.584	2913.095–3918.905	5386
8	3207.393	213.525	2788.884–3625.902	3208.000	333.000	2555.320–3860.680	5375
9	3762.602	329.956	3115.888–4409.316	4529.000	550.754	3449.522–5608.478	5382
10	3025.133	197.339	2638.349–3411.916	3105.000	614.264	1901.043–4308.957	5378
11	2990.808	242.739	2515.040–3466.576	2594.000	486.210	1641.028–3546.972	5386
12	3182.598	167.266	2854.756–3510.440	3089.000	190.616	2715.393–3462.607	5386
13	3281.345	231.936	2826.750–3735.941	2914.000	850.603	1246.818–4581.182	5378
14	3403.398	189.866	3031.260–3775.536	3527.000	440.086	2664.431–4389.569	5383
15	3442.769	224.318	3003.106–3882.432	3662.000	230.323	3210.567–4113.433	5379
16	2842.636	317.108	2221.105–3464.168	2352.000	968.088	454.547–4249.453	5374

17	3617.920	217.091	3192.423–4043.418	3737.000	429.196	2895.776–4578.224	5386
18	3486.556	251.609	2993.401–3979.710	3861.000	410.441	3056.536–4665.464	5384
19	2902.608	209.152	2492.669–3312.546	2842.000	315.506	2223.609–3460.391	5383
20	3115.469	215.323	2693.436–3537.501	2954.000	618.000	1742.720–4165.280	5375

1. Estimation is limited to the largest survival time if it is censored.
2. Standard error.
3. Total survival time in days.

The Log-rank (Mantel-Cox) showed that the Chi-square value was 29.808 with an associated p=0.054 in 20 clusters. In other words, there was only just a statistically significant difference in the mean survival time between 20 clusters. Cluster 16 had the lowest mean survival time and was significantly different from clusters 1, 2, 6, and 9 when compared with these clusters. Cluster 9 had the highest mean survival time and was significantly different from clusters 16, 19, and 20.

Ten-year mortality in the NLSAA study

Figure 7.8 shows the survival plots between 10 clusters in the NLSAA study for ten-year mortality.

Clearly, people in cluster 7 (sky blue line) appeared to live longer, whereas, people in cluster 5 (yellow line) had shorter survival times than the other clusters. As can be seen from Figure 7.8, there was an apparent large gap between the lines, especially, between cluster 7 (sky blue line) and clusters 1 (blue line), 3 (gray line), 5 (yellow line), and 6 (red line).

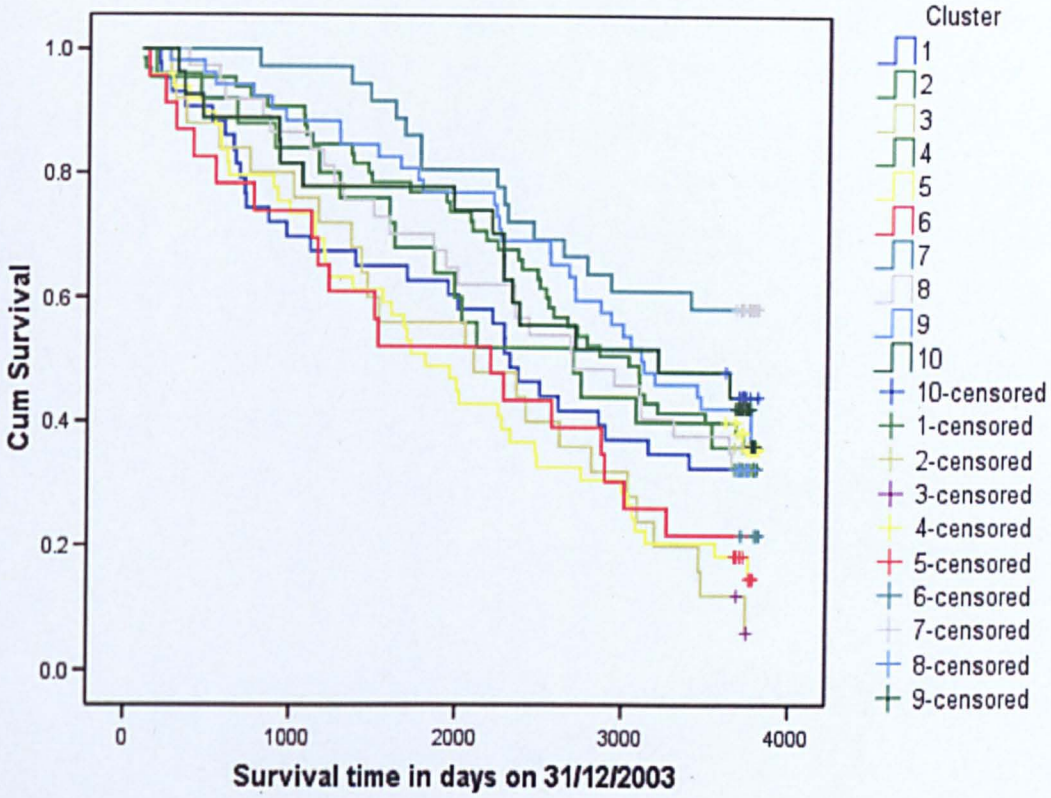

Figure 7.8: Kaplan-Meier estimated survival curves for the 10 clusters in the NLSAA study (ten-year mortality).

Table 7.7 presents the mean and median survival time for the 10 clusters in the NLSAA study of ten-year mortality.

Table 7.7: The mean and median survival time for the 10 clusters in the NLSAA study for ten-year mortality.

Cluster	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
1	2270.512	203.927	1870.815–2670.208	2318.000	187.492	1950.516–2685.484	3803
2	2485.960	247.749	2000.371–2971.549	2699.000	599.520	1523.941–3874.059	3803
3	2079.520	231.430	1625.917–2533.123	2101.000	691.113	746.418–3455.582	3746
4	2709.181	142.062	2430.740–2987.623	3031.000	250.476	2540.067–3521.933	3810
5	1995.404	171.305	1659.647–2331.161	1811.000	224.653	1370.680–2251.320	3779
6	2047.391	272.427	1513.433–2581.349	2203.000	622.869	982.178–3423.822	3815
7	3095.861	157.509	2787.143–3404.579	–	–	–	3808
8	2559.811	193.209	2181.122–2938.500	2690.000	458.473	1791.393–3588.607	3793
9	2821.533	151.398	2524.793–3118.273	3106.000	311.279	2495.893–3716.107	3788
10	2692.216	241.323	2219.224–3165.208	3208.000	1064.340	1121.893–5294.107	3807

1. Estimation is limited to the largest survival time if it is censored.
2. Standard error.
3. Total survival time in days.

As can be seen in Table 7.7, the cluster 7 did not have estimate for a median survival time. There can be no estimated median survival time because it is not enough people

had died to if it is censored. The Log-rank (Mantel-Cox) test showed that the Chi-square value was 33.288 with an associated $p<0.001$. In other words, there was a statistically significant difference in the mean survival time among the 10 clusters. Cluster 7 had the highest mean survival time and was significantly different from clusters 1, 3, 5, 6, and 8. Cluster 5 had the lowest mean survival time and was significantly different from clusters 4, 7, 9, and 10. Cluster 3 was significantly different from clusters 7, 8, 9, and 10.

Ten-year mortality in the SHLSET study

The Kaplan-Meier curve describes survivorship between the 12 clusters. Figure 7.9 shows the survival plots between 12 clusters of the SHLSET study for ten-year mortality.

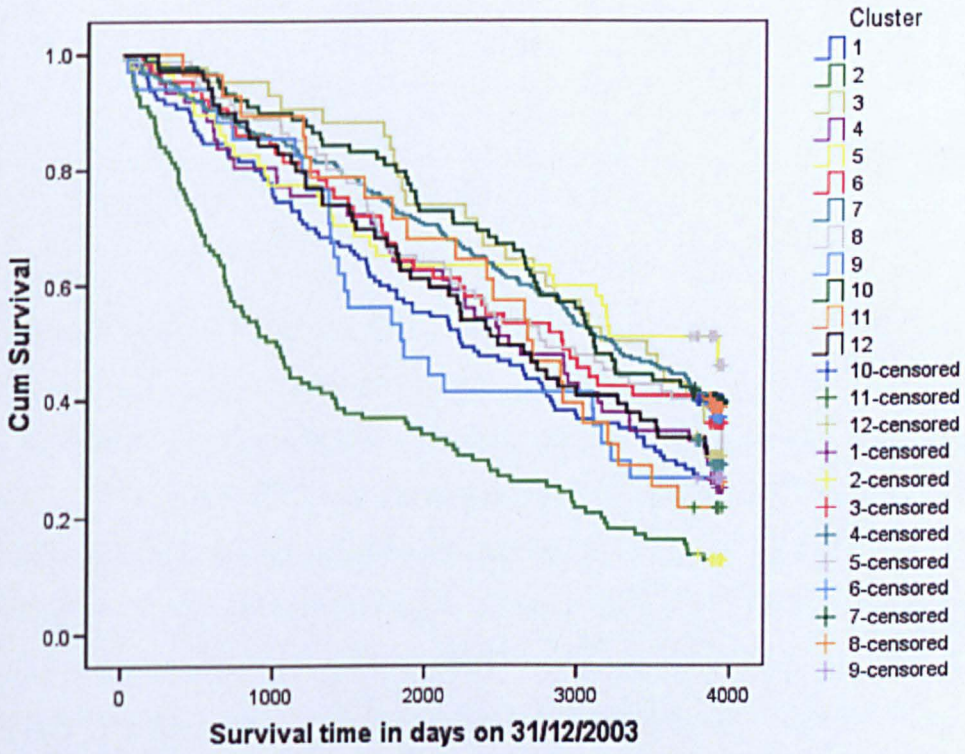

Figure 7.9: Kaplan-Meier estimated survival curves for the 12 clusters in the SHLSET study (ten-year mortality).

Visually, there were gaps between the curves, which suggested possible differences among the 12 clusters in the survival time. As can be seen in Figure 7.9, cluster 2 (bright green line) had the lowest line compared with the other clusters, people in cluster 2 did not live as long. Conversely, people who were in clusters 3 (green-grey line), 10 (green line), 5 (yellow line), and 7 (turquoise line) survived longer. Moreover, there was a large gap between cluster 2 and clusters 1 (blue line), 3 (green-

gray line), 4 (violet line), 5 (yellow line), 6 (red line), 7 (turquoise line), 8 (grey line), 9 (sky blue line), 10 (green line), 11 (orange line), and 12 (black line).

Table 7.8 presents the mean and median survival time for the 12 clusters in the SHLSET study for ten-year mortality.

Table 7.8: The mean and median of survival time for comparing clusters in the SHLSET study of 10-year mortality.

Cluster	Mean[1]			Median			Total survival time[3]
	Estimate	Std. Error[2]	95% CI	Estimate	Std. Error	95% CI	
1	2291.977	120.128	2056.526–2527.427	2231.000	316.262	1611.126–2850.874	3952
2	1554.396	128.587	1302.365–1806.427	952.000	141.548	674.567–1229.433	3952
3	2928.452	171.683	2591.954–3264.951	3150.000	389.385	2386.806–3913.194	3952
4	2467.824	170.770	2133.114–2802.533	2549.000	362.570	1838.363–3259.637	3950
5	2730.804	189.682	2359.027–3102.580	3914.000	–	–	3952
6	2601.907	164.041	2280.387–2923.427	2892.000	355.000	2196.200–3587.800	3941
7	2764.294	84.053	2599.549–2929.038	3221.000	209.321	2810.730–3631.270	3949
8	2665.473	140.671	2389.757–2941.189	2752.000	427.089	1914.906–3589.094	3948
9	2251.176	221.259	1817.509–2684.844	1840.000	388.487	1078.565–2601.435	3944
10	2869.670	123.401	2627.805–3111.536	3105.000	124.765	2860.460–3349.540	3947
11	2570.286	208.695	2161.243–2979.328	2675.000	293.017	2100.687–3249.313	3949
12	2505.222	152.519	2206.285–2804.159	2477.000	301.380	1886.295–3067.705	3948

1. Estimation is limited to the largest survival time if it is censored.
2. Standard error.
3. Total survival time in days.

As can be seen in Table 7.8, the cluster 5 did not have estimate median survival time. The cluster 5 did not have the standard error and 95% CI because the estimate median closes to the total survival time. The Log-rank (Mantel-Cox) test showed that the Chi-square value was 86.202 with an associated $p<0.001$ across 12 clusters. In other words, there was a statistically significant in the mean survival time between the 12 clusters. Cluster 2 had the lowest mean survival time and was significantly different from the other clusters. Cluster 5 had the highest mean survival time and was significantly different from clusters 1 and 2. Cluster 1 was significantly different from clusters 2, 3, 5, 7, and 10.

7.3.3 Clusters as predictors of mortality

14-year mortality in the NLSAA study

Table 7.9 shows the results of the Cox regression analysis for the clusters and other variables as predictors of mortality in the NLSAA data set from 1989 to 2003. The

overall model (χ^2=193.835; df=46; p<0.001), with all independent variables entered, was significant.

Model 1 presents the relative risk of mortality (p=0.022) for the clusters compared to cluster 11 (the cluster with the highest mean LSI score). The relative risk ratio for Clusters 8, 5, 15, 3, 14, 6, 7, and 10 showed that there was an increased risk of mortality for people in cluster 8 (HR=2.114), cluster 5 (HR=2.371), cluster 15 (HR=3.181), cluster 3 (HR=2.087), cluster 14 (HR=1.933), cluster 6 (HR=2.134), cluster 7 (HR=2.169), cluster 10 (HR=1.704), relative to people in cluster 11. In other words, people in clusters 8, 5, 15, 3, 14, 6, 7, and 10 had a significantly higher risk of mortality than those in the reference cluster 11.

In Model 2, there was no significant relationship between clusters and mortality when demographic factors were included in the model. However, other predictors were related to the risk of mortality; for example, a hazard ratio of 1.072 for age indicates that each one-year increase in age was associated with a 0.072 (7.2%) increase in the hazard rate for death. The risk of mortality for females was only 0.656 times the level for males, when controlling for all other covariates in the model.

There was no significant association between clusters and mortality when demographic variables, physical and mental health factors, and social engagement factors were included in the model. Increasing age was associated with increasing mortality risk. Females had a lower risk. Those who rated their health as poor, fair or good had an elevated risk versus those who rated their health as excellent. Decreased risk was also evident for non-smokers, those with no self-reported heart problems, and those not using a walking aid. Psychological and social engagement factors did not exert any appreciable influence on mortality risk.

Table 7.9: Cluster as a predictor of mortality in the NLSAA study for 14-year mortality.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Cluster (11)	8	2.114*	1.151–3.883	2.018	1.085–3.754	1.429	0.738–2.769	1.547	0.761–3.144	1.520	0.745–3.103
	5	2.371**	1.425–3.943	2.174	1.289–3.665	1.616	0.939–2.781	1.657	0.953–2.881	1.606	0.918–2.810
	15	3.181**	1.609–6.289	2.998	1.490–6.031	2.431	1.182–5.000	2.483	1.202–5.130	2.458	1.175–5.140
	4	1.653	0.873–3.129	1.576	0.826–3.009	1.037	0.532–2.022	1.070	0.544–2.103	1.029	0.518–2.044
	3	2.087*	1.146–3.801	2.024	1.095–3.741	1.902	1.017–3.557	1.902	1.016–3.559	1.906	1.010–3.595
	14	1.933*	1.053–3.551	1.664	0.898–3.082	1.604	0.852–3.021	1.649	0.863–3.154	1.626	0.844–3.131
	6	2.134**	1.234–3.691	1.938	1.103–3.405	1.387	0.762–2.526	1.431	0.777–2.637	1.464	0.789–2.720
	7	2.169**	1.292–3.641	1.878	1.111–3.176	1.749	1.023–2.991	1.762	1.030–3.015	1.693	0.987–2.905
	1	1.581	0.948–2.634	1.444	0.857–2.434	1.320	0.776–2.245	1.316	0.771–2.247	1.304	0.762–2.234
	9	1.639	0.930–2.888	1.294	0.728–2.302	1.293	0.721–2.319	1.301	0.725–2.333	1.283	0.713–2.307
	12	1.318	0.771–2.252	1.508	0.881–2.583	1.439	0.832–2.491	1.440	0.832–2.493	1.431	0.826–2.481
	2	1.404	0.827–2.383	1.424	0.831–2.441	1.352	0.781–2.340	1.359	0.784–2.357	1.396	0.804–2.424
	13	1.467	0.855–2.516	1.414	0.819–2.442	1.345	0.771–2.347	1.345	0.771–2.347	1.324	0.758–2.312
	10	1.704*	1.009–2.876	1.587	0.934–2.699	1.503	0.871–2.596	1.515	0.876–2.620	1.568	0.903–2.721
Age				1.072***	1.051–1.093	1.081***	1.059–1.103	1.081***	1.059–1.103	1.081***	1.058–1.104
Gender (Male)	Female			0.656***	0.529–0.814	0.674**	0.529–0.858	0.683**	0.534–0.874	0.688**	0.535–0.884
Marital status (Married)	Single			1.163	0.670–2.018	0.975	0.538–1.767	0.973	0.536–1.765	0.948	0.517–1.740
	Widowed			1.405	0.967–2.042	1.336	0.901–1.982	1.333	0.894–1.987	1.333	0.892–1.993
	Separated/ Divorced			1.124	0.593–2.133	1.135	0.592–2.175	1.152	0.600–2.213	1.134	0.588–2.190
Living status (Live alone)	Live with Someone			0.935	0.657–1.330	0.952	0.658–1.376	0.949	0.655–1.376	0.977	0.670–1.425

(Continued overleaf)

Table 7.9 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Satisfied with income (Satisfied)	Dissatisfied			0.895	0.699–1.148	0.864	0.670–1.114	0.861	0.667–1.111	0.863	0.666–1.120
Social class (Professional/intermediate)	Skilled/manual & non-manual			1.211	0.896–1.636	1.243	0.907–1.703	1.249	0.911–1.713	1.219	0.887–1.675
	Semiskilled/ unskilled/others			1.055	0.746–1.493	1.082	0.749–1.564	1.083	0.750–1.565	1.035	0.711–1.505
Self-rated health (Excellent)	Poor					3.775***	2.050–6.953	3.835***	2.069–7.110	3.882***	2.059–7.320
	Fair					1.567*	1.016–2.417	1.601*	1.032–2.485	1.671*	1.071–2.606
	Average					1.483	0.992–2.218	1.494	0.998–2.237	1.513*	1.007–2.273
	Good					1.590**	1.146–2.205	1.601**	1.153–2.222	1.597**	1.145–2.227
Perceived health relative to peers (More healthy)	Less healthy					1.179	0.727–1.913	1.200	0.737–1.953	1.182	0.723–1.933
	About as healthy					1.163	0.916–1.477	1.162	0.914–1.476	1.168	0.918–1.487
Smoking (Yes)	No					0.658**	0.515–0.843	0.664**	0.518–0.852	0.687**	0.533–0.886
Arthritis (Yes)	No					1.052	0.836–1.326	1.050	0.834–1.323	1.032	0.817–1.304
Heart (Yes)	No					0.706**	0.550–0.906	0.708**	0.551–0.910	0.708**	0.549–0.913
Stomach (Yes)	No					0.934	0.732–1.192	0.931	0.729–1.189	0.947	0.740–1.213
Dizziness (Yes)	No					1.003	0.794–1.267	0.996	0.787–1.259	0.989	0.782–1.251
High blood pressure (Yes)	No					1.032	0.804–1.325	1.032	0.804–1.325	1.040	0.810–1.336
Urinary incontinence (Yes)	No					1.004	0.775–1.300	1.005	0.776–1.302	1.013	0.781–1.315
Walking difficulties (Difficulty)	No					1.102	0.856–1.419	1.090	0.845–1.407	1.072	0.828–1.388
Walking aid (Use aid)	Not use aid					0.730*	0.560–0.951	0.737*	0.565–0.962	0.748*	0.573–0.977

(Continued overleaf)

Table 7.9 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Loneliness (Lonely)	Not lonely							1.019	0.787–1.320	1.022	0.788–1.326
Standardised SAD score								0.996	0.984–1.008	0.996	0.984–1.008
Newspaper or journal (Yes)	No									0.948	0.666–1.350
Religious group (Yes)	No									1.031	0.808–1.317
Club or organization (Yes)	No									1.140	0.908–1.430
Pets (Yes)	No									0.962	0.746–1.241
TV or radio (Yes)	No									1.330	0.875–2.022
Friends (Yes)	No									0.986	0.750–1.297

P.S.: *** <0.001; ** <0.01; * <0.05.

14-year mortality in the SHLSET study

Table 7.10 presents the results of Cox regression analysis of clusters and other variables as predictors of mortality in the SHLSET (Taiwan) study from 1989 to 2003. The overall model (χ^2=229.430; df=51; p<0.001), with all independent variables entered, was significant.

Model 1 shows that there was a significant association between clusters and the risk of mortality (p=0.017), but there was no statistically-significant relationship between individual clusters and the reference category, cluster 20, the cluster with the highest life satisfaction mean score.

In Model 2, there was a significant relationship between clusters and mortality when demographic factors were included in the model. Clusters 6, 7, and 14 were associated with a decrease in mortality by factors of 0.543 (cluster 6), 0.468 (cluster 7), and 0.610 (cluster 14), relative to cluster 13. In addition, each one-year increase in age was associated with a 0.064 (6.4%) increase in the hazard ratio for mortality. The risk of mortality for females was 0.675 times the level for males. People who were separated or divorced status were 1.998 times as likely to die as those who were married.

Model 3 revealed a significant association between clusters and mortality when demographic and relative health variables were included. As can be seen in Table 7.10, the relative risk ratios for clusters 11, 10, 6, 4, 3, 18, 7, 15, 14, and 2 were significantly different from cluster 13, being 0.372 (cluster 11), 0.400 (cluster 10), 0.458 (cluster 6), 0.496 (cluster 4), 0.459 (cluster 3), 0.488 (cluster 18), 0.439 (cluster 7), 0.575 (cluster 15), 0.535 (cluster 14), and 0.549 (cluster 2). Increasing age increased the mortality risk. Relative to males, females had a lower risk of mortality. People who were separated or divorced had a higher risk relative to those who were married. Those in the sample who rated their health as poor, fair, average or good had an increased risk of mortality relative to those who reported that they had excellent health. People with no urinary incontinence and those with no walking problems had a decreased risk relative to those with these problems.

When demographic, physical, and mental health factors were included, cluster and mortality were associated (Model 4). The relative risk ratios for death for clusters 11, 10, 6, 4, 3, 18, 7, 15, 14 and 2 were significantly less than for cluster 13, being 0.383 (cluster 11), 0.414 (cluster 10), 0.464 (cluster 6), 0.496 (cluster 4), 0.455 (cluster 3), 0.489 (cluster 18), 0.437 (cluster 7), 0.581 (cluster 15), 0.535 (cluster 14), and 0.549 (cluster 2). Each one-year increase in age increased the risk of mortality by a factor of 1.065 (a 6.5% increase). As before, being separated or divorced versus married was a risk factor. In addition, as in Model 3, gender, self-rated health, urinary incontinence, and walking difficulties were related to the risk of mortality. However, mental health factors (e.g., loneliness, depression) exerted no effect on mortality hazard.

In Model 5, there was a significant association between cluster and mortality when demographic variables, physical and mental health factors, and social engagement factors were included in the model. The hazard ratios for clusters 11, 10, 6, 4, 3, 18, 7, 15, 14, and 2 were 0.373 (cluster 11), 0.425 (cluster 10), 0.458 (cluster 6), 0.528 (cluster 4), 0.458 (cluster3), 0.499 (cluster 18), 0.457 (cluster 7), 0.565 (cluster 15), 0.595 (cluster 12), 0.525 (cluster 14), and 0.542 (cluster 2), all significantly less than for cluster 13. The risk of mortality increased by 6.2% for each one-year increase in age. Females had a decreased risk relative to males. Being separated or divorced versus being married increased the risk. Having poor, fair, average, or good health, versus excellent, increased the risk. Decreased risk of death was evident for those with no urinary incontinence or walking problems. Psychological and social engagement factors exerted no statistically significant effect.

Table 7.10: Cluster as a predictor of mortality in SHLSET for 14-year mortality.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Cluster (13) **	11	0.952	0.553–1.639	0.625	0.355–1.098	0.372**	0.207–0.671	0.383**	0.212–0.693	0.373**	0.206–0.676
	10	0.940	0.581–1.522	0.720	0.433–1.197	0.400**	0.234–0.683	0.414**	0.241–0.711	0.425**	0.246–0.731
	19	1.336	0.834–2.140	1.206	0.738–1.971	0.889	0.536–1.475	0.923	0.552–1.544	0.894	0.533–1.501
	8	0.926	0.561–1.530	0.829	0.492–1.399	0.681	0.400–1.160	0.683	0.401–1.163	0.695	0.407–1.190
	16	1.798	0.980–3.299	1.219	0.645–2.303	0.983	0.511–1.890	1.000	0.519–1.924	1.024	0.524–2.004
	6	0.659	0.396–1.098	0.543*	0.319–0.926	0.458**	0.268–0.785	0.464**	0.271–0.796	0.458**	0.267–0.786
	4	0.880	0.491–1.579	0.672	0.368–1.224	0.496*	0.268–0.917	0.496*	0.268–0.918	0.528*	0.283–0.984
	3	0.918	0.553–1.523	0.725	0.433–1.214	0.459**	0.266–0.791	0.455**	0.264–0.785	0.458**	0.266–0.791
	5	1.121	0.659–1.907	0.838	0.487–1.442	0.592	0.335–1.047	0.605	0.341–1.072	0.587	0.331–1.044
	18	0.679	0.379–1.219	0.549	0.300–1.005	0.488*	0.264–0.900	0.489*	0.265–0.902	0.499*	0.270–0.923
	7	0.619	0.362–1.059	0.468**	0.270–0.812	0.439**	0.251–0.769	0.437**	0.250–0.765	0.457**	0.260–0.801
	15	0.669	0.399–1.119	0.682	0.403–1.152	0.575*	0.336–0.983	0.581*	0.339–0.995	0.565*	0.329–0.970
	12	0.851	0.534–1.357	0.698	0.435–1.120	0.626	0.387–1.014	0.616	0.380–0.999	0.595*	0.366–0.966
	9	0.678	0.331–1.388	0.648	0.315–1.332	0.527	0.254–1.097	0.522	0.251–0.086	0.520	0.250–1.083
	14	0.724	0.447–1.172	0.610*	0.372–0.998	0.535*	0.322–0.889	0.535*	0.322–0.890	0.525*	0.315–0.875
	17	0.866	0.506–1.481	0.761	0.443–1.309	0.715	0.409–1.250	0.711	0.407–1.244	0.721	0.412–1.264
	20	1.087	0.672–1.760	0.954	0.586–1.553	0.848	0.518–1.389	0.845	0.516–1.385	0.822	0.500–1.352
	2	0.661	0.407–1.074	0.617	0.378–1.005	0.549*	0.334–0.901	0.549*	0.334–0.902	0.542*	0.329–0.891
	1	0.746	0.475–1.172	0.719	0.456–1.133	0.686	0.434–1.084	0.687	0.435–1.086	0.691	0.436–1.094

(Continued overleaf)

Table 7.10 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Age				1.069***	1.052–1.086	1.064***	1.047–1.082	1.065***	1.047–1.083	1.062***	1.044–1.080
Gender (Male)	Female			0.675***	0.559–0.815	0.622***	0.498–0.776	0.622***	0.498–0.777	0.589***	0.467–0.744
Marital status (Married)	Single			1.325	0.759–2.313	1.610	0.909–2.850	1.604	0.899–2.861	1.660	0.921–2.990
	Widowed			0.948	0.786–1.144	1.072	0.885–1.299	1.070	0.881–1.300	1.068	0.879–1.298
	Separated/Divorced			1.998**	1.193–3.345	2.141**	1.270–3.610	2.147**	1.273–3.621	2.065**	1.218–3.500
Living status (Live alone)	Live with someone			2.657	0.356–19.835	1.124	0.145–8.720	1.071	0.137–8.391	0.993	0.123–8.029
Social class (Professional/intermediate)	Skilled/manual & non-manual			1.077	0.777–1.492	1.117	0.803–1.554	1.112	0.799–1.549	1.093	0.781–1.530
	Semiskilled/ unskilled/others			1.310	1.003–1.711	1.300	0.991–1.706	1.289	0.982–1.693	1.176	0.877–1.579
Satisfied with income (Satisfied)	Dissatisfied			1.205	0.999–1.452	1.090	0.899–1.320	1.093	0.902–1.325	1.083	0.892–1.314
Self-rated health (Excellent)	Poor					2.946***	1.643–5.285	3.127***	1.713–5.708	2.950**	1.596–5.454
	Fair					1.938**	1.305–2.879	1.974**	1.326–2.939	1.917**	1.285–2.858
	Average					1.594**	1.142–2.226	1.600**	1.146–2.235	1.587**	1.134–2.221
	Good					1.468*	1.052–2.048	1.473*	1.055–2.056	1.441*	1.031–2.015
Perceived health relative to peers (More healthy)	Less healthy					1.229	0.899–1.678	1.229	0.900–1.678	1.178	0.860–1.614
	About as healthy					1.111	0.892–1.383	1.107	0.889–1.378	1.076	0.862–1.344
Smoking (Yes)	No					0.911	0.735–1.128	0.917	0.740–1.137	0.920	0.741–1.143

(Continued overleaf)

Table 7.10 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Arthritis (Yes)	No					1.130	0.940–1.359	1.119	0.929–1.347	1.125	0.934–1.356
Heart (Yes)	No					0.973	0.789–1.201	0.967	0.783–1.194	0.945	0.763–1.170
Stomach (Yes)	No					1.025	0.828–1.268	1.017	0.821–1.260	1.042	0.838–1.294
Dizziness (Yes)	No					0.914	0.612–1.364	0.924	0.618–1.382	0.927	0.619–1.386
High blood pressure (Yes)	No					0.852	0.700–1.037	0.849	0.697–1.033	0.825	0.675–1.008
Urinary incontinence (Yes)	No					0.757*	0.593–0.966	0.751*	0.588–0.959	0.754*	0.590–0.964
Walking difficulties (Difficulty)	Not difficulty					0.722**	0.580–0.897	0.717**	0.576–0.892	0.727**	0.583–0.908
Walking aid (Use aid)	Not use aid					0.818	0.614–1.088	0.819	0.614–1.091	0.815	0.611–1.089
Loneliness (Lonely)	Not lonely							0.993	0.800–1.232	0.998	0.804–1.239
Standardised SAD score								0.997	0.990–1.005	0.998	0.991–1.005
Newspaper or journal (Yes)	No									1.239	0.981–1.565
TV or radio (Yes)	No									1.032	0.735–1.449
Pets (Yes)	No									1.137	0.861–1.501
Religious group (Yes)	No									1.070	0.809–1.416
Club or organization (Yes)	No									0.955	0.672–1.358
Friends (Yes)	No									0.815	0.559–1.188

P.S.: *** <0.001; ** <0.01; * <0.05

Ten-year mortality in the NLSAA study

Table 7.11 presents the results of the Cox regression analysis for clusters and other variables as predictors of mortality in the NLSAA data set from 1993 to 2003. The overall model (χ^2=118.612; df=41; p<0.001), with all independent variables entered, was significant.

Model 1 shows a significant relationship between clusters and the risk of mortality (p<0.000). The relative risk ratios for clusters 3, 5, and 7 were 2.357 (cluster 3) and 2.052 (cluster 5) relative to the reference category, cluster 4, which had the highest mean life satisfaction score cluster. In addition, cluster 7 (HR=0.529) had a significantly lower risk of mortality than cluster 4.

In Model 2, there was a significant relationship between cluster and mortality when demographic factors were included in the model (p<0.000). The relative risk ratios for cluster 1 (HR=1.837) and cluster 5 (HR=1.675) were significantly higher than for cluster 4. However, cluster 7 had lower risk of mortality than cluster 4. Increasing age by one year also increased the mortality risk.

Model 3 revealed a significant relationship between 'cluster' and mortality when demographic and health variables were included (p<0.000). As can be seen Table 7.11, the relative risk ratios for clusters 10 and 7 were 0.446 (cluster 10) and 0.466 (cluster 7), were significantly different from the reference category, cluster 4. Again, increasing age increased the risk of mortality. Non-smokers and those without walking difficulties had a decreased risk of mortality versus their counterparts.

When demographic, physical, and mental health factors were included (Model 4), clusters again had a significant relationship with mortality (p<0.000). Clusters 10 (HR=0.437) and 7 (HR=0.497) had a lower risk of mortality compared with cluster 4. Age increased the risk of mortality by a factor of 1.103 for each one-year increase in age. People who did not feel lonely had a significantly decreased risk of mortality as well.

In the final model, there again was a significant association between clusters and mortality when demographic variables, physical and mental health factors, and social engagement factors were included in the model (p<0.000). The relative risk ratios for clusters 10 and 7 were 0.449 and 0.499, significantly different from cluster 4. The risk

of mortality increased ten percent for each year of age. As in Model 4, people who were non-smokers, had no walking problems, and were not lonely had less risk of death than their counterparts. An unexpected finding was that those with no urinary incontinence had a statistically significant increase in mortality risk versus those with urinary incontinence.

Table 7.11: Cluster as a predictor of mortality in the NLSAA for ten-year mortality.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Cluster (4)	3	2.357**	1.385–4.012	1.837*	1.046–3.226	1.833	0.976–3.443	1.751	0.911–3.364	1.700	0.887–3.259
	5	2.052**	1.315–3.202	1.675*	1.059–2.650	1.612	0.979–2.654	1.558	0.928–2.615	1.497	0.886–2.532
	2	1.249	0.698–2.234	1.166	0.644–2.111	1.150	0.614–2.154	1.074	0.575–2.008	1.056	0.557–2.001
	1	1.369	0.843–2.226	1.341	0.804–2.237	1.248	0.720–2.162	1.198	0.687–2.090	1.182	0.677–2.065
	6	1.677	0.937–3.002	1.465	0.801–2.680	1.450	0.763–2.755	1.512	0.797–2.871	1.575	0.823–3.017
	9	0.824	0.502–1.354	0.795	0.478–1.321	0.774	0.459–1.305	0.760	0.450–1.284	0.724	0.425–1.234
	10	0.787	0.412–1.504	0.537	0.277–1.041	0.446*	0.225–0.885	0.437*	0.220–0.868	0.449*	0.223–0.904
	7	0.529*	0.283–0.992	0.498*	0.261–0.948	0.466*	0.240–0.905	0.497*	0.255–0.967	0.499*	0.253–0.983
	8	1.115	0.666–1.867	1.076	0.632–1.834	1.070	0.616–1.858	1.126	0.645–1.966	1.168	0.657–2.075
Age				1.095***	1.062–1.128	1.100***	1.065–1.136	1.103***	1.067–1.140	1.102***	1.065–1.140
Gender (Male)	Female			0.892	0.664–1.198	0.911	0.658–1.261	0.924	0.663–1.287	0.931	0.664–1.304
Marital status (Married)	Single			2.114	1.035–4.317	2.226	1.068–4.640	2.138	1.028–4.449	2.267	1.070–4.804
	Widowed			1.189	0.752–1.881	1.143	0.728–1.793	1.105	0.705–1.733	1.110	0.707–1.744
	Separated/ Divorced			1.251	0.569–2.750	1.252	0.565–2.775	1.506	0.673–3.369	1.490	0.660–3.363
Living status (Live alone)	Live with someone			0.746	0.485–1.146	0.724	0.475–1.104	0.659	0.428–1.015	0.674	0.436–1.042
Satisfied with income (Satisfied)	Dissatisfied			0.922	0.629–1.353	0.849	0.570–1.264	0.889	0.596–1.325	0.838	0.557–1.260
Social class (Professional/intermediate)	Skilled/manual & non-manual			1.174	0.790–1.746	1.197	0.792–1.807	1.133	0.750–1.713	1.109	0.729–1.686
	Semiskilled/ unskilled/others			1.121	0.715–1.758	1.176	0.729–1.898	1.117	0.694–1.798	1.092	0.675–1.766

(Continued overleaf)

Table 7.11 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Self-rated health (Excellent)	Poor					1.688	0.803–3.550	1.617	0.760–3.439	1.672	0.784–3.567
	Fair					1.505	0.810–2.796	1.486	0.798–2.765	1.535	0.822–2.867
	Average					1.826	1.029–3.239	1.793	1.007–3.192	1.886	1.049–3.390
	Good					1.491	0.895–2.483	1.426	0.853–2.386	1.423	0.850–2.385
Perceived health relative to peers (More healthy)	Less healthy					0.912	0.492–1.692	0.976	0.510–1.867	0.922	0.481–1.768
	About as healthy					0.877	0.622–1.237	0.837	0.591–1.184	0.809	0.570–1.149
Smoking (Yes)	No					0.573**	0.399–0.824	0.559**	0.389–0.803	0.563**	0.388–0.818
Arthritis (Yes)	No					1.110	0.793–1.556	1.042	0.740–1.468	0.979	0.687–1.394
Heart (Yes)	No					0.872	0.613–1.239	0.866	0.607–1.237	0.818	0.570–1.176
Stomach (Yes)	No					0.931	0.671–1.293	0.920	0.662–1.278	0.931	0.668–1.296
Dizziness (Yes)	No					1.160	0.851–1.581	1.073	0.785–1.466	1.101	0.803–1.508
High blood pressure (Yes)	No					0.978	0.708–1.353	0.979	0.707–1.357	0.958	0.688–1.336
Urinary incontinence (Yes)	No					1.385	0.987–1.944	1.401	0.999–1.963	1.421*	1.009–2.001
Walking difficulties (Difficulty)	Not difficulty					0.643*	0.440–0.940	0.659*	0.452–0.960	0.672*	0.460–0.983
Walking aid (Use aid)	Not use aid					0.984	0.707–1.369	0.936	0.674–1.301	0.961	0.686–1.346
Loneliness (Lonely)	Not lonely							0.655**	0.482–0.890	0.633**	0.463–0.864
Standardised SAD score								0.990	0.973–1.007	0.991	0.973–1.008
Newspaper or journal (Yes)	No									1.099	0.710–1.730
TV or radio (Yes)	No									0.000	0.000–
Religious group (Yes)	No									1.227	0.876–1.718
Club or organization (Yes)	No									1.044	0.768–1.418
Pets (Yes)	No									0.908	0.619–1.332
Friends (Yes)	No									1.171	0.774–1.771

P.S.: *** <0.001; ** <0.01; * <0.05.

Ten-year mortality in the SHLSET study for

Table 7.12 presents the results of the Cox regression analysis for clusters and other variables as predictors of mortality in the SHLSET (Taiwan) study for ten-year mortality. The overall model (χ^2=151.178; df=43; p<0.001), with all independent variables entered, was significant.

Cluster 7 had the highest mean score for life satisfaction and was used as the reference category. There was no significant association between cluster and the risk of mortality in Model 1 (p=0.099).

Again, in Model 2, there was no significant relationship between cluster and mortality when demographic factors were included in the model. Each one-year increase in age increased the risk of mortality (HR=1.057). The risk of mortality for females was only 0.762 times the level for males.

In model 3 again there was no significant association between cluster and mortality, when demographic and relative health variables were included. Age again exerted an effect (HR=1.046). Non-smokers had lower risk of mortality versus smokers. People who did not have a walking problem had a decreased risk of mortality versus those with walking difficulties.

When demographic, physical, and mental health factors were included, clusters again demonstrated no relationship with mortality, in Model 4. There was a statistically significant association between age and mortality (HR=1.048), and not smoking and having no walking difficulties were both associated with a decrease in risk.

Finally, in Model 5, again there was no significant association between cluster and mortality, when demographic variables, physical and mental health factors, and social engagement factors were included into the model. The risk of mortality increased one unit when age increased one year. Females had a lower risk, as did non-smokers and those without a walking problem. As with Model 4, psychological factors did not have any statistically significant association with mortality risk. Among social engagement factors, not watching TV or listening to the radio, and being without a friend increased one's risk of mortality versus one's counterparts.

Table 7.12: Cluster as a predictor of mortality in SHLSET for ten-year mortality.

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Cluster (7)	1	1.485	1.096–2.013	1.406	1.013–1.951	0.996	0.686–1.447	1.030	0.704–1.507	0.897	0.607–1.327
	4	1.350	0.900–2.026	1.292	0.846–1.972	1.057	0.678–1.647	1.087	0.693–1.703	0.988	0.627–1.557
	6	0.817	0.506–1.318	0.780	0.479–1.270	0.699	0.422–1.156	0.704	0.425–1.165	0.623	0.373–1.039
	9	1.667	1.010–2.750	1.411	0.847–2.350	1.058	0.621–1.802	1.072	0.629–1.828	1.010	0.591–1.727
	2	0.798	0.294–2.167	0.610	0.223–1.669	0.569	0.204–1.587	0.579	0.207–1.616	0.531	0.189–1.490
	5	0.939	0.598–1.475	0.953	0.602–1.509	0.810	0.502–1.306	0.803	0.497–1.296	0.751	0.465–1.214
	11	1.513	0.894–2.561	1.463	0.858–2.494	1.191	0.688–2.061	1.181	0.682–2.046	1.039	0.594–1.816
	12	1.158	0.783–1.712	1.245	0.837–1.851	1.143	0.761–1.715	1.152	0.767–1.730	1.081	0.719–1.626
	3	1.019	0.649–1.600	0.994	0.632–1.564	0.910	0.573–1.446	0.926	0.582–1.474	0.893	0.560–1.424
	8	1.109	0.773–1.592	1.053	0.730–1.518	0.993	0.682–1.445	1.006	0.691–1.465	0.964	0.661–1.407
	10	0.914	0.631–1.325	0.920	0.632–1.337	0.917	0.627–1.341	0.925	0.632–1.355	0.880	0.599–1.292
Age				1.057***	1.037–1.077	1.046***	1.025–1.068	1.048***	1.026–1.069	1.043***	1.021–1.066
Gender (Male)	Female			0.762*	0.614–0.945	0.822	0.641–1.052	0.827	0.645–1.060	0.754*	0.581–0.978
Marital status (Married)	Single			0.812	0.341–1.935	0.801	0.333–1.927	0.801	0.333–1.929	0.820	0.338–1.992
	Widowed			0.966	0.772–1.208	0.990	0.787–1.246	0.995	0.790–1.253	0.946	0.751–1.193
	Separated/ Divorced			1.394	0.771–2.520	1.383	0.754–2.536	1.421	0.771–2.618	1.367	0.726–2.574
Social class (Professional/intermediate)	Skilled/manual & non-manual			0.896	0.612–1.311	0.913	0.619–1.347	0.915	0.620–1.349	0.926	0.628–1.367
	Semiskilled/ unskilled/others			1.109	0.814–1.510	1.041	0.761–1.425	1.032	0.754–1.413	0.965	0.695–1.341

(Continued overleaf)

Table 7.12 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
Living status (Live alone)	Live with someone			0.720	0.506–1.024	0.741	0.520–1.056	0.752	0.526–1.075	0.688*	0.474–0.999
Satisfied with income (Satisfied)	Dissatisfied			1.202	0.975–1.481	1.182	0.954–1.464	1.192	0.960–1.479	1.095	0.877–1.367
Self-rated health (Excellent)	Poor					1.767	0.957–3.265	1.817	0.975–3.387	1.722	0.916–3.236
	Fair					1.389	0.897–2.151	1.390	0.896–2.155	1.376	0.887–2.135
	Average					1.198	0.829–1.732	1.196	0.828–1.729	1.197	0.824–1.740
	Good					1.428	0.988–2.065	1.431	0.990–2.068	1.369	0.946–1.980
Perceived health relative to peers (More healthy)	Less healthy					1.014	0.689–1.493	1.036	0.702–1.530	1.005	0.680–1.483
	About as healthy					0.982	0.759–1.271	0.989	0.764–1.281	1.029	0.793–1.335
Smoking (Yes)	No					0.655**	0.503–0.852	0.656**	0.504–0.853	0.671**	0.514–0.876
Heart (Yes)	No					0.916	0.706–1.187	0.909	0.701–1.180	0.911	0.698–1.189
Arthritis (Yes)	No					1.115	0.874–1.423	1.103	0.863–1.410	1.068	0.832–1.371
High blood pressure (Yes)	No					0.887	0.706–1.115	0.882	0.701–1.109	0.864	0.684–1.092
Stomach (Yes)	No					1.058	0.753–1.486	1.049	0.746–1.474	1.009	0.714–1.426
Dizziness (Yes)	No					1.106	0.149–8.213	1.124	0.151–8.347	0.978	0.131–7.280
Urinary incontinence (Yes)	No					0.761	0.548–1.059	0.760	0.547–1.056	0.765	0.550–1.064
Walking difficulties (Difficulty)	Not difficulty					0.613***	0.469–0.801	0.612***	0.468–0.801	0.587***	0.447–0.770
Walking aid (Use aid)	Not use aid					0.833	0.625–1.110	0.839	0.629–1.118	0.923	0.687–1.241
Loneliness (Lonely)	Not lonely							1.093	0.837–1.428	1.041	0.794–1.364
Standardised SAD score								0.999	0.992–1.006	0.999	0.992–1.006

(Continued overleaf)

Table 7.12 (continued)

Variable (reference category)	Category	Model 1		Model 2		Model 3		Model 4		Model 5	
		Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI	Hazard ratio	95% CI
TV or radio (Yes)	No									1.998***	1.457–2.738
Newspaper or journal (Yes)	No									1.129	0.858–1.486
Religious group (Yes)	No									1.138	0.779–1.662
Club or organization (Yes)	No									1.270	0.783–2.058
Pets (Yes)	No									0.905	0.681–1.203
Friends (Yes)	No									1.302*	1.046–1.620

P.S.: *** <0.001; ** <0.01; * <0.05.

7.4 *Discussion*

This study set out with an aim of assessing the importance of life satisfaction in old age, thereby contributing to much-needed cross-cultural empirical studies in this area. In this chapter, there was two goals. The first was to explore patterns in life satisfaction among older people in the UK and Taiwan. For this purpose, cluster analysis was used to explore whether there were subgroups of participants who had similar patterns of life satisfaction within clusters, and then the profiles of their characteristics were compared across these clusters. Second, this research examined whether the patterns of life satisfaction were associated with mortality, and Cox regression analysis was used to obtain a better understanding of the correlation between patterns of life satisfaction and survival in the comparison of the older people of the two nations.

Patterns in life satisfaction among older people

This section explored the potential usefulness of cluster analysis for identifying patterns in life satisfaction among older people in the two studies. These results suggest that the cluster analyses identified different and meaningful patterns in life satisfaction with different satisfaction scores in the two countries. Each cluster was also considered from the point of other factors that might influence life satisfaction. Therefore, it might be meaningful and important to understand how people construct their life satisfaction according to patterns of response to the individual items of LSI.

The response patterns for the LSI questions were such that older people can be clustered into meaningful groups with similar patterns within the clusters. Consider, for example, the majority of the people in the NLSAA study who had high levels of life satisfaction because they were satisfied with their life as they looked back on it and were doing interesting things (e.g., cluster 10, 11, 12, and 13 in 1989; cluster 1, 2, 7, 8, and 10 in 1993). In other words, these interesting things might be related to their education or job associated with their socioeconomic class. These people tended to feel that they had accomplished what they had wanted to do or achieved their own personal goals.

On the other hand, the older people in the SHLSET study (e.g., in clusters 1, 7, 9, 12, 13, 14, 15, 18, and 20 in 1989) had always felt interested in the things they had done and felt

satisfied with their lives as they looked back. However, these older Taiwanese people reported that these were the best years of their lives compared with older people in the UK. Thus, through this finding it might be concluded that 'doing interesting things' and 'satisfaction with life' are indicators of a more positive view of old age, which is very important to life satisfaction for a successful ageing population.

These clusters of older people have similar patterns that make them somewhat different from other clusters. For example, older people with the highest mean score of life satisfaction in cluster 11 (NLSAA) and 13 (SHLSET) had the same opinion of happiness as when they were younger; did things were as interesting as ever; were satisfied with their lives; had made plans for things that they would be doing in a month or a year from now; and get pretty much what they had expected out of life. In contrast, the majority of people in the low level of life satisfaction cluster did not have a happy time while they were younger, nor did they state that this was not the best time of their lives, nor would they be making plans for things they would be doing in a month or a year from now. Therefore, differences between the high and low of life satisfaction clusters tended to be more about older people's emotional lives and acknowledging such negative emotions as regrets, unhappiness, and disappointments from the past that people with low life satisfaction had experienced.

Some positive things were similar or appeared commonly within high life satisfaction clusters. It might be that peoples' patterns of responses for LSI are linked to other aspects of their current and past lives, e.g., marital status, health, and social engagement. The findings suggested that some groups, particularly those at extremes had some specific things in common. For example, people in some clusters of high life satisfaction appeared to have good health, were married, and satisfied with income and so on in the NLSAA study. For example, the older people in clusters 2, 10, 11, 13 in 1989 and 4, 7, 8, 10 in 1993 tended to be married, rated their health as excellent, were satisfied with income, had friends, attended religious group, were non-smokers, lived with someone, had very good health and less disease, did not feel lonely and had less depression. On the other hand, low life satisfaction clusters had some poor things in common. For instance, people in clusters 5, 8, 15 in 1989 and cluster 3 in 1993 in the NLSAA study had higher levels of depression, rated their health as poor, had some diseases, felt lonely, used a walking aid,

and lived alone. The results also confirmed the findings in Chapter 5 that some specific factors, including self-rated poor health, feeling lonely, and depression, affected life satisfaction.

Compared with people in the UK, older people with high life satisfaction in clusters 1, 2, 9, 12, 13, 14, 17, 20 (1989) and 3, 7, 8, 10 (1993) in the SHLSET study were younger, were males, married, of a higher social class, had good health, did not have walking problem, lived with someone, and were satisfied with their income. Conversely, people who had low life satisfaction in clusters 10, 11, 19 (1989) and 1, 4, 6 (1993) were more likely to be single, female, and widowed, were in lower social class, felt lonely, were dissatisfied with income, rated their health as poor, did not read newspaper or journal, and did not have a TV or radio. In addition, some groups of people combined multifaceted profile and these patterns were similar to their counterparts in the UK. These findings were consistent with the results in Chapter 5 and with that described in the literature review that people who male, married, of a high socioeconomic class, satisfaction with their income, and living with someone were more likely to have higher levels of life satisfaction (Sobieszczyk et al., 2003; Ofstedal et al., 2004). Two points are derived from the results. First, older men in Taiwan who were married, had high socioeconomic class, and were satisfied with their income associated with have higher life satisfaction than older women. Older women had financial support from their husband or older children because most women were housewives, especially in Taiwan (Ofstedal et al., 2004). Second, older people who lived with someone related to have high life satisfaction. In Taiwan, older parents are usually more likely to live with a son than a daughter. Although the cultural conditions may have changed to some extent from this point, living arrangements may present additional important factors in terms of older people's living quality because older people co-residing with older children may have their food and other expenses covered as well as having emotional and other forms of support. However, living arrangements depend not only on the family type but also on the availability of kin as potential household members. Thus, living arrangements may have an important influence on life satisfaction of older people, particularly in Taiwan.

There were noticeable differences in the patterns of life satisfaction between the UK and Taiwan. With regard to high life satisfaction, for example, older people in cluster 11 (UK)

tended to disagree with 'this is the dreariest time of my life', but some of them disagreed with 'these are the best years of my life' although these people did interesting things and had made plans for things a month or a year in the future. One possible explanation is that these people were not satisfied with their current lives because they suffered loneliness (84%) and had arthritis or rheumatism problems (66%). These people probably tended to live with their spouses until the spouse died and then they lived alone. On the other hand, older people with arthritis or rheumatism problems – might lead to either having walking problems or using a walking aid, affecting their social engagement. The result was consistent with the findings in Chapter 5. Compared with people in the UK, older Taiwanese in cluster 13 had positive attitude in the LSI item, even though they were in a lower socioeconomic class. This difference might reflect different factors affecting older people who assessed their life satisfaction in the two countries.

With regard to patterns of low life satisfaction, people in the low life satisfaction cluster in the UK in 1989 (cluster 8) tended to state that they were not happy when they were younger, did not do interesting things, did not make plans for things and life did not turn out as they had expected. Conversely, older Taiwanese reported that they were satisfied with life, were not having the best time in old age, and felt old and weary (cluster 11). In 1993, people in both countries reported that they did not have more chances in their life (cluster 3 in the UK and cluster 1 in Taiwan). The results suggest that 'chance' is an important contributor for these peoples' past lives – and fewer chances might not allow them to achieve their goals, leading to not having the best time in old age. In addition, other attributes such as physical and mental health and financial problems were also related to low life satisfaction patterns. For example, UK older people in cluster 8 tended to have more diseases (e.g. arthritis or rheumatism, giddiness, high blood pressure, urinary incontinence, using walking aid); versus, people in cluster 11 in Taiwan who had heart and stomach problems. However, these people in both countries rated their health as poor, were not satisfied with their income, and had mental health problems (e.g., loneliness, depression). The results were consistent with Chapter 5 and were also discussed in the literature review, i.e., physical and mental health problems lead to low life satisfaction in late life.

To conclude, patterns of life satisfaction were observed to have a relation to several financial, physical and mental health problems in the UK and Taiwan. However, socioeconomic class and demographic factors appeared to be related to patterns of life satisfaction among older people in Taiwan. The patterns of life satisfaction are different between the two countries, perhaps because living in different societies with their own culture, life experiences, and environmental status influenced responses to older peoples' evaluation of life satisfaction.

Cluster as a predictor of mortality

Cox regression analyses were used to examine whether the patterns of LSI responses influenced 14-year and ten-year mortality. The relationship between patterns of life satisfaction and mortality may help to understand the importance of life satisfaction items in relation to mortality in older people. For example, people who agreed that 'this is the dreariest time' may have perceived that they had limited time left to live and responded in this way. The results found that patterns of responses of LSI demonstrated predictive validity for survival time for both 10-year and 14-year mortality in the NLSAA and for ten-year mortality in the SHLSET study.

In the NLSAA study of 14-year mortality, clusters 3, 5, 6, 7, 8, 10, 14, and 15 were associated with an increased risk of mortality in the unadjusted model compared to the cluster with the highest mean score of LSI. These clusters contain people who did not have more chance, that responded this was not the best time of their lives, was the dreariest time of their life, did boring things, did not make plans for things in a month or a year, got down in the dumps too often, and did not expect much out of life. These older people seemed to have a particularly low pattern of life satisfaction. Clusters with medium and lower mean scores of LSI had increased mortality risk. However, the relationship was no longer significant when demographic, health, and social engagement variables were included in model, suggesting that it was other demographic characteristics associated with these groups that were associated with mortality. For example, people in these clusters tended to be older, widowed, middle or lower socioeconomic class (e.g., semiskilled and skilled), had specific health problems (e.g., heart, stomach, high blood pressure, and urinary incontinence), smokers, had walking

problems, and had low levels of social engagement (e.g., did not attend clubs or organisations, did not read a newspaper or journal, had no friends). The results were consistent with the findings in Chapter 6. These attributes were discussed in the literature review Section 2.6, and were significantly related to the association of low life satisfaction with mortality in old age. For example, Tsai et al. (2007) examined whether health-related quality of life would predict 3-year mortality. They suggested that physical and psychological health related to low quality of life is important factor with an impact on mortality. Thus, it is not surprising that these people were in the medium or low life satisfaction clusters and had a higher risk of mortality.

Based on an examination of survival differences among clusters over ten-year mortality in the NLSAA study, the results found that people in clusters 3 and 5 had a higher risk of mortality than their counterparts in cluster 4 in the unadjusted Cox regression model. However, there was no longer a significant relationship after controlling for health and social engagement variables. The people in cluster 3 and 5 who disagreed that 'these are the best time of my life' were more than people in cluster 4. This might reflect that people who complain about their current circumstances tend to have lower patterns of life satisfaction predicting mortality. Then, in fact, people in cluster 3 and 5, most of whom were older people, more being widowed, more rating health as poor or fair, more having diseases (e.g., stomach, giddiness, high blood press, and urinary incontinence), and more having mental health problems (e.g., loneliness, depression), and these factors were associated with life satisfaction, which increased the risk of mortality over their counterparts in cluster 4.

An interesting finding is the decreased risk of mortality within cluster 7 compared to the reference cluster 4. Cluster 7 contains people who had a high life satisfaction, but an LSI score that was lower than cluster 4. These people were satisfied with their life, did interesting things, made plans for things, had high life satisfaction and quality of life and lived longer. One possible reason is that members in the reference cluster 4 included more people who were separated or divorced from their partners (n=7; 7.7%) and fewer people were in the professional class (n=6; 9.2%) than people who were in cluster 7. Another possible reason is that the people in cluster 7 were younger, did not feel lonely, and had higher levels of social engagement than the people in the reference cluster 4. A

clear indicator of social engagement (e.g., attending religious groups, clubs or organisations) has been positively linked to health as discussed in the literature review (Maier and Smith, 1999; Anstey et al., 2002), and therefore may have helpful in improving life satisfaction. There is some evidences that social engagement, especially religious involvement, has a positive impact on health and longevity (Oman and Reed, 1998; Coleman, 2005; Yeager et al., 2006; Hsu, 2007). Social engagement can help improve social relationships and networks for enhancing life satisfaction. Therefore, being socially engaged could improve life satisfaction and reduce mortality risk.

Over the 14-year period, within the SHLSET dataset, the results showed that overall, the patterns in life satisfaction had a significant relationship to mortality, but no specific cluster had association with mortality compared to the reference cluster. The first possible explanation might be in the use of the reference cluster for the analyses. The cluster with the highest mean life satisfaction score was used; however, if a different cluster had been used there might have been a significant increase/decrease in the mortality associated with specific clusters. This possibility was not explored in order to reduce the risk of over-analyzing the data and the risk of a Type I error. However, in the adjusted model, people in clusters 2, 3, 4, 6, 7, 10, 11, 12, 14, 15, 16, and 18 lived longer than those people in the reference cluster that had high levels of life satisfaction when demographic, health, and social engagement variables were included. These clusters contained people with different levels of life satisfaction; e.g., although some people felt old and somewhat tired, had done boring things, and would like to change their past lives if they could, most were satisfied with their lives, had more breaks, and had done interesting things.

A second possible explanation for this is that the higher proportion of particular groups in these groups had a protective effect. For example, some of the people in these clusters were married (e.g., cluster 2), attended clubs or organisations (e.g., cluster 6), rated their health as good (e.g., cluster 7), had more friends (e.g., cluster 12), were younger (e.g., clusters 15), had higher levels of social engagement (e.g., cluster 18), and lived with someone (e.g., cluster 14); and these attributes were associated with decreased risk of mortality when compared with the reference cluster (13). These attributes may have led to a protective effect.

The third possible reason for explaining why clusters 3 and 4 had a lower risk of death than the reference cluster 13 is that most people felt they were fairly well satisfied as they looked back on their lives in cluster 3 (95.3%) and 4 (97.6%) although they had lower overall life satisfaction scores. As well, the majority of people in cluster 16 (97.0%) reported these are the best years of my life compared to reference cluster 13. These positive feelings could have had a particularly protective effect. It is surprising that most people felt old and somewhat tired and had low levels of life satisfaction in cluster 10 and 11; however, they still lived longer than people who had high life satisfaction in cluster 13. When people felt old, it may have reflected a kind of self-concept of weakness, sickness, or incompetence. However, people in these clusters lived with someone (100%) and also a higher proportion people without health problems; these factors may have had a particularly powerful protective effect. It may be of interest to future research that there were many different reasons why that area is important to them, in order to gain a better understanding of life satisfaction in late life, possibly using qualitative approaches.

There was no significant correlation between clusters and mortality in the SHLSET study for 10-year mortality in either the unadjusted or the adjusted models. The results were consistent with the findings in Section 6.3.2 that other such predictors as age, gender, walking, and social engagement (e.g., having a TV or radio, having friends) had a greater effect on mortality than the clusters. It might also be explained by the small number of the individual items of LSI because fewer items could not cover all the views of older people and the four-item scale was not discriminating enough, even though there were clusters with both completely positive and negative responses. Therefore, the patterns of life satisfaction that were identified did not reveal differences in mortality between the clusters.

The patterns of life satisfaction showed the differences between the two samples for 14-year and ten-year of mortality. The large gap between the two countries is from people in the UK who tended to report a negative attitude in life (e.g., dissatisfied with life, not having more chances, and not the best time of their life etc.); which led to a lower life satisfaction that was associated with increased mortality risk. The result also suggested an increasing risk of mortality observed in older people who lived alone and had more health problems, especially those who were lonely and had depression. In contrast to people in

the UK, older Taiwanese were satisfied with their lives associated with a decreased risk of mortality. The probable important attributes are that most of them lived with someone and had more friends.

A possible explanation for the difference between the UK and Taiwan assumes that Westerners are more individualistic and independent. Asians in Confucian societies with filial responsibilities demonstrate respect, caring and support of older people. Thus, living status becomes a possible reason. In Taiwan, living arrangements, in particular, lie at the heart of the traditional system of familial support for older people. As discussed in the literature review, family members are likely to be a source of either material or non-material support for older people. Moreover, support from adult children living within the same household or residential compound is important for older peoples' health and economic as well as emotional well-being. As well as having a positive impact on their life satisfaction, this likely will have real benefits for their health and well-being in decreasing the risk of mortality. Although these people had lower life satisfaction than their counterparts in the UK, they had longer survival time, demonstrating perhaps a greater resilience.

In the ten-year period, there was a significant correlation between clusters and mortality in the NLSAA study; conversely, there was no association between clusters and mortality in the SHLSET dataset. Perhaps such LSI subjective states are difficult to understand by Taiwanese older people and are less meaningful. The older people in Taiwan probably would rate their life satisfaction in terms of health, family income, or other life circumstances rather than through the subjective concepts in the life satisfaction scale. Therefore, objective predictors (e.g., health, finance) may have been more important when Taiwanese older people assessed their life satisfaction, e.g., Table 7.12 shows that other people without a TV or radio had almost double the risk of mortality.

7.5 *Conclusion*

This chapter has analysed and compared patterns of life satisfaction in older people in the UK and Taiwan. The main findings from the cluster analyses have shown that there is a relationship between the questions of the LSI (e.g., satisfaction with their life, doing interesting things, and these are the best years) and mortality in old age across the two

countries. The influence of past life and its impact on the present life is clearly important. Although the collected data for this research is much related to each individual person's own life experience and opinion, which to some degree, is difficult to quantify, the findings of this chapter are important in that they have demonstrated the key element of this aspect to life satisfaction (e.g., good health, satisfaction with income, having friends, attending religious group). Such findings are very beneficial to researchers, social workers, and older people as well; and the findings can become a valuable reference in terms of how to improve older people's life satisfaction.

Furthermore, Cox regression analyses demonstrated the relationship between patterns of life satisfaction and mortality. What the Cox regression results have indicated, however, is that the patterns of life satisfaction within the clusters are useful predictors of mortality in old age. According to the analyses of the life satisfaction score, people with low life satisfaction within clusters tended to have increased mortality risk; while high life satisfaction might improve morale, linking to decreased risk of mortality. This might be because older people with high life satisfaction were usually in good health, had positive feeling, and a good level of social engagement. This is very simplistic and overlooks the fact that an older person's health may get worse, leading to reduced life satisfaction and increased mortality risk.

The final chapter, Chapter 8, will bring this research to a close, will provide a broader context for the results, and will examine implications of the findings for gerontology research and future research efforts.

Chapter 8 Conclusion

This final chapter concludes with an overview of the major findings, a review of some of the potential limitations of this study, and concludes with a brief discussion of implications for further research that arise from this research.

8.1 *Introduction*

The research presented in this thesis was an attempt to develop a new understanding of quality of life among older people in two countries. This final chapter brings together what has been learned in this thesis on quality of life among older people and relates this to the current knowledge on this issue.

A fundamental issue underlying the thesis is what exactly is 'quality of life'? Different conceptualizations of quality of life have been proposed, ranging from the general to the more specific. For example, Lawton (1999, p. 182) defined quality of life "as the multidimensional evaluation, by both intrapersonal and social-normative criteria, of the person-environment system of an individual with especially four sectors: behavioural competence, environmental quality, perceived quality of life, and psychological well-being." In an empirical study, Sarvimäki and Stenbock-Hult (2000 , p. 1025) defined quality of life as "a sense of well-being, meaning, and value." However, the World Health Organization Quality of Life assessment (WHOQOL) group defined quality of life as "'Individuals' perception of their position in life in the context of the culture and the value system in which they live and in relation to their goals, expectations, standards and concerns (World Health Organization, 2002, p. 13)." This particular definition has influenced how quality of life has been defined and used in previous studies, as well as in this research.

In relation to quality of life, there is the meaning of the term itself. The quality of an individual's life is affected by many complex interactions, related to personal perceptions, values, living situations, and experiences. Quality of life may be affected by a variety of factors, including an individual's physical function, mental health status, social indicators, and so on. In addition, quality of life may be influenced by finance, friendships, family life, occupation, the ageing process itself, etc. It is important that older people are able to

express their emotional status resulting from an evaluation of their life and life experiences. Although the definitions of quality of life are plenty, complex, and broad in previous research, there is no common anchor definition. As discussed in the literature review (Section 2.3 and 2.4), the construct of quality of life requires both subjective (e.g., life satisfaction, happiness, morale, psychological well-being) and objective measures (e.g., health, social indicators). As Section 2.9 described that happiness, psychological well-being, morale, and life satisfaction are being used to measure quality of life and also define a part of quality of life in previous studies. In this research, the term 'life satisfaction' was used as a component of quality of life and the life satisfaction index was used to measure quality of life, even though life satisfaction is only one aspect of quality of life. Quality of life is a broad and multifaceted concept and one aspect of it is life satisfaction; an individual's self-assessment on life satisfaction that was used in this research for measuring quality of life. Such a measurement may be a judgment about a person's life as a whole. In addition, other attributes can complement each other in measuring life satisfaction. Moreover, it is possible that life satisfaction has a direct or indirect effect on mortality.

In this research, the overall aim was to examine quality of life among older people in the UK and Taiwan. The two methodological questions were (1) to harmonise the two data sets from independent studies; and (2) to examine the effects of attrition in the two studies. The specific research objectives were (1) to examine the differences between the UK and Taiwan in quality of life and predictors of quality of life in old age; (2) to identify relationships between a variety of specified factors and quality of life in old age; (3) to identify factors associated with change in quality of life in older people in the UK and Taiwan; (4) to examine the relationship between quality of life and mortality in older people in the UK and Taiwan; and (5) to determine any patterns in quality of life and their relationship with mortality among older people.

These objectives have been achieved in this study. This chapter summarizes the results and it's structured as follows: The following section summaries the main findings. The next section discusses the contributions of this research to our understanding of quality of

life in old age. This is followed by an account of the various limitations of the current research. Finally, the conclusion is presented and suggestions made for further research.

8.2 *Summary of the findings*

The first two questions related to methodological issues were answered in Chapter 4. They are 'how might datasets from independent studies on older people be combined to undertake cross-national comparisons?' and 'how does attrition affect the samples of older people in longitudinal studies?' The answers provided by the study described herein, were as follows:

Question #1: In order to compare data sets from the two studies, selected variables in those data sets either had the same, or were assumed to have virtually the same, meaning, in order to ensure the comparative results were valid. Therefore, a process of data harmonisation was used to create independent variables in a third dataset, in which paired variables, one from each of the datasets, were combined into one. One variable measuring life satisfaction was used. Although there were differences in the scales from the two studies, there was sufficient overlap in the individual items and in the overall measurement, to use both scales, and to create a standardised score for them. A similar approach was taken for the depression scales in each study. A number of other categorical variable were sufficiently similar in content and meaning to allow the variables to be harmonised. The results are showed in Table 4.1-4.7 and cover the areas of participant demographics, socioeconomic status, physical health, self-rated health, mobility, mental health, social engagement, and life satisfaction.

Question #2: Attrition is one of the methodological issues in longitudinal studies. Selective attrition – participants when are still alive but drop out from the study – may generate bias and affect the validity of the data. Consequently, it may lead to the sample no longer representing the population. Thus, to ensure that this research is valid, the factors affecting whether or not individuals participated in follow-up interviews in the two studies were assessed. Only self-rated health was an important significant variable in determining whether people accepted being interviewed in the follow-up study in the UK; whereas only whether someone lived with someone exerted more of an effect on re-interview participation in Taiwan. These findings suggest that there was very limited

selective attrition in the two studies, and given that the two original samples were representative of the older population in those countries, it can be assumed that the results of this research can be generalized to the wider populations of older people in the UK and Taiwan.

Five research objectives were asked and answered in Chapters 4 to 7. The answers provided by the study described herein, were as follows:

Objective #1 is 'what are the differences in quality of life among older people in the UK and Taiwan?' Following data harmonisation, statistical analyses identified significant differences between the two studies with respect to age, gender, socioeconomic class, arthritis, dizziness, loneliness, standardised SAD score, reading newspaper or journal, and attending a club or organisation at the two point times. Additional variables were individually at different time points. The results demonstrated that older people in Taiwan had lower life satisfaction, were younger, were single and widowed, lived with someone, perceived fair health relative to peers, had more depression and high blood pressure, and more friends than their counterparts in the UK. Older people in the UK had high life satisfaction, were female, were in high socioeconomic class, rated health as poor or good, had arthritis and dizziness problems, felt lonely, read a newspaper or journal, attended a club or organisation, and had a pet.

It is not surprising that older people in the UK have a higher quality of life than their counterparts in Taiwan. In the 1980-1990s, the UK was an economically advanced country, whereas Taiwan was still a developing country (Section 1.4). However, political economy is relative to social and economic conditions which have a direct and indirect affect on people's lives. On the other hand, older UK people, who had a higher educational level (Section 1.4) than their Taiwanese counterparts tended to be in a higher socioeconomic class and read newspapers or journals, which may have been at least partly responsible for their having a higher level of quality of life. Older people in the UK felt more lonely, probably because they either lived alone when they had lost a spouse or partner, or had less contact with family members, relatives, friends, or neighbours. Conversely, the older Taiwanese tended to live with family members and had more contact with relatives or friends (Section 1.4). However, older people tended to have high

level of depression, and one possible explanation is that older Taiwanese were depressed because they possibly had a greater number of physical diseases linked with having a lower quality of life (Chang et al., 2006).

Objective #2 is 'what factors are associated with quality of life among older people?' Having examined the difference in quality of life, it was important to understand the factors affecting quality of life among older people, comparing the two counties. Table 5.34 shows the results from the stepwise regression analyses that identified predictors of life satisfaction. Loneliness, self-rated health, having problems walking and satisfaction with income were selected in the NLSAA and SHLSET in 1989 and 1993, and standardised depression score was selected in three of the models (NLSAA: 1989 and 1993; SHLSET: 1989). Attending a religious group was related to higher life satisfaction in the NLSAA at both time points and perceived health relative to peers was associated with life satisfaction in the SHLSET at both time points. Additional variables were selected individually at different time points in the two studies. The study location variable was identified as a predictor of life satisfaction in 1989, confirming the difference observed between the two countries.

Mann-Whitney U tests, chi-square analyses and logistic regression analyses were used to assess factors influencing quality of life. These yielded similar results to those derived using stepwise regression analyses. When examining the results in relation to the literature review of Chapter 2, the majority of the findings in this research were consistent with previously-published studies on quality of life in old age. Physical and mental health and social engagement affected quality of life in both countries. Demographic characteristics (e.g., marital status, social class, satisfaction with income) were not factors in the UK, but were associated with quality of life in older people in Taiwan. Differentiated clearly were the types of social engagement that influence quality of life in the two countries; again, reading newspapers or journals in the UK, versus TV or radio use in Taiwan. It is possible that more older Taiwanese were illiterate and watching TV or listening to radio as one of their important leisure activities (Chen, 2001).

This result confirmed that the study location variable was significantly associated with the level of life satisfaction in 1993 following a Chi-square analysis, but this was not an

independent predictor of life satisfaction. Older people in the UK who were married, reported excellent health, smoked, had diseases (e.g., heart, stomach, dizziness, etc.), had mobility problems, had high levels of depression, did not read newspapers or journals, attended clubs or organisations, and had a pet, had higher life satisfaction than their counterparts in Taiwan. There was no significant difference in the levels of life satisfaction among older people in the two countries without these attributes. In Taiwan, older people without friends exhibited lower life satisfaction than people in the UK.

One probable explanation for this is that older people in the UK had high life satisfaction because they had better living conditions than people in Taiwan, owing to a better welfare system and healthcare services. As discussed in Sections 1.4.3-1.4.4, although older people in the UK in 1989 may not have had a really good life, the better healthcare and social support systems and improvements made may have had a positive impact on their lives. There are some differences in the social service systems which support older people's lives between the two countries. For instance, in Taiwan, National Health Insurance began in 1995 and the National Pension Insurance started in 2008. This means that older Taiwanese were perhaps more worried about their health problems, healthcare expenses, and overall economic situation than their counterparts in the UK during the study time period. Therefore, UK older people who reported excellent health, and even those who had some diseases and depression, still tended to have higher levels of quality of life than people in Taiwan.

Another explanation is that extended families are more common in Taiwan (see Section 1.4.4), and in the extended family system, older people have friends consisting of their family members, kin, relatives, or others (e.g., classmates, colleagues, and neighbours). As discussed in Section 1.4.5, Taiwanese behave in a pleasant, kindly way, and like to be with other people, and this is reciprocated by their friends. This reciprocation is a kind of informal support, and is particularly important for older people. If older people lose their physical capability, they can also re-adjust their social activities. For example, they may become dependent on relatives or friends coming to visit them. This result supports the Activity, Continuity, and Subculture theories (Section 2.7) that older people can improve their lives through a positive social process (e.g., keeping friendships, having activities

with friends, keeping interests and habits, and inclusion from social participation). This is perhaps why older people without friends had a low level of quality of life in Taiwan.

Objective #3 is 'which factors are associated with a change in the quality of life among older people?' and understanding changes in the quality of life and the factors which predict these changes may help to develop ways of improving quality of life among older people. There are common variables, in that 'better perceived health relative to peers' and 'improvement in self-rated health' were selected in both studies in the stepwise regression models. Additional variables (e.g., UK – age; Taiwan – satisfaction with income, walking difficulties, and having a TV or radio) were selected individually at different time periods in the two studies. These variables tended to be selected in the regression model, and account for a small proportion of the variance and therefore, are related to changes in life satisfaction. The study location variable was identified as a predictor of change in life satisfaction; however, this result suggests that older people in the UK tended to have a decreased life satisfaction when compared with their counterparts in Taiwan.

In the logistic regression models, increased standardised SAD score was related to decreased life satisfaction in the two studies, and worse self-rated health and worse perceived health relative to peers were associated with decreasing life satisfaction among older people in the SHLSET. These results suggested that mental health was related to a change in life satisfaction among older people in both countries; however, for people in Taiwan change in perceived health relative to their peers had an effect on life satisfaction.

Objective #4 is 'what is the relationship between quality of life and mortality in old age in the UK and Taiwan?' According to the Kaplan-Meier survival analyses, there was no difference in survival time between the two countries for people with high and low life satisfaction in 1989; people with low life satisfaction in the UK had less survival time than those in Taiwan. In 1993, there was a difference in survival time between levels of life satisfaction in both countries, but the two groups (people with high and low life satisfaction) showed no difference in survival time between the two countries.

With regard to the relationship between life satisfaction and mortality, the results suggested that high life satisfaction was related to decreased mortality risk in the two

countries; however life satisfaction might have more of a relationship with mortality among older people in the UK compared to those in Taiwan. Smoking tended to increase the risk of mortality in both 14-year and ten-year periods in the UK. Mortality risk was likely to increase with advancing age and walking difficulties in both the 14-year and ten-year periods in Taiwan. Additional variables were showed at different time periods in the two studies – loneliness especially showed its effect on increase mortality risk in the UK, but having a TV or radio and friends tended to decrease the risk of mortality in Taiwan.

People who had poor health and mobility problems (either walking difficulties or using a walking aid) in 1989, and growing older and were smokers in 1993 tended to have increased mortality risk in both countries. People who rated health as poor, were smokers, had heart problems, and used a walking aid in 1989 and grew older and felt lonely in 1993 were more likely to have an increased risk of mortality in the UK. Although quality of life was associated with mortality in old age in Taiwan, no relationship was apparent when other predictors were included. It is clear that age, being female, smoking, and having walking difficulties had a stronger direct effect on increase mortality risk; conversely, people who had a TV or radio and had friends tended to have decreased risk of mortality in Taiwan. The study location variable did not have any effect on the relationship between levels of life satisfaction and 14-year and ten-year mortality.

Regarding the relationship between and change in life satisfaction and mortality, the results suggested that changes in life satisfaction did not seem to have a relationship with mortality; instead, other factors affected mortality. Age, smoking, and walking difficulties were associated with mortality among older people in both the UK and Taiwan. Moreover, other predictors showed differences between older people in the UK and Taiwan. Urinary incontinence and loneliness were associated with the risk of mortality in the UK, while walking difficulties, having a TV or radio, and having friends were related to the risk of death in Taiwan.

When Cox regression analyses were used to examine the relationship between each item on the Life Satisfaction Index and mortality, the common individual items that people agreed with 'the things I do are as interesting to me' (1989) and 'there are the best years of my life' (1993) tended to decrease mortality risk in the two countries. The results were

consistent with literature review (Section 2.6) that people with positive feeling linked to high life satisfaction tend live longer. There were differences between the UK and Taiwan. The findings showed that people with the negative items of LSI were more likely to have an increased risk of mortality in the UK. For example, people who agreed with 'this is the dreariest time of my life', 'most of the things I do are boring', and 'compared with other people, I got down in the dumps too often' were more likely to have an increased risk of mortality in 1989 and 1993. Comparison between the UK and Taiwan was limited because of the differences in the individual items in the two studies and the overall number of questions.

Objective #5 is 'are there observable patterns of quality of life among older people and do any such patterns have a relationship with mortality among older people?' For understanding the patterns of life satisfaction, cluster analysis was used to group older people who had similar patterns of response to the life satisfaction scale. These results confirmed the earlier analyses that people with higher levels of life satisfaction tended to have relatively good health. For example, people in the two countries with high life satisfaction patterns who assessed they did interesting things, had been happy when they were younger, and were satisfied with their lives tended to rate their health as excellent. On the contrary, people in both countries with low life satisfaction patterns disagreed that these were the best years of their lives, were more likely to have diseases, and did not have pets.

According to Kaplan-Meier survival analyses, cluster 11 had the highest median survival time and there were differences between it and clusters 3, 4, 5, 6, 7, and 8 in the fourteen-year period; cluster 7 had the highest median survival time and had differences between it and clusters 1, 3, 5, and 6 in the ten-year period in the UK. In Taiwan, there was not a significant difference between the cluster with the highest median survival and other clusters in the 14-year period, but cluster 15 had the highest median survival time and there were differences between it and other clusters in the ten-year period.

As regards the relationship between patterns of life satisfaction and mortality, the findings suggested that certain clusters had an increased/decreased mortality risk over both 14-year (1989-2003) and ten-year (1993-2003) periods in the UK. In Taiwan, such

associations existed only over fourteen years, but not over ten years, suggesting a weaker, and less consistent, relationship. As people grow older, mortality risk was likely to increase in both 14-year and ten-year periods in the two countries. Smoking and mobility problems (either walking problems or using a walking aid) tended to increase the risk of mortality in both 14-year and ten-year periods in the UK. With advancing age, being male, and having walking difficulties were likely to increase mortality risk in both 14-year and ten-year periods in Taiwan. Additional variables of mortality were similar to the predictors identified during the earlier analyses in the research, as indicated in Objective #4.

8.3 *Implications of this research*

This research can be seen to have provided empirical validation for comparing quality of life between older people in the UK and Taiwan. The overall implications from the findings of this research are summarised below.

8.3.1 Implications for research findings

Quality of life is an important concept which affects the well-being of older people, and according to the conceptualization of quality of life in the literature review, life satisfaction is one aspect, and was used as a measure for this research. The significance of this research is its potential contribution to comparing quality of life between older people in the UK and Taiwan. People who live in different countries experience different lifestyles, and therefore it may be that people in different objective circumstances have different needs and expectations. This research assumes that, as these two samples were representative of older people in the two countries, the results could be generalized to the whole populations of older people. The concept of quality of life is a Western one, and older people in Taiwan may assess their life satisfaction by other, more objective factors relating to quality of life, e.g., finance. Some of the differences between the countries may be because of these differences, and the way it is measured may have had more meaning for older people in the UK compared with those in Taiwan, so that older people in the UK could respond more positively to questions.

Related to these various factors and quality of life, is the prospect of clarifying the most important factors affecting the quality of life in old age. Older people in different countries may have specific problems because of local differences in conditions and life experience. A further contribution of this research is improving the understanding of the factors which adversely affect people's quality of life in old age. However, such findings underscore the importance of recognising that older people maintain their quality of life. Maintaining quality of life may be helped by activities with others, maintaining health, developing social relationships from community based schemes, requiring resources from social support systems, etc.

8.3.2 Implications for the policy

The results of analysing the location of the study demonstrated that older people with specific health problems had a higher life satisfaction in the UK than their counterparts in Taiwan. To improve quality of life at all ages may be considered as the primary goal in every country. Thus, this research may inform policy makers on making decisions regarding healthcare services and social security for older people. For instance, healthcare policy can provide greater support for older people's health. However, the system of the National Health Service was established in the UK in 1948, while, in Taiwan, the National Health Insurance was only implemented in 1995, so this healthcare development in Taiwan lagged 47 years behind that of the UK. As mentioned in Sections 1.4.3 and 1.4.4, the NHS and Community Care can be viewed as being very important for the health and well-being of older people. Although the UK Government has achieved several important developments that may be associated with the quality of life for older people, some challenges remain, such as waiting times for admission to hospital for various forms of acute care. The most serious deficiency in Taiwanese healthcare is the lack of residential care homes, respite care, palliative care, and hospice care. Other factors, such as transport facilities, community services, health knowledge, and so on are needed from social services to support older people in maintaining their quality of life. Finally, poverty among older people can be improved by pensions and employment policies, and this may have had a more beneficial effect in the UK.

8.3.3 Implications for theory

Comparing the quality of life in the two countries, some risk factors are pertinent to local social, economic, and cultural problems. The findings in this research may help with a rapidly ageing population, as it purports to better understand the ageing process, thereby helping to improve quality of life. For example, people in the UK were more likely to feel lonely, and this tended to increase the ten-year mortality risk. As discussed in Section 2.5.2.5, feeling lonely is associated with widowhood, living alone, disability, and losing physical capabilities, and this also isolates older people from their social relationships or social activities. Bennett (2006) suggested that levels of social engagement either have a direct effect on the risk of mortality or current hidden health problems, acting as a marker for later ill health among older people in the NLSAA. Therefore, it is assumed that older people experiencing loneliness may have to withdraw from society, and this may tend to increase the risk of mortality. Loneliness may reflect a growing awareness of the individual's ageing. However, this is different from the Disengagement Theory, whereby older people gradually withdraw from their social roles and social relationships due to an inevitable and natural ageing process (Section 2.7.2). Loneliness is an incorporate concept which specifies the relationships between individuals, their contacts with other peers, and psychosocial factors. However, older people could have the best years of their lives if their loneliness was reduced, so interaction to reduce loneliness could have a very positive impact.

As discussed in Section 2.8, successful ageing has been proposed to emphasize freedom from disability and staying active with others. However, this research identifies that the high proportions of older people (both in the UK and Taiwan) had walking problems, and this may affect not only their activities of daily living, but also their social activities. The Activity Theory emphasizes the importance of continuing to undertake social activities for maintaining a person's role in society, such as a familial role, leisurely roles, and volunteer or community roles (see Section 2.7.2). Hsu and Chang (2004) also demonstrated that successful and active ageing indicators include better activities of daily of living, the absence of depression, and higher social support and activities among the older Taiwanese population. However, individuals must replace roles that are lost

because of advancing age with new roles. Therefore, older people should be encouraged to maintain physical health, remain active, expand and develop their own friends, since this positively correlates with a favourable psychological outcome and life satisfaction.

In later life, friendship is an important factor for older people, and this research confirms that having friends affects the quality of life among older people, particularly in Taiwan. Friendships have been identified as being part of a person's social support and social network (Yeh et al., 2003; Yeh et al., 2004; Litwin et al., 2001; Zunzunegui et al., 2003; Kim et al., 2000). Finchum and Weber (2000) examined the relationship between the Continuity Theory and older people's friendships, and they found that the Continuity Theory is more adaptable in terms of there being a strong relationship between lifestyles and social relationships. Older people have the ability to choose and maintain their friendships from their life experience. However, a person also has the ability to maintain friendships from adulthood into old age because friendship is a dynamic and progressive process, with a beginning, a period of endurance, change, and an ending. Thus, the Continuity Theory suggests that friendship plays an important role in the development of a life course associated with a social network, social support, and social relationships which could exert a positive effect on older people's quality of life. However, the Continuity Theory cannot be used to explain the negative effects of ageing on physical health, only that older people have the ability to better cope with a varying diet and life habits for maintaining good health.

As discussed in Section 2.7.4, the Subculture Theory proposes that older people, as a group, have their beliefs, expectations, habits and norms. In the ageing subculture, a person's status is based upon health and mobility rather than education, financial condition, or occupation, so that older people are less integrated into large social groups. However, this research refutes this theory because of the results, which indicate that older people are still engaged with society in a number of ways, such as watching television, attending religious groups, clubs or organizations, reading newspapers or journals. Older people still have interaction with family members, especially those who tend to live with someone in Taiwan, although older people may not have a sufficiently good social function, role, or activity. However, older people still play some roles, for example,

grandfather or carer in a family, so that older people are never permanently excluded from society.

8.3.4 Implications for methods

There are three contributions to this research in terms of methodological issues. Firstly, the current research provides insights which can be used for future research in social gerontology. This research has been comparatively successful in analyzing data by using a harmonised data set, and undertake a comparative study, even though the two studies had different research designs. Harmonising data in this way can be used to compare older people in two or more countries using existing data sets.

Secondly, a greater contribution of this research was in examining the relationship between the items on the Life Satisfaction Index scale and mortality to see what differences exist between the two countries. As suggested in Chapter 6, a higher level of life satisfaction is associated with a lower risk of mortality. Improving the quality of life and the factors associated with it may, therefore, lead to a better lifestyle with a much better overall quality of life. However, Reed (2008) suggested that using qualitative research to explore the various dimensions of quality of life may generate new ideas and understanding of older age in later life. For example, older people may explain why they responded positively or negatively to specific items on the Life Satisfaction Index scale associated with their quality of life.

Finally, in terms of the advantage of using cluster analysis, this research provided the first investigation into patterns of life satisfaction, and examined the relationship between it and mortality among older people in the UK and Taiwan. Moreover, this approach successfully captured how people were satisfied with their lives, and how differences in their judgment in terms of the life satisfaction scale were due to the fact that not everybody is equally satisfied with life. The results suggest that people who rated that they did interesting things and were satisfied with their lives had a pattern of high life satisfaction. On the other hand, people who disagreed with the idea that these were the best years of their lives generally had patterns of low life satisfaction.

8.4 *Limitations of this research*

The research in this thesis had several limitations. First of all, it utilized secondary data drawn for different purposes in two distinct surveys; and though data harmonization is an appropriate method by which to combine and compare distinct datasets, the process itself has limitations e.g., the assumption that some variables had the same meaning when comparing research.

A limitation was also associated with the choice of predictors of quality of life. For example, some variables were not selected because they were different between the NLSAA and SHLSET studies. For example, one question asked "Are you planning to go on holiday in the next year or so?" in the NLSAA study; whereas the two questions in the SHLSET study asked "Pleasure trips that involve staying away from home overnight" and "Travelling abroad, or visiting relatives in Mainland". Therefore, one still needs to keep in mind that these variables differed between the countries and these differences reflect both cultures.

Again, the study used secondary, international data to address the research questions. Specifically, data were drawn from the *Nottingham Longitudinal Study of Activity and Ageing* (NLSAA) in the UK, and *Survey of Health and Living Status of the Elderly in Taiwan* (SHLSET). As can be seen from the titles of these two studies, the two data sets were collected for different purposes and using different questionnaires. As mentioned in the chapter on methodology, the NLSAA collected data rich in information concerning participants' physical activity. In contrast, the SHLSET survey focused on health, family networks, and social support. Therefore, numerous data from both studies were not relevant to, or difficult to use in this research.

Another problem was that it was often difficult to determine the quality of the data for questions when the researcher selected variables. The survey instruments were developed by other researchers, and they decided what data to collect and what scales to use – dependent upon the aims of their own study. Consequently, not all of the information we might have desired was available for the purposes of this research. In other words, it was difficult to select and compare variables from the two surveys. Thus, the research was

limited by different variables, and many variables in the two studies were not similar enough to be compared.

A further limitation of the research was that the two samples were not from equivalent areas of the UK and Taiwan; for example, participants in the NLSAA were from the Nottingham area; in contrast, for the SHLSET survey, the sample was drawn from across the entire country (albeit, a relatively small one). However, both studies reported that the samples were representative of Taiwan and the UK respectively.

An additional limitation was that the data were old, collected in 1989 and 1993, and the situation may have changed in both countries since that time. However, individuals 65 years and over comprise a more diverse group than those in any other age group. The reason for this variability derives from the variety of experiences older people have had over time, and their broad range of health status and/or functional ability. For example, an 85-year old might be frail and housebound because older people themselves as age their health changes, versus a 65-year old who might still being highly active, or even still working. However, these data still have their value, and can help us to understand the complex conditions or status of older people at the time the data were collected. In addition, the mortality data are much more recent and the older survey combined with recent mortality data enabled longer follow-up periods for the mortality analyses.

Another limitation, as with most research of this kind, is that it is likely that certain participant characteristics, related to both dependent and independent variables (so called 'confounders'), were not examined in the research. It must be kept in mind that the presence of such confounding variables – known or unknown – could explain at least part of the relationships detected in this research. For example, it was not possible to assess certain disease states. It is possible some disease states that were not examined (e.g., alcohol abuse) could be related to quality of life and a variety of other factors; and not examining these conditions may limit the extent to which these findings can be interpreted.

Finally, the selected indicators of quality of life might not explain the whole concept of quality of life. The complexity of measuring the various components of quality of life has been noted in the literature review in Chapter 2. Given the lack of knowledge regarding

which aspects of quality of life are most important, it is possible that potentially important components were missing in this research; for instance, bereavement, grief, social support, the environment, fear of crime, and so on. This research was designed to examine quality of life among older people in the UK and Taiwan. As a result, the questions associated with quality of life did not seem complete. Limitations arise because the studies might fail to recognize variations between countries in the importance of quality of life. The lack of comparable data (e.g., environment, bereavement, crime), often restricts international research as it attempts to explain multiple dimensions of quality of life.

8.5 *Suggestions for future research*

The findings of this study provide a number of insights for future research. They suggest that several categories of variable found to predict quality of life are also associated with mortality. In particular, the positive findings regarding self-rated health, mental health, and physical health problems extend previous research on older people. The next major step with regards to these results is to determine why certain associations happen in these people in the UK and/or Taiwan. For instance, loneliness appears to be more common among older people in the UK. Studies will be required to test alternative explanations systematically for the influence of psychosocial variables on physiological processes and quality of life. Qualitative fieldwork to investigate how older people deal with loneliness could prove useful. In this research, although depression was a major influence on quality of life, the levels of depression did not affect the relationship between quality of life and mortality in the two studies. Even though some investigators have explored the relationship between depression and mortality, few studies have looked at the effect of depression on quality of life and its relationship to mortality: the association between these factors could be investigated in future studies.

Future studies could resolve some of the more minor shortcomings of the combined data sets used in the present analyses. In the future, measures incorporating the length, breadth and profundity of quality of life in different countries would be of great help in understanding ageing populations.

8.6 *Conclusion*

Quality of life is like a network of various interlacing factors (e.g., health, living environment, social relationships, and demographic characteristics). Various factors affect an individual's quality of life, and these vary with the circumstances of their life. However, each person has different standards for his or her life.

All analyses demonstrated that quality of life was important to older people in the UK and Taiwan. Moreover, quality of life encompasses a wide range of elements. After Lassey and Lassey (2001) summarised studies from a variety of British researchers, they concluded that good physical and mental health, adequate income, having social support, being autonomous, having a sense of control over one's own fate, satisfaction with social relationships, having an active life style, having a good quality home, and being happy with one's environmental setting are important determinants of satisfaction with life among Britain's older people. This research confirms the majority of these factors.

The results also confirm certain components of quality of life identified in Chen's (2001) research in Taiwan. He concluded that quality of life decreases with advancing age among Taiwanese older people; meanwhile, living status and social engagement also affect their life satisfaction. However, in this thesis, other factors influenced quality of life and mortality; for instance smoking, walking difficulties, TV or radio use, and having friends. Watching TV or listening to the radio might be questioned, because the majority of older people were not wealthy in 1989; now, however most Taiwanese older people have these items. TV or radio use and having friends may reflect Chinese people's orientation towards social relationships and social exchanges.

Quality of life is important for older people. This research explored factors influencing quality of life among older people in two very distinct societies, in the UK and Taiwan. According to the literature review, life satisfaction is one the aspects of quality of life. Together with predictors of physical and mental health, social factors, environment, and demographic characteristics, it indicates how satisfied people are with their lives. These findings identified the differences between these two countries. Although this research did not explore all aspects of the concept of quality of life fully, the study result provides a basis for further research about the quality of life for older people.

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Appendix A: The PhD research for using the older people dataset of Taiwan.

行政院衛生署國民健康局資料庫
資料使用申請計畫摘要表

計畫主題				
Determinants of quality of life among the elderly people in the UK and Taiwan				
目的及方法（得另附詳細計畫書）				
The primary aim of this research is to examine cross-cultural differences in the relationship between physical health, psychological well-being, social factors, and quality of life among elderly people in the UK and Taiwan. This research will conduct through secondary analysis of data from the Nottingham Longitudinal Study and Aging in the UK and the Survey of Health and Living Status of the Elderly in Taiwan, which contain data from similar nationally-representative cohorts of older people aged 65 and older, who were interviewed in 1989 and 1993. Descriptive analyses and binary and multinomial logistic regression analyses will be used for this study with further testing for interactions between variables as necessary.				
共同參與人員及實際處理資料人員（不足請另紙填附）				
姓名	機構及單位	職稱	聯絡電話	電子郵件信箱
Dr. Peter Bath	University of Sheffield Department of Information Studies	Senior Lecturer	44-1142222636	p.a.bath@sheffield.ac.uk
Chih-Ping Lucia Li	University of Sheffield Department of Information Studies	Student	44-7914090530	lichihping@hotmail.com
成果發表計畫(例如:預定於何時完成論文、發表文章)				
The thesis will be submitted to department in 2009.				
資料灌裝機台數(超過一台者請註明理由)				
The data will be installed two computers including Dr. Peter Bath and Chih-Ping Lucia Li. 指導教授的電腦也需要灌裝資料，因為我必須與指導教授討論資料的變項，使用何種統計方法以及與英國的資料變項做比較。				
申請『個人可辨識欄位』者請以附頁提出『資料管控方式』供參				

申請人簽章：李志平 Lucia Li

指導教授簽章：

所屬機關主管/系所所長、主任簽章：Peter Bath

Appendix B: The letter for the older people dataset application.

The University Of Sheffield.

Department Of Information Studies.

Bureau of Health Promotion,
Department of Health,
Executive Yuan,
Taiwan
R.O.C

26 May 2006

Head of Department
Professor Peter Willett

Regent Court
211 Portobello Street
Sheffield
S1 4DP

Telephone: +44 (0) 114 222 2630
Fax: +44 (0) 114 278 0300
Email: dis@sheffield.ac.uk
Website: www.sheffield.ac.uk/is

To whom it may concern,

I am writing in support of Chih-Ping Lucia Li, who is a registered research student studying in the Department of Information Studies at the University of Sheffield. The topic of Lucia Li's thesis is "Determinants of quality of life among the elderly people in the UK and Taiwan". To undertake her research, Lucia Li would like access to the following data: Survey of Health and Living Status of the Middle Aged and Elderly in Taiwan in 1989 and 1993. I hope that the Bureau of Health Promotion will approve Li's application.

Thank you very much,
Yours faithfully

UNIVERSITY OF SHEFFIELD Department of Information Studies

Dr. Peter Bath
Senior Lecturer,
Head, Health Informatics Research Group

Appendix C: The agreement for using the older people dataset of Taiwan.

行政院衛生署國民健康局資料庫
資料使用同意書

本人/機關 李志平 CHIH-PING LUCIA LI 茲向行政院衛生署國民健康局申請民國 78 年及民國 82 年台灣老人保健與生活問題調查 資料檔案作為 博士論文:Determinants of quality of life among the elderly people in the UK and Taiwan 計畫 / 業務之用，同意恪遵：「電腦處理個人資料保護法」、「行政院衛生署國民健康局資料提供及使用作業要點」及以下各點：

1. 使用本資料庫資料檔案時，不因任何理由侵犯個人隱私權，亦不作為營利之目的及用途。
2. 申請資料若含個人可辨識資料欄位、或為戶役政資訊連結作業資料，同意以書面明確記錄資料使用情形，包括執行計畫時需使用資料之相關人員、使用平臺、場所與時間等。
3. 資料使用範圍僅限於國民健康局核准之主題、資料使用年限，並僅限於共同參與計畫人員使用，計畫主題之變更需提出申請並經國民健康局同意。
4. 因故須延長使用期限，同意使用期限屆滿前一個月重新提出申請，若未重新申請，則於期限屆滿時由國民健康局收回資料使用權。
5. 對提供之資料負保密責任，不任意拷貝提供他人或單獨對外發布個人資料，或未經國民健康局同意進行個案身份辨識或與其他資料進行串聯分析。如因而致生損害於他人者，願負法律責任。
6. 利用本資料撰述而成之論著，以中文或英文詳細書明資料出處，並於發表或出版後一個月內郵寄二份著作交予國民健康局收藏。
7. 於計畫結束或屆滿前，銷毀所申請之資料、簽署並寄回「行政院衛生署國民健康局資料使用結案單」。
8. 若違反「行政院衛生署國民健康局提供資料及使用作業要點」所述相關規定時，除銷毀所有資料，且絕不保留備份資料外，國民健康局並得停止本人 / 機關申請使用資料庫之權利。
9. 因違反所有相關法令規定所致一切後果，由本人 / 機關負全部責任。
10. 本使用同意書之解釋、效力及其他有關之未盡事宜，皆以中華民國法律為準據法，本人同意如有訴訟，以台中地方法院為第一審管轄法院。

申請人已確認詳細閱讀相關規定，完全瞭解其內容，並同意遵守之。

I have explained then content of this document to Professor Peter Willett and Dr. Peter Bath. We have listened to Chih-Ping Lucia Li about the articles listed in this form that fully understand the content of this form before I sign.

申請人簽章：李志平 Lucia Li 民國 95年 6 月 16 日

指導教授簽章：_____ 民國 95年 6 月 16 日

單位主管/系所所長、主任簽章：Peter Willett 民國 95 年 6 月 16 日

衛生署國民健康局 老人保健與生活問題調查研究

Appendix D: The approved letter (English) for using the older people dataset of Taiwan.

行 政 院 衛 生 署 國 民 健 康 局
BUREAU OF HEALTH PROMOTION
DEPARTMENT OF HEALTH, TAIWAN, ROC

台中市南屯區黎明路二段 503 號 5 樓 | 台中市郵政信箱 47-40 號 | Phone:886-4-22525249
5th Fl., 503 Sect. 2, Li-Ming Rd, | P.O. Box 47-40 | 886-4-22591999
Taichung, Taiwan 408 ROC | Taichung, Taiwan 408 ROC | Fax: 886-4-22591728

Dr. Peter Bath
Senior Lecturer,
Head, Health Informatics Research Group
Department of Information Studies
University of Sheffield
Regent Court
211 Portobello Street
Sheffield
S1 4DP, UK

June 28th, 2006

Dear Dr. Bath,

Your letter dated May 26, 2006 was well received. I am writing to formally inform you that your request for Ms. Chih-Ping Li's access to the datasets of the Survey of Health and Living Status of Middle Aged and Elderly has been approved. She will be receiving a FedEx package with a CD-ROM disk and related document shortly.

Sincerely,

Yi-Li Chuang, Director
Population and Health survey Research Center
Bureau of Health Promotion
Department of Health
Taiwan

Appendix E: The frequencies of individual life satisfaction item in the NLSAA study in 1989.

Item of life satisfaction scale	Category	N	(%)	Total
1. As I grow older, things seem better than I thought they would be.	No, disagree	185	(26.8)	651
	Do not know	87	(12.6)	
	Yes, agree	379	(54.9)	
2. I have had more chances in life than most of the people I know.	No, disagree	293	(42.5)	651
	Do not know	103	(14.9)	
	Yes, agree	255	(37.0)	
3. This is the dreariest time of my life.	No, disagree	186	(27.0)	651
	Do not know	32	(4.6)	
	Yes, agree	433	(62.8)	
4. I am just as happy as when I was younger.	No, disagree	233	(35.8)	651
	Do not know	35	(5.4)	
	Yes, agree	383	(58.8)	
5. These are the best years of my life.	No, disagree	407	(62.5)	651
	Do not know	61	(9.4)	
	Yes, agree	183	(28.1)	
6. Most of the things I do are boring or monotonous.	No, disagree	130	(20.0)	651
	Do not know	25	(3.8)	
	Yes, agree	496	(76.2)	
7. The things I do are as interesting to me as they ever were.	No, disagree	133	(20.4)	651
	Do not know	35	(5.4)	
	Yes, agree	483	(74.2)	
8. As I look back on my life, I am fairly well satisfies.	No, disagree	68	(10.4)	651
	Do not know	28	(4.3)	
	Yes, agree	555	(85.3)	
9. I have made plans for things I will be doing in a month or a year from now.	No, disagree	409	(62.8)	651
	Do not know	5	(0.8)	
	Yes, agree	237	(36.4)	
10. When I think back over my life, I did not get most of the important things I wanted.	No, disagree	297	(45.7)	651
	Do not know	58	(8.9)	
	Yes, agree	295	(45.4)	
11. Compared with other people, I get down in the dumps too often.	No, disagree	114	(17.5)	651
	Do not know	27	(4.1)	
	Yes, agree	510	(78.3)	
12. I have pretty much what I expected out of life.	No, disagree	72	(11.1)	651
	Do not know	47	(7.2)	
	Yes, agree	532	(81.7)	
13. In spite of what people say, the life of the average person is getting worse, not better.	No, disagree	197	(30.3)	651
	Do not know	90	(13.8)	
	Yes, agree	364	(55.9)	

Appendix F: The frequencies of individual life satisfaction item in the NLSAA study in 1993.

Item of life satisfaction scale	Category	N	(%)	Total
1. As I grow older, things seem better than I thought they would be.	No, disagree	143	(37.4)	382
	Do not know	40	(10.5)	
	Yes, agree	199	(52.1)	
2. I have had more chances in life than most of the people I know.	No, disagree	170	(44.5)	382
	Do not know	30	(7.9)	
	Yes, agree	182	(47.6)	
3. This is the dreariest time of my life.	No, disagree	136	(35.6)	382
	Do not know	11	(2.9)	
	Yes, agree	235	(61.5)	
4. I am just as happy as when I was younger.	No, disagree	143	(37.4)	382
	Do not know	15	(3.9)	
	Yes, agree	224	(58.6)	
5. These are the best years of my life.	No, disagree	267	(69.9)	382
	Do not know	20	(5.2)	
	Yes, agree	95	(24.9)	
6. Most of the things I do are boring or monotonous.	No, disagree	78	(20.4)	382
	Do not know	7	(1.8)	
	Yes, agree	297	(77.7)	
7. The things I do are as interesting to me as they ever were.	No, disagree	58	(15.2)	382
	Do not know	12	(3.1)	
	Yes, agree	312	(81.7)	
8. As I look back on my life, I am fairly well satisfies.	No, disagree	30	(7.9)	382
	Do not know	10	(2.6)	
	Yes, agree	342	(89.5)	
9. I have made plans for things I will be doing in a month or a year from now.	No, disagree	224	(58.6)	382
	Do not know	4	(1.0)	
	Yes, agree	154	(40.3)	
10. When I think back over my life, I did not get most of the important things I wanted.	No, disagree	111	(29.1)	382
	Do not know	15	(3.9)	
	Yes, agree	256	(67.0)	
11. Compared with other people, I get down in the dumps too often.	No, disagree	53	(13.9)	382
	Do not know	8	(2.1)	
	Yes, agree	321	(84.0)	
12. I have pretty much what I expected out of life.	No, disagree	47	(12.3)	382
	Do not know	23	(6.0)	
	Yes, agree	312	(81.7)	
13. In spite of what people say, the life of the average person is getting worse, not better.	No, disagree	144	(37.7)	382
	Do not know	63	(16.5)	
	Yes, agree	175	(45.8)	

Appendix G: The frequencies of individual life satisfaction item in the SHLSET study in 1989.

Item of life satisfaction scale	Category	N	(%)	Total
1. I have had more breaks in life than most of the people I know. (compared to elderly neighbors and relatives)	No, disagree	492	(36.8)	1336
	Do not know	2	(0.1)	
	Yes, agree	842	(63.0)	
2. As I look back on my life, I am fairly well satisfied.	No, disagree	373	(27.8)	1340
	Do not know	2	(0.1)	
	Yes, agree	965	(72.0)	
3. My life could be happier than it is now.	No, disagree	604	(45.2)	1336
	Do not know	2	(0.1)	
	Yes, agree	730	(54.6)	
4. I would not change my past even if I could.	No, disagree	595	(44.5)	1337
	Do not know	1	(0.1)	
	Yes, agree	741	(55.4)	
5. These are the best years of my life.	No, disagree	444	(33.1)	1341
	Do not know	3	(0.2)	
	Yes, agree	894	(68.7)	
6. Most of the things I do are boring or monotonous.	No, disagree	918	(31.3)	1337
	Do not know	1	(0.1)	
	Yes, agree	418	(66.7)	
7. I have always felt interested in the things I have done.	No, disagree	325	(24.3)	1338
	Do not know	2	(0.1)	
	Yes, agree	1011	(75.6)	
8. I expect some interesting and pleasant things to happen to me in the future.	No, disagree	446	(33.3)	1339
	Do not know	2	(0.1)	
	Yes, agree	891	(66.5)	
9. I feel old and somewhat tired.	No, disagree	477	(64.4)	1343
	Do not know	1	(0.1)	
	Yes, agree	865	(35.5)	
10. I've become pretty much what I expected out of life.	No, disagree	478	(35.7)	1340
	Do not know	1	(0.1)	
	Yes, agree	861	(64.3)	

Appendix H: The frequencies of individual life satisfaction item in the SHLSET study in 1993.

Item of life satisfaction scale	Category	N	(%)	Total
3. I have had more breaks in life than most of the people I know. (Compared to elderly neighbours and relatives).	No, disagree	465	(46.4)	1003
	Do not know	147	(14.7)	
	Yes, agree	391	(39.0)	
4. As I look back on my life, I am fairly well satisfied.	No, disagree	385	(38.4)	1003
	Do not know	113	(11.3)	
	Yes, agree	505	(50.3)	
6. These are the best years of my life.	No, disagree	395	(39.4)	1003
	Do not know	107	(10.7)	
	Yes, agree	501	(50.0)	
9. I expect some interesting and pleasant things to happen to me in the future.	No, disagree	231	(23.0)	1003
	Do not know	115	(11.5)	
	Yes, agree	657	(65.5)	

Appendix I: The 15 clusters from cluster analysis in the NLSAA study in 1989.

Cluster	1 (n=60)			2 (n=56)			3 (n=30)			4 (n=31)			5 (n=57)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. As I grow older, things seem better than I thought they would be.	41 (68.3)	7 (11.7)	12 (20.0)	26 (46.4)	24 (42.9)	6 (10.7)	14 (46.7)	10 (33.3)	6 (20.0)	4 (12.9)	22 (71.0)	5 (16.1)	6 (10.5)	43 (75.4)	8 (14.0)
2. I have had more chances in life than most of the people I know.	16 (26.7)	34 (56.7)	10 (16.7)	27 (48.2)	15 (26.8)	14 (25.0)	0 (0)	28 (93.3)	2 (6.7)	20 (64.5)	7 (22.6)	4 (12.9)	14 (24.6)	36 (63.2)	7 (12.3)
3. This is the dreariest time of my life.	20 (33.3)	37 (61.7)	3 (5.0)	2 (3.6)	51 (91.1)	3 (5.4)	25 (83.3)	3 (10.0)	2 (6.7)	24 (77.4)	5 (16.1)	2 (6.5)	48 (84.2)	9 (15.8)	0 (0)
4. I am just as happy as when I was younger.	7 (11.7)	49 (81.7)	4 (6.7)	52 (92.9)	1 (1.8)	3 (5.4)	28 (93.3)	0 (0)	2 (6.7)	7 (22.6)	23 (74.2)	1 (3.2)	3 (5.3)	53 (93.0)	1 (1.8)
5. These are the best years of my life.	5 (8.3)	53 (88.3)	2 (3.3)	5 (8.9)	47 (83.9)	4 (7.1)	7 (23.3)	20 (66.7)	3 (10.0)	0 (0)	30 (96.8)	1 (3.2)	2 (3.5)	54 (94.7)	1 (1.8)
6. Most of the things I do are boring or monotonous.	5 (8.3)	55 (91.7)	0 (0)	0 (0)	56 (100)	0 (0)	13 (43.3)	16 (53.3)	1 (3.3)	0 (0)	31 (100)	0 (0)	51 (89.5)	3 (5.3)	3 (5.3)
7. The things I do are as interesting to me as they ever were.	54 (90.0)	2 (3.3)	4 (6.7)	42 (75.0)	11 (19.6)	3 (5.4)	23 (76.7)	6 (20.0)	1 (3.3)	9 (29.0)	19 (61.3)	3 (9.7)	12 (21.1)	42 (73.7)	3 (5.3)
8. As I look back on my life, I am fairly well satisfied.	50 (83.3)	5 (8.3)	5 (8.3)	54 (96.4)	1 (1.8)	1 (1.8)	28 (93.3)	2 (6.7)	0 (0)	25 (80.6)	5 (16.1)	1 (3.2)	48 (84.2)	5 (8.8)	4 (7.0)
9. I have made plans for things I will be doing in a month or a year from now.	41 (68.3)	18 (30.0)	1 (1.7)	50 (89.3)	4 (7.1)	2 (3.6)	4 (13.3)	26 (86.7)	0 (0)	0 (0)	31 (100)	0 (0)	8 (14.0)	49 (86.0)	0 (0)
10. When I think back over my life, I did not get most of the important things I wanted.	22 (36.7)	33 (55.0)	5 (8.3)	8 (14.3)	42 (75.0)	6 (10.7)	18 (60.0)	9 (30.0)	3 (10.0)	5 (16.1)	23 (74.2)	3 (9.7)	30 (52.6)	20 (35.1)	7 (12.3)
11. Compared with other people, I get down in the dumps too often.	0 (0)	60 (100)	0 (0)	0 (0)	54 (96.4)	2 (3.6)	2 (6.7)	26 (86.7)	2 (6.7)	5 (16.1)	23 (74.2)	3 (9.7)	21 (36.8)	34 (59.6)	2 (3.5)
12. I have pretty much what I expected out of life.	46 (76.7)	7 (11.7)	7 (11.7)	51 (91.1)	1 (1.8)	4 (7.1)	24 (80.0)	5 (16.7)	1 (3.3)	24 (77.4)	4 (12.9)	3 (9.7)	50 (87.7)	1 (1.8)	6 (10.5)
13. In spite of what people say, the life of the average person is getting worse, not better.	11 (18.3)	41 (68.3)	8 (13.3)	12 (21.4)	35 (62.5)	9 (16.1)	3 (10.0)	23 (76.7)	4 (13.3)	6 (19.4)	21 (67.7)	4 (12.9)	18 (31.6)	26 (45.6)	13 (22.8)
Life satisfaction standardized mean score		66.22			78.78			56.03			51.36			35.43	

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Appendix H (continued)

Item / Cluster	6 (n=40)			7 (n=66)			8 (n=26)			9 (n=41)			10 (n=49)		
	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. As I grow older, things seem better than I thought they would be.	26 (65.0)	8 (20.0)	6 (15.0)	47 (71.2)	15 (22.7)	4 (6.1)	6 (23.1)	18 (69.2)	2 (7.7)	28 (68.3)	5 (12.2)	8 (19.5)	42 (85.7)	0 (0)	7 (14.3)
2. I have had more chances in life than most of the people I know.	29 (72.5)	3 (7.5)	8 (20.0)	38 (57.6)	16 (24.2)	12 (18.2)	6 (23.1)	18 (69.2)	2 (7.7)	1 (2.4)	37 (90.2)	3 (7.3)	26 (53.1)	17 (34.7)	6 (12.2)
3. This is the dreariest time of my life.	12 (30.0)	24 (60.0)	4 (10.0)	13 (19.7)	46 (69.7)	7 (10.6)	23 (88.5)	3 (11.5)	0 (0)	1 (2.4)	40 (97.6)	0 (0)	0 (0)	48 (98.0)	1 (2.0)
4. I am just as happy as when I was younger.	11 (27.5)	25 (62.5)	4 (10.0)	38 (57.6)	18 (27.3)	10 (15.2)	0 (0)	26 (100)	0 (0)	28 (68.3)	11 (26.8)	2 (4.9)	49 (100)	0 (0)	0 (0)
5. These are the best years of my life.	0 (0)	37 (92.5)	3 (7.5)	10 (15.2)	51 (77.3)	5 (7.6)	3 (11.5)	23 (88.5)	0 (0)	30 (73.2)	8 (19.5)	3 (7.3)	30 (61.2)	13 (26.5)	6 (12.2)
6. Most of the things I do are boring or monotonous.	16 (40.0)	21 (52.5)	3 (7.5)	0 (0)	61 (92.4)	5 (7.6)	23 (88.5)	2 (7.7)	1 (3.8)	2 (4.9)	37 (90.2)	2 (4.9)	0 (0)	47 (95.9)	2 (4.1)
7. The things I do are as interesting to me as they ever were.	29 (72.5)	6 (15.0)	5 (12.5)	48 (72.5)	14 (21.2)	4 (6.1)	0 (0)	25 (96.2)	1 (3.8)	35 (85.4)	2 (4.9)	4 (9.8)	49 (100)	0 (0)	0 (0)
8. As I look back on my life, I am fairly well satisfied.	40 (100)	0 (0)	0 (0)	60 (90.9)	2 (3.0)	4 (6.1)	9 (34.6)	13 (50.0)	4 (15.4)	23 (56.1)	14 (34.1)	4 (9.8)	49 (100)	0 (0)	0 (0)
9. I have made plans for things I will be doing in a month or a year from now.	17 (42.5)	23 (57.5)	0 (0)	0 (0)	66 (100)	0 (0)	2 (7.7)	24 (92.3)	0 (0)	0 (0)	41 (100)	0 (0)	49 (100)	0 (0)	0 (0)
10. When I think back over my life, I did not get most of the important things I wanted.	13 (32.5)	24 (60.0)	3 (7.5)	64 (97.0)	0 (0)	2 (3.0)	17 (65.4)	9 (34.6)	0 (0)	29 (70.7)	7 (17.1)	5 (12.2)	48 (98.0)	0 (0)	1 (2.0)
11. Compared with other people, I get down in the dumps too often.	27 (67.5)	12 (30.0)	1 (2.5)	2 (3.0)	59 (89.4)	5 (7.6)	16 (61.5)	8 (30.8)	2 (7.7)	6 (14.6)	31 (75.6)	4 (9.8)	0 (0)	49 (100)	0 (0)
12. I have pretty much what I expected out of life.	39 (97.5)	0 (0)	1 (2.5)	55 (83.3)	5 (7.6)	6 (9.1)	0 (0)	25 (96.2)	1 (3.8)	34 (82.9)	1 (2.4)	6 (14.6)	44 (89.8)	2 (4.1)	3 (6.1)
13. In spite of what people say, the life of the average person is getting worse, not better.	17 (42.5)	16 (40.0)	7 (17.5)	31 (47.0)	27 (40.9)	8 (12.1)	22 (84.6)	2 (7.7)	2 (7.7)	0 (0)	37 (90.2)	4 (9.8)	5 (10.2)	36 (73.5)	8 (16.3)
Life satisfaction standardized mean score		59.71			61.19			17.01			66.32			83.99	

(Continued overleaf)

Appendix H (continued)

Item	Cluster 11 (n=50)			12 (n=49)			13 (n=50)			14 (n=29)			15 (n=16)		
	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. As I grow older, things seem better than I thought they would be.	45 (90.0)	0 (0)	5 (10.0)	21 (42.9)	17 (34.7)	11 (22.4)	47 (94.0)	0 (0)	3 (6.0)	22 (75.9)	4 (13.8)	3 (10.3)	3 (18.8)	12 (75.0)	1 (6.3)
2. I have had more chances in life than most of the people I know.	22 (44.0)	19 (38.0)	9 (18.0)	10 (20.4)	34 (69.4)	5 (10.2)	27 (54.0)	9 (18.0)	14 (28.0)	12 (41.4)	14 (48.3)	3 (10.3)	6 (37.5)	6 (37.5)	4 (25.0)
3. This is the dreariest time of my life.	0 (0)	48 (96.0)	2 (4.0)	2 (4.1)	46 (93.9)	1 (2.0)	0 (0)	50 (100)	0 (0)	8 (27.6)	16 (55.2)	5 (17.2)	7 (43.8)	7 (43.8)	2 (12.5)
4. I am just as happy as when I was younger.	48 (96.0)	1 (2.0)	1 (2.0)	41 (83.7)	6 (12.2)	2 (4.1)	45 (90.0)	2 (4.0)	3 6.0()	23 (79.3)	4 (13.8)	2 (6.9)	3 (18.8)	13 (81.3)	0 (0)
5. These are the best years of my life.	34 (68.0)	6 (12.0)	10 (20.0)	20 (40.8)	24 (49.0)	5 (10.2)	20 (40.0)	18 (36.0)	12 (24.0)	17 (58.6)	6 (20.7)	6 (20.7)	0 (0)	16 (100)	0 (0)
6. Most of the things I do are boring or monotonous.	2 (4.0)	45 (90.0)	3 (6.0)	1 (2.0)	47 (95.9)	1 (2.0)	1 (2.0)	46 (92.0)	3 (6.0)	16 (55.2)	13 (44.8)	0 (0)	0 (0)	15 (93.8)	1 (6.3)
7. The things I do are as interesting to me as they ever were.	47 (94.0)	1 (2.0)	2 (4.0)	48 (98.0)	0 (0)	1 (2.0)	48 (96.0)	1 (2.0)	1 (2.0)	22 (75.9)	4 (13.8)	3 (10.3)	16 (100)	0 (0)	0 (0)
8. As I look back on my life, I am fairly well satisfied.	46 (92.0)	3 (6.0)	1 (2.0)	48 (98.0)	1 (2.0)	0 (0)	49 (98.0)	0 (0)	1 (2.0)	25 (86.2)	2 (6.9)	2 (6.9)	0 (0)	15 (93.8)	1 (6.3)
9. I have made plans for things I will be doing in a month or a year from now.	50 (100)	0 (0)	0 (0)	0 (0)	49 (100)	0 (0)	0 (0)	49 (98.0)	1 (2.0)	12 (41.4)	16 (55.2)	1 (3.4)	4 (25.0)	12 (75.0)	0 (0)
10. When I think back over my life, I did not get most of the important things I wanted.	1 (2.0)	42 (84.0)	7 (14.0)	3 (6.1)	42 (85.7)	4 (8.2)	4 (8.0)	38 (76.0)	8 (16.0)	22 (75.9)	5 (17.2)	2 (6.9)	13 (81.3)	1 (6.3)	2 (12.5)
11. Compared with other people, I get down in the dumps too often.	1 (2.0)	48 (96.0)	1 (2.0)	0 (0)	47 (95.9)	2 (4.1)	1 (2.0)	49 (98.0)	0 (0)	29 (100)	0 (0)	0 (0)	3 (18.8)	10 (62.5)	3 (18.8)
12. I have pretty much what I expected out of life.	48 (96.0)	0 (0)	2 (4.0)	43 (87.8)	2 (4.1)	4 (8.2)	46 (92.0)	2 (4.0)	2 (4.0)	23 (79.3)	6 (20.7)	0 (0)	4 (25.0)	11 (68.8)	1 (6.3)
13. In spite of what people say, the life of the average person is getting worse, not better.	9 (18.0)	39 (78.0)	2 (4.0)	34 (69.4)	5 (10.2)	10 (20.4)	3 (6.0)	38 (76.0)	9 (18.0)	15 (51.7)	13 (44.8)	1 (3.4)	11 (68.8)	4 (25.0)	1 (6.3)
Life satisfaction standardized mean score		89.92			69.23			81.77			57.56			38.94	

Appendix J: The 15 clusters profile in the NLSAA study in 1989.

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)
Age	<80		37 (61.7)	38 (67.9)	19 (63.3)	18 (58.1)	33 (57.9)	24 (60.0)	33 (50.0)	16 (61.5)	25 (61.0)	29 (59.2)	35 (70.0)	39 (79.6)	30 (60.0)	14 (48.3)	12 (75.0)
	>80		23 (38.3)	18 (32.1)	11 (36.7)	13 (41.9)	24 (42.1)	16 (40.0)	33 (50.0)	10 (38.5)	16 (39.0)	20 (40.8)	15 (30.0)	10 (20.4)	20 (40.0)	15 (51.7)	4 (25.0)
Gender	Male		22 (36.7)	23 (41.1)	6 (20.0)	12 (38.7)	20 (35.1)	11 (27.5)	31 (47.0)	8 (30.8)	15 (36.6)	20 (40.8)	21 (42.0)	23 (46.9)	21 (42.0)	11 (37.9)	6 (37.5)
	Female		38 (63.3)	33 (58.9)	24 (80.0)	19 (61.3)	37 (64.9)	29 (72.5)	35 (53.0)	18 (69.2)	26 (63.4)	29 (59.2)	29 (58.0)	26 (53.1)	29 (58.0)	18 (62.1)	10 (62.5)
Marital status	Married		17 (28.3)	30 (53.6)	9 (30.0)	9 (29.0)	17 (29.8)	17 (42.5)	28 (42.4)	6 (23.1)	20 (48.8)	27 (55.1)	27 (54.0)	32 (65.3)	27 (54.0)	12 (41.4)	3 (18.8)
	Single		4 (6.7)	2 (3.6)	4 (13.3)	1 (3.2)	3 (5.3)	0 (0)	3 (4.5)	2 (7.7)	2 (4.9)	1 (2.0)	6 (12.0)	6 (12.2)	2 (4.0)	3 (10.3)	0 (0)
	Widowed		37 (61.7)	23 (41.1)	16 (53.3)	18 (58.1)	33 (57.9)	21 (52.5)	34 (51.5)	17 (65.4)	17 (41.5)	19 (38.8)	15 (30.0)	11 (22.4)	19 (38.0)	12 (41.4)	13 (81.3)
	Separated/divorced		2 (3.3)	1 (1.8)	1 (3.3)	3 (9.7)	4 (7.0)	2 (5.0)	1 (1.5)	1 (3.8)	2 (4.9)	2 (4.1)	2 (4.0)	0 (0)	2 (4.0)	2 (6.9)	0 (0)
Living status	Living alone		34 (56.7)	23 (41.1)	14 (46.7)	22 (71.0)	35 (61.4)	20 (50.0)	36 (54.5)	14 (53.8)	20 (48.8)	19 (38.0)	19 (38.0)	12 (24.5)	17 (34.0)	14 (48.3)	13 (81.3)
	Living with someone		26 (43.3)	33 (58.9)	16 (53.3)	9 (29.0)	21 (36.8)	20 (50.0)	30 (45.5)	10 (38.5)	20 (48.8)	30 (61.2)	31 (62.0)	37 (75.5)	32 (64.0)	15 (51.7)	3 (18.8)
Socioeconomic class	Professional/intermediate		16 (26.7)	17 (30.4)	2 (6.7)	8 (25.8)	8 (14.0)	5 (12.5)	3 (4.5)	5 (19.2)	3 (7.3)	5 (10.2)	10 (20.0)	5 (10.2)	7 (14.0)	4 (13.8)	1 (6.3)
	Skilled-non manual/ skilled-manual		34 (56.7)	35 (62.5)	16 (53.3)	19 (61.3)	33 (57.9)	29 (72.5)	42 (63.6)	12 (46.2)	27 (65.9)	27 (55.1)	29 (58.0)	32 (65.3)	29 (58.0)	16 (55.2)	11 (68.8)
	Semiskilled/unskilled/ others		10 (16.7)	4 (7.1)	12 (40.0)	4 (12.9)	16 (28.1)	6 (15.0)	21 (31.8)	8 (30.8)	11 (26.8)	17 (34.7)	10 (20.0)	12 (24.5)	14 (28.0)	8 (27.6)	4 (25.0)
Satisfied with income	Dissatisfied		10 (16.7)	11 (19.6)	5 (16.7)	5 (16.1)	14 (24.6)	10 (25.0)	24 (36.4)	13 (50.0)	6 (14.6)	7 (14.3)	7 (14.0)	14 (28.6)	3 (6.0)	6 (20.7)	7 (43.8)
	Satisfied		50 (83.3)	44 (78.6)	25 (83.3)	26 (83.9)	42 (73.7)	30 (75.0)	42 (63.6)	12 (46.2)	34 (82.9)	41 (83.7)	43 (86.0)	35 (71.4)	47 (94.0)	23 (79.3)	9 (56.3)
Loneliness	No lonely		28 (46.7)	6 (10.7)	13 (43.3)	17 (54.8)	36 (63.2)	22 (55.0)	21 (31.8)	19 (73.1)	17 (41.5)	6 (12.2)	8 (16.0)	6 (12.2)	8 (16.0)	18 (62.1)	11 (68.8)
	Lonely		32 (53.3)	50 (89.3)	17 (56.7)	14 (45.2)	21 (36.8)	18 (45.0)	45 (68.2)	7 (26.9)	24 (58.5)	43 (87.8)	42 (84.0)	43 (87.8)	42 (84.0)	11 (37.9)	5 (31.3)
Depression	Not depressed		26 (43.3)	29 (51.8)	8 (26.7)	7 (22.6)	7 (12.3)	8 (20.0)	26 (39.4)	2 (7.7)	13 (31.7)	21 (42.9)	24 (48.0)	25 (51.0)	30 (60.0)	6 (20.7)	3 (18.8)
	Depressed		33 (55.0)	27 (48.2)	22 (73.3)	24 (77.4)	50 (87.7)	31 (77.5)	40 (60.6)	23 (88.5)	28 (68.3)	28 (57.1)	26 (52.0)	24 (49.0)	20 (40.0)	23 (79.3)	13 (81.3)

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Appendix I (continued)

Variable	Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)
Self-rated health	Poor	1 (1.7)	3 (5.4)	2 (6.7)	4 (12.9)	12 (21.1)	2 (5.0)	3 (4.5)	10 (38.5)	4 (9.8)	1 (2.0)	1 (2.0)	2 (4.1)	0 (0)	2 (6.9)	0 (0)
	Fair	12 (20.0)	4 (7.1)	3 (10.0)	8 (25.8)	12 (21.1)	15 (37.5)	14 (21.2)	7 (26.9)	6 (14.6)	2 (4.1)	5 (10.0)	8 (16.3)	5 (10.0)	4 (13.8)	9 (56.3)
	Average	10 (16.7)	8 (14.3)	10 (33.3)	3 (9.7)	16 (28.1)	11 (27.5)	12 (18.2)	5 (19.2)	7 (17.1)	10 (20.4)	6 (12.0)	7 (14.3)	12 (24.0)	8 (27.6)	1 (6.3)
	Good	27 (45.0)	28 (50.0)	11 (36.7)	14 (45.2)	17 (29.8)	7 (17.5)	30 (45.5)	3 (11.5)	17 (41.5)	28 (57.1)	26 (52.0)	22 (44.9)	25 (50.0)	11 (37.9)	3 (18.8)
	Excellent	10 (16.7)	13 (23.2)	4 (13.3)	1 (3.2)	0 (0)	5 (12.5)	7 (10.6)	1 (3.8)	7 (17.1)	8 (16.3)	12 (24.0)	10 (20.4)	8 (16.0)	4 (13.8)	3 (18.8)
Comparison with peer group health	Less healthy	3 (5.0)	3 (5.4)	4 (13.3)	5 (16.1)	14 (24.6)	6 (15.0)	6 (9.1)	8 (30.8)	4 (9.8)	3 (6.1)	0 (0)	7 (14.3)	0 (0)	4 (13.8)	1 (6.3)
	About as healthy	29 (48.3)	19 (33.9)	13 (43.3)	14 (45.2)	33 (57.9)	20 (50.0)	30 (45.5)	11 (42.3)	16 (39.0)	14 (28.6)	19 (38.0)	22 (44.9)	22 (44.0)	14 (48.3)	8 (50.0)
	More healthy	27 (45.0)	32 (57.1)	13 (43.3)	10 (32.3)	8 (14.0)	14 (35.0)	27 (40.9)	5 (19.2)	20 (48.8)	31 (63.3)	31 (62.0)	19 (38.8)	28 (56.0)	11 (37.9)	7 (43.8)
Smoking	No	46 (76.7)	39 (69.6)	25 (83.3)	23 (74.2)	41 (71.9)	25 (62.5)	50 (75.8)	17 (65.4)	36 (87.8)	40 (81.6)	41 (82.0)	41 (83.7)	40 (80.0)	22 (75.9)	11 (68.8)
	Yes	13 (21.7)	17 (30.4)	5 (16.7)	8 (25.8)	16 (28.1)	14 (35.0)	13 (19.7)	7 (26.9)	5 (12.2)	9 (18.4)	7 (14.0)	7 (14.3)	9 (18.0)	5 (17.2)	5 (31.3)
Arthritis or rheumatism	No	19 (31.7)	31 (55.4)	14 (46.7)	12 (38.7)	20 (35.1)	14 (35.0)	25 (37.9)	6 (23.1)	18 (43.9)	22 (44.9)	17 (34.0)	23 (46.9)	20 (40.0)	11 (37.9)	8 (50.0)
	Yes	41 (68.3)	25 (44.6)	16 (53.3)	19 (61.3)	37 (64.9)	26 (65.0)	41 (62.1)	20 (76.9)	23 (56.1)	27 (55.1)	33 (66.0)	26 (53.1)	30 (60.0)	18 (62.1)	8 (50.0)
Heart problem	No	51 (85.0)	47 (83.9)	21 (90.0)	24 (77.4)	43 (75.4)	34 (85.0)	52 (78.8)	20 (76.9)	34 (82.9)	41 (83.7)	40 (80.0)	42 (85.7)	40 (80.0)	20 (69.0)	10 (62.5)
	Yes	9 (15.0)	9 (16.1)	9 (30.0)	7 (22.6)	14 (24.6)	6 (15.0)	14 (21.2)	6 (23.1)	7 (17.1)	8 (16.3)	10 (20.0)	7 (14.3)	10 (20.0)	9 (31.0)	6 (37.5)
Stomach	No	38 (63.3)	42 (75.0)	20 (66.7)	21 (67.7)	35 (61.4)	28 (70.0)	49 (74.2)	17 (65.4)	28 (68.3)	39 (79.6)	37 (74.0)	38 (77.6)	39 (78.0)	20 (69.0)	10 (62.5)
	Yes	22 (36.7)	14 (25.0)	10 (33.3)	10 (32.3)	22 (38.6)	12 (30.0)	17 (25.8)	9 (34.6)	13 (31.7)	10 (20.4)	13 (26.0)	11 (22.4)	11 (22.0)	9 (31.0)	6 (37.5)
Giddiness	No	40 (66.7)	41 (73.2)	21 (70.0)	19 (61.3)	27 (47.4)	18 (45.0)	39 (59.1)	9 (34.6)	24 (58.5)	30 (61.2)	33 (66.0)	30 (61.1)	40 (80.0)	18 (62.1)	6 (37.5)
	Yes	20 (33.3)	15 (26.8)	9 (30.0)	12 (38.7)	30 (52.6)	22 (55.0)	27 (40.9)	17 (65.4)	17 (41.5)	19 (38.8)	17 (34.0)	19 (38.8)	10 (20.0)	11 (37.9)	10 (62.5)

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Appendix I (continued)

Variable		Cluster 1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)
High blood pressure	No	50 (83.3)	52 (92.9)	26 (86.7)	22 (71.0)	38 (66.7)	27 (67.5)	53 (80.3)	15 (57.7)	33 (80.5)	38 (77.6)	38 (76.0)	41 (83.7)	40 (80.0)	22 (75.9)	11 (68.8)
	Yes	10 (16.7)	4 (7.1)	4 (13.3)	9 (29.0)	19 (33.3)	13 (32.5)	13 (19.7)	11 (42.3)	8 (19.5)	11 (22.4)	12 (24.0)	8 (16.3)	10 (20.0)	7 (24.1)	5 (31.3)
Urinary incontinence	No	44 (73.3)	44 (78.6)	25 (83.3)	22 (71.0)	37 (64.9)	32 (80.0)	54 (81.8)	14 (53.8)	31 (75.6)	30 (61.2)	43 (86.0)	40 (81.6)	42 (84.0)	25 (86.2)	12 (75.0)
	Yes	16 (26.7)	12 (21.4)	4 (13.3)	9 (29.0)	20 (35.1)	7 (17.5)	12 (18.2)	12 (46.2)	9 (22.0)	19 (38.8)	6 (12.0)	9 (18.4)	8 (16.0)	4 (13.8)	4 (25.0)
Newspaper or journal	No	1 (1.7)	4 (7.1)	4 (13.3)	3 (9.7)	14 (24.6)	7 (17.5)	11 (16.7)	6 (23.1)	5 (12.2)	1 (2.0)	5 (10.0)	4 (8.2)	3 (6.0)	3 (10.3)	2 (12.5)
	Yes	59 (98.3)	52 (92.9)	26 (86.7)	28 (90.3)	43 (75.4)	33 (82.5)	55 (83.3)	20 (76.9)	36 (87.8)	48 (98.0)	45 (90.0)	45 (91.8)	47 (94.0)	26 (89.7)	14 (87.5)
Religious group	No	44 (73.3)	39 (69.6)	23 (76.7)	23 (74.2)	47 (82.5)	29 (72.5)	52 (78.8)	21 (80.8)	27 (65.9)	33 (67.3)	28 (56.0)	37 (75.5)	37 (74.0)	22 (75.9)	13 (81.3)
	Yes	16 (26.7)	17 (30.4)	7 (23.3)	8 (25.8)	10 (17.5)	11 (27.5)	14 (21.2)	5 (19.2)	14 (34.1)	16 (32.7)	22 (44.0)	12 (24.5)	13 (26.0)	7 (24.1)	3 (18.8)
Club or organization	No	32 (53.3)	28 (50.0)	24 (80.0)	23 (74.2)	44 (77.2)	25 (62.5)	49 (74.2)	19 (73.1)	25 (61.0)	26 (53.1)	28 (56.0)	30 (61.2)	32 (64.0)	17 (58.6)	12 (75.0)
	Yes	28 (46.7)	28 (50.0)	6 (20.0)	8 (25.8)	13 (22.8)	15 (37.5)	17 (25.8)	7 (26.9)	16 (39.0)	23 (46.9)	22 (44.0)	19 (38.8)	18 (36.0)	12 (41.4)	4 (25.0)
Pet	No	45 (75.0)	44 (78.6)	21 (70.0)	27 (87.1)	41 (71.9)	31 (77.5)	50 (75.8)	20 (76.9)	30 (73.2)	39 (79.6)	39 (78.0)	38 (77.6)	34 (68.0)	22 (75.9)	15 (93.8)
	Yes	15 (25.0)	12 (21.4)	9 (30.0)	4 (12.9)	16 (28.1)	9 (22.5)	16 (24.2)	6 (23.1)	11 (26.8)	10 (20.4)	11 (22.0)	11 (22.4)	16 (32.0)	7 (24.1)	1 (6.3)
TV or radio	No	5 (8.3)	4 (7.1)	0 (0)	3 (9.7)	4 (7.0)	0 (0)	8 (12.1)	1 (3.8)	6 (14.6)	2 (4.1)	3 (6.0)	4 (8.2)	2 (4.0)	1 (3.4)	0 (0)
	Yes	54 (90.0)	52 (92.9)	30 (100)	28 (90.3)	53 (93.0)	40 (100)	58 (87.9)	25 (96.2)	35 (85.4)	47 (95.9)	47 (94.0)	45 (91.8)	48 (96.0)	28 (96.6)	16 (100)
Friend	No	7 (11.7)	8 (14.3)	10 (33.3)	10 (32.3)	21 (36.8)	8 (20.0)	10 (15.2)	8 (30.8)	13 (31.7)	5 (10.2)	7 (14.0)	10 (20.4)	8 (16.0)	6 (20.7)	4 (25.0)
	Yes	53 (88.3)	48 (85.7)	20 (66.7)	21 (67.7)	36 (63.2)	32 (80.0)	56 (84.8)	18 (69.2)	28 (68.3)	44 (89.8)	43 (86.0)	39 (79.6)	42 (84.0)	23 (79.3)	12 (75.0)
Walking problem	No difficult	43 (71.7)	44 (78.6)	24 (80.0)	19 (61.3)	27 (47.4)	27 (67.5)	44 (66.7)	14 (53.8)	30 (73.2)	39 (79.6)	35 (70.0)	40 (81.6)	39 (78.0)	17 (58.6)	13 (81.3)
	Yes, difficult	16 (26.7)	12 (21.4)	6 (20.0)	11 (35.5)	30 (52.6)	11 (27.5)	20 (30.3)	11 (42.3)	11 (26.8)	10 (20.4)	15 (30.0)	9 (18.4)	11 (22.0)	11 (37.9)	3 (18.8)
Walking aid	No	45 (75.0)	42 (75.0)	21 (70.0)	17 (54.8)	39 (68.4)	27 (67.5)	41 (62.1)	13 (50.0)	30 (73.2)	42 (85.7)	38 (76.0)	40 (81.6)	39 (78.0)	22 (75.9)	10 (62.5)
	Yes	13 (21.7)	10 (17.9)	6 (20.0)	9 (29.0)	14 (24.6)	11 (27.5)	15 (22.7)	10 (38.5)	6 (14.6)	6 (12.2)	5 (10.0)	8 (16.3)	5 (10.0)	4 (13.8)	4 (25.0)

Appendix K: The 20 clusters from cluster analysis in the SHLSET study in 1989.

Cluster	1 (n=135)			2 (n=85)			3 (n=64)			4 (n=41)			5 (n=43)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.	134 (99.3)	1 (0.7)	0 (0)	82 (96.5)	3 (3.5)	0 (0)	39 (60.9)	25 (39.1)	0 (0)	1 (2.4)	40 (97.6)	0 (0)	43 (100)	0 (0)	0 (0)
2. As I look back on my life, I am fairly well satisfied.	134 (99.3)	1 (0.7)	0 (0)	83 (97.6)	2 (2.4)	0 (0)	61 (95.3)	3 (4.7)	0 (0)	40 (97.6)	1 (2.4)	0 (0)	40 (93.0)	3 (7.0)	0 (0)
3. My life could be happier than it is now.	131 (97.0)	4 (3.0)	0 (0)	0 (0)	85 (100)	0 (0)	57 (89.1)	7 (10.9)	0 (0)	26 (63.4)	15 (36.6)	0 (0)	18 (41.9)	25 (58.1)	0 (0)
4. I would not change my past even if I could.	105 (77.8)	30 (22.2)	0 (0)	79 (92.9)	6 (7.1)	0 (0)	38 (59.4)	26 (40.6)	0 (0)	22 (53.7)	19 (46.3)	0 (0)	0 (0)	43 (100)	0 (0)
5. These are the best years of my life.	126 (93.3)	9 (6.7)	0 (0)	55 (64.7)	30 (35.3)	0 (0)	8 (12.5)	56 (87.5)	0 (0)	15 (36.6)	26 (63.4)	0 (0)	41 (95.3)	2 (4.7)	0 (0)
6. Most of the things I do are boring or monotonous.	0 (0)	135 (100)	0 (0)	23 (27.1)	62 (72.9)	0 (0)	45 (70.3)	19 (29.7)	0 (0)	1 (2.4)	40 (97.6)	0 (0)	0 (0)	43 (100)	0 (0)
7. I have always felt interested in the things I have done.	132 (97.8)	3 (2.2)	0 (0)	80 (94.1)	5 (5.9)	0 (0)	50 (78.1)	14 (21.9)	0 (0)	23 (56.1)	18 (43.9)	0 (0)	37 (86.0)	6 (14.0)	0 (0)
8. I expect some interesting and pleasant things to happen to me in the future.	135 (100)	0 (0)	0 (0)	75 (88.2)	10 (11.8)	0 (0)	47 (73.4)	17 (26.6)	0 (0)	30 (73.2)	11 (26.9)	0 (0)	0 (0)	43 (100)	0 (0)
9. I feel old and somewhat tired.	0 (0)	135 (100)	0 (0)	76 (89.4)	9 (10.6)	0 (0)	61 (95.3)	3 (4.7)	0 (0)	40 (97.6)	1 (2.4)	0 (0)	40 (93.0)	3 (7.0)	0 (0)
10. I've become pretty much what I expected out of life.	115 (85.2)	20 (14.8)	0 (0)	85 (100)	0 (0)	0 (0)	55 (85.9)	9 (14.1)	0 (0)	1 (2.4)	40 (97.6)	0 (0)	32 (74.4)	11 (25.6)	0 (0)
Life satisfaction standardized mean score		85.56			81.76			51.09			45.85			61.40	

(Continued overleaf)

Appendix J (continued)

Cluster	6 (n=81)			7 (n=54)			8 (n=64)			9 (n=29)			10 (n=98)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.	3 (3.7)	78 (96.3)	0 (0)	51 (94.4)	3 (5.6)	0 (0)	14 (21.9)	50 (78.1)	0 (0)	29 (100)	0 (0)	0 (0)	32 (32.7)	65 (66.3)	1 (1.0)
2. As I look back on my life, I am fairly well satisfied.	11 (13.6)	70 (86.4)	0 (0)	54 (100)	0 (0)	0 (0)	1 (1.6)	63 (98.4)	0 (0)	29 (100)	0 (0)	0 (0)	9 (9.2)	88 (89.8)	1 (1.0)
3. My life could be happier than it is now.	37 (45.7)	44 (54.3)	0 (0)	50 (92.6)	4 (7.4)	0 (0)	59 (92.2)	5 (7.8)	0 (0)	15 (51.7)	14 (48.3)	0 (0)	8 (8.2)	89 (90.8)	1 (1.0)
4. I would not change my past even if I could.	1 (1.2)	80 (98.8)	0 (0)	29 (53.7)	25 (46.3)	0 (0)	31 (48.4)	33 (51.6)	0 (0)	24 (82.8)	5 (17.2)	0 (0)	12 (12.2)	85 (86.7)	1 (1.0)
5. These are the best years of my life.	36 (44.4)	45 (55.6)	0 (0)	47 (87.0)	7 (13.0)	0 (0)	35 (54.7)	29 (45.3)	0 (0)	28 (96.6)	1 (3.4)	0 (0)	10 (10.2)	87 (88.8)	1 (1.0)
6. Most of the things I do are boring or monotonous.	9 (11.1)	72 (88.9)	0 (0)	54 (100)	0 (0)	0 (0)	34 (53.1)	30 (46.9)	0 (0)	5 (17.2)	24 (82.8)	0 (0)	81 (82.7)	16 (16.3)	1 (1.0)
7. I have always felt interested in the things I have done.	63 (77.8)	18 (22.2)	0 (0)	54 (100)	0 (0)	0 (0)	57 (89.1)	6 (9.4)	1 (1.6)	0 (0)	29 (100)	0 (0)	32 (32.7)	65 (66.3)	1 (1.0)
8. I expect some interesting and pleasant things to happen to me in the future.	72 (88.9)	9 (11.1)	0 (0)	38 (70.4)	16 (29.6)	0 (0)	63 (98.4)	1 (1.6)	0 (0)	27 (93.1)	2 (6.9)	0 (0)	48 (49.0)	49 (50.0)	1 (1.0)
9. I feel old and somewhat tired.	33 (40.7)	48 (59.3)	0 (0)	10 (18.5)	44 (81.5)	0 (0)	53 (82.8)	11 (17.2)	0 (0)	12 (41.4)	17 (58.6)	0 (0)	91 (92.9)	6 (6.1)	1 (1.0)
10. I've become pretty much what I expected out of life.	16 (19.8)	65 (80.2)	0 (0)	47 (87.0)	7 (13.0)	0 (0)	28 (43.8)	36 (56.3)	0 (0)	26 (89.7)	3 (10.3)	0 (0)	16 (16.3)	81 (82.7)	1 (1.0)
Life satisfaction standardized mean score		45.19			68.15			43.05			75.17			28.06	

(Continued overleaf)

Appendix J (continued)

Item	Cluster	11 (n=55)			12 (n=82)			13 (n=55)			14 (n=91)			15 (n=65)		
		Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.		0 (0)	55 (100)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	74 (81.3)	17 (18.7)	0 (0)	33 (50.8)	32 (49.2)	0 (0)
2. As I look back on my life, I am fairly well satisfied.		0 (0)	55 (100)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	87 (95.6)	4 (4.4)	0 (0)	65 (100)	0 (0)	0 (0)
3. My life could be happier than it is now.		55 (100)	0 (0)	0 (0)	82 (100)	0 (0)	0 (0)	0 (0)	55 (100)	0 (0)	34 (37.4)	57 (62.6)	0 (0)	31 (47.7)	33 (50.8)	1 (1.5)
4. I would not change my past even if I could.		15 (27.3)	40 (72.7)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	90 (98.9)	1 (1.1)	0 (0)	8 (12.3)	57 (87.7)	0 (0)
5. These are the best years of my life.		4 (7.3)	51 (92.7)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	80 (87.9)	11 (12.1)	0 (0)	65 (100)	0 (0)	0 (0)
6. Most of the things I do are boring or monotonous.		29 (52.7)	26 (47.3)	0 (0)	82 (100)	0 (0)	0 (0)	0 (0)	55 (100)	0 (0)	14 (15.4)	77 (84.6)	0 (0)	0 (0)	65 (100)	0 (0)
7. I have always felt interested in the things I have done.		9 (16.4)	46 (83.6)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	89 (97.8)	2 (2.2)	0 (0)	62 (95.4)	3 (4.6)	0 (0)
8. I expect some interesting and pleasant things to happen to me in the future.		18 (32.7)	37 (67.3)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	5 (5.5)	86 (94.5)	0 (0)	54 (83.1)	11 (16.9)	0 (0)
9. I feel old and somewhat tired.		53 (96.4)	2 (3.6)	0 (0)	82 (100)	0 (0)	0 (0)	0 (0)	55 (100)	0 (0)	56 (61.5)	35 (38.5)	0 (0)	64 (98.5)	1 (1.5)	0 (0)
10. I've become pretty much what I expected out of life.		11 (20.0)	44 (80.0)	0 (0)	82 (100)	0 (0)	0 (0)	55 (100)	0 (0)	0 (0)	91 (100)	0 (0)	0 (0)	65 (100)	0 (0)	0 (0)
Life satisfaction standardized mean score			15.45			70.00			100.00			75.27			69.46	

(Continued overleaf)

Appendix J (continued)

Item / Cluster	16 (n=33)			17 (n=57)			18 (n=45)			19 (n=79)			20 (n=64)		
	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.	14 (42.4)	19 (57.6)	0 (0)	39 (68.4)	17 (29.8)	1 (1.8)	41 (91.1)	4 (8.9)	0 (0)	6 (7.6)	73 (92.4)	0(0)	64 (100)	0 (0)	0 (0)
2. As I look back on my life, I am fairly well satisfied.	28 (84.8)	5 (15.2)	0 (0)	56 (98.2)	1 (1.8)	0 (0)	42 (93.3)	3 (6.7)	0 (0)	14 (17.7)	64 (81.0)	1 (1.3)	64 (100)	0 (0)	0 (0)
3. My life could be happier than it is now.	18 (54.5)	15 (45.5)	0 (0)	4 (7.0)	53 (93.0)	0 (0)	27 (60.0)	18 (40.0)	0 (0)	11 (13.9)	68 (86.1)	0 (0)	64 (100)	0 (0)	0 (0)
4. I would not change my past even if I could.	16 (48.5)	17 (51.5)	0 (0)	9 (15.8)	48 (84.2)	0 (0)	33 (73.3)	12 (26.7)	0 (0)	21 (26.6)	58 (73.4)	0 (0)	64 (100)	0 (0)	0 (0)
5. These are the best years of my life.	32 (97.0)	1 (3.0)	0 (0)	51 (89.5)	5 (8.8)	1 (1.8)	42 (93.3)	3 (6.7)	0 (0)	7 (8.9)	72 (91.1)	0 (0)	64 (100)	0 (0)	0 (0)
6. Most of the things I do are boring or monotonous.	11 (33.3)	22 (66.7)	0 (0)	0 (0)	57 (100)	0 (0)	14 (31.1)	31 (68.9)	0 (0)	14 (17.7)	65 (82.3)	0 (0)	0 (0)	64 (100)	0 (0)
7. I have always felt interested in the things I have done.	2 (6.1)	31 (93.9)	0 (0)	53 (93.0)	4 (7.0)	0 (0)	43 (95.6)	2 (4.4)	0 (0)	11 (13.9)	68 (86.1)	0 (0)	64 (100)	0 (0)	0 (0)
8. I expect some interesting and pleasant things to happen to me in the future.	0 (0)	33 (100)	0 (0)	33 (57.9)	23 (40.4)	1 (1.8)	31 (68.9)	14 (31.1)	0 (0)	7 (8.9)	72 (91.1)	0 (0)	64 (100)	0 (0)	0 (0)
9. I feel old and somewhat tired.	33 (100)	0 (0)	0 (0)	0 (0)	57 (100)	0 (0)	39 (86.7)	6 (13.3)	0 (0)	42 (53.2)	37 (46.8)	0 (0)	64 (100)	0 (0)	0 (0)
10. I've become pretty much what I expected out of life.	14 (42.4)	19 (57.6)	0 (0)	35 (61.4)	22 (38.6)	0 (0)	0 (0)	45 (100)	0 (0)	12 (15.2)	67 (84.8)	0 (0)	64 (100)	0 (0)	0 (0)
Life satisfaction standardized mean score		43.33			77.98			63.78			31.46			80.00	

Appendix L: The 20 clusters profile in the SHLSET study in 1989.

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)	16 n (%)	17 n (%)	18 n (%)	19 n (%)	20 n (%)
Age	<80		112 (83.0)	71 (83.5)	51 (79.7)	35 (85.4)	28 (65.1)	70 (86.4)	44 (81.5)	52 (81.3)	23 (79.3)	75 (76.5)	39 (70.9)	63 (76.8)	48 (87.3)	66 (72.5)	56 (86.2)	23 (69.7)	44 (77.2)	38 (84.4)	56 (70.9)	49 (76.6)
	>80		23 (17.0)	14 (16.5)	13 (20.3)	6 (14.6)	15 (34.9)	11 (13.6)	10 (18.5)	12 (18.8)	6 (20.7)	23 (23.5)	16 (29.1)	19 (23.2)	7 (12.7)	25 (27.5)	9 (13.8)	10 (30.3)	13 (22.8)	7 (15.6)	23 (29.1)	15 (23.4)
Gender	Male		89 (65.9)	45 (52.9)	36 (56.3)	23 (56.1)	28 (65.1)	41 (50.6)	33 (61.1)	31 (48.4)	17 (58.6)	46 (46.9)	25 (45.5)	46 (56.1)	36 (65.5)	52 (57.1)	26 (40.0)	16 (48.5)	32 (56.1)	27 (60.0)	25 (31.6)	38 (59.4)
	Female		46 (34.1)	40 (47.1)	28 (43.8)	18 (43.9)	15 (34.9)	40 (49.4)	21 (38.9)	33 (51.6)	12 (41.4)	52 (53.1)	30 (54.5)	36 (43.9)	19 (34.5)	39 (42.9)	39 (60.0)	17 (51.5)	25 (43.9)	18 (40.0)	54 (68.4)	26 (40.6)
Marital status	Married		85 (63.0)	52 (61.2)	35 (54.7)	23 (56.1)	20 (46.5)	31 (38.3)	26 (48.1)	32 (50.0)	14 (48.3)	43 (43.9)	26 (47.3)	45 (54.9)	32 (58.2)	49 (53.8)	35 (53.8)	12 (36.4)	36 (63.2)	26 (57.8)	27 (34.2)	44 (68.8)
	Single		4 (3.0)	2 (2.4)	2 (3.1)	1 (2.4)	0 (0)	5 (6.2)	2 (3.7)	1 (1.6)	0 (0)	7 (7.1)	4 (7.3)	2 (2.4)	0 (0)	1 (1.1)	1 (1.5)	2 (6.1)	0 (0)	2 (4.4)	2 (2.5)	1 (1.6)
	Widowed		42 (31.1)	28 (32.9)	27 (42.2)	15 (36.6)	22 (51.2)	35 (43.2)	25 (46.3)	27 (42.2)	15 (51.7)	43 (43.9)	22 (40.0)	34 (41.5)	23 (41.8)	39 (42.9)	29 (44.6)	18 (54.5)	20 (35.1)	15 (33.3)	45 (57.0)	19 (29.7)
	Separated/ Divorced		3 (2.2)	3 (3.5)	0 (0)	2 (4.9)	1 (2.3)	9 (11.1)	1 (1.9)	4 (6.3)	0 (0)	5 (5.1)	3 (5.5)	1 (1.2)	0 (0)	2 (2.2)	0 (0)	1 (3.0)	1 (1.8)	2 (4.4)	5 (6.3)	0 (0)
Living status	Living alone		0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	1 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Living with someone		135 (100)	85 (100)	64 (100)	41 (100)	43 (100)	81 (100)	53 (98.1)	64 (100)	29 (100)	98 (100)	55 (100)	82 (100)	55 (100)	91 (100)	65 (100)	33 (100)	57 (100)	45 (100)	78 (98.7)	64 (100)
Socioeconomic class	Professional/ intermediate		16 (11.9)	15 (17.6)	13 (20.3)	3 (7.3)	6 (14.0)	7 (8.6)	4 (7.4)	6 (9.4)	5 (17.2)	3 (3.1)	2 (3.6)	8 (9.8)	16 (29.1)	9 (9.9)	4 (6.2)	1 (3.0)	8 (14.0)	5 (11.1)	3 (3.8)	9 (14.1)
	Skilled-non manual/skilled-manual		15 (11.1)	13 (15.3)	8 (12.5)	8 (19.5)	9 (20.9)	9 (11.1)	7 (13.0)	10 (15.6)	3 (10.3)	11 (11.2)	7 (12.7)	11 (13.4)	10 (18.2)	11 (12.1)	8 (12.3)	4 (12.1)	11 (19.3)	3 (6.7)	7 (8.9)	6 (9.4)
	Semiskilled/ unskilled/others		66 (48.9)	42 (49.4)	33 (51.6)	23 (56.1)	21 (48.8)	49 (60.5)	36 (66.7)	37 (57.8)	16 (55.2)	65 (66.3)	41 (74.5)	55 (67.1)	22 (40.0)	56 (61.5)	40 (61.5)	20 (60.6)	27 (47.4)	31 (68.9)	63 (79.7)	41 (64.1)
Satisfied with income	Dissatisfied		59 (43.7)	33 (38.8)	38 (59.4)	34 (82.9)	22 (51.2)	58 (71.6)	24 (44.4)	53 (82.8)	9 (31.0)	85 (86.7)	49 (89.1)	40 (48.8)	8 (14.5)	54 (59.3)	29 (44.6)	22 (66.7)	26 (45.6)	28 (62.2)	55 (69.6)	24 (37.5)
	Satisfied		76 (56.3)	52 (61.2)	26 (40.6)	7 (17.1)	21 (48.8)	23 (28.4)	30 (55.6)	11 (17.2)	20 (69.0)	12 (12.2)	6 (10.9)	42 (51.2)	47 (85.5)	37 (40.7)	36 (55.4)	11 (33.3)	31 (54.4)	16 (35.6)	23 (29.1)	40 (62.5)
Loneliness	No lonely		123 (91.1)	65 (76.5)	41 (64.1)	31 (75.6)	32 (74.4)	54 (66.7)	45 (83.3)	42 (65.6)	22 (75.9)	48 (49.0)	31 (56.4)	73 (89.0)	50 (90.9)	74 (81.3)	51 (78.5)	21 (63.6)	52 (91.2)	34 (75.6)	50 (63.3)	55 (85.9)
	Lonely		12 (8.9)	20 (23.5)	23 (35.9)	10 (24.4)	11 (25.6)	27 (33.3)	9 (16.7)	22 (34.4)	7 (24.1)	50 (51.0)	24 (43.6)	9 (11.0)	5 (9.1)	17 (18.7)	14 (21.5)	12 (36.4)	5 (8.8)	11 (24.4)	29 (36.7)	9 (14.1)
Depression	Not depressed		58 (43.0)	45 (52.9)	29 (45.3)	9 (22.0)	12 (27.9)	27 (33.3)	28 (51.9)	23 (35.9)	9 (31.0)	21 (21.4)	9 (16.4)	67 (81.7)	22 (40.0)	39 (42.9)	16 (24.6)	8 (24.2)	30 (52.6)	15 (33.3)	29 (36.7)	31 (48.4)
	Depressed		74 (54.8)	39 (45.9)	35 (54.7)	32 (78.0)	30 (69.8)	53 (65.4)	24 (44.4)	41 (64.1)	19 (65.5)	76 (77.6)	44 (80.0)	15 (18.3)	32 (58.2)	51 (56.0)	48 (73.8)	25 (75.8)	26 (45.6)	30 (66.7)	49 (62.0)	33 (51.6)

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Appendix K (continued)

Variable	Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)	16 n (%)	17 n (%)	18 n (%)	19 n (%)	20 n (%)
Self-rated health	Poor	2 (1.5)	0 (0)	6 (9.4)	4 (9.8)	3 (7.0)	2 (2.5)	0 (0)	4 (6.3)	0 (0)	15 (15.3)	7 (12.7)	3 (3.7)	1 (1.8)	0 (0)	2 (3.1)	2 (6.1)	0 (0)	0 (0)	9 (11.4)	0 (0)
	Fair	10 (7.4)	14 (16.5)	22 (34.4)	7 (17.1)	9 (20.9)	18 (22.2)	6 (11.1)	18 (28.1)	5 (17.2)	33 (33.7)	25 (45.5)	7 (8.5)	2 (3.6)	13 (14.3)	15 (23.1)	6 (18.2)	3 (5.3)	12 (26.7)	28 (35.4)	11 (17.2)
	Average	49 (36.3)	42 (49.4)	27 (42.2)	19 (46.3)	23 (53.5)	37 (45.7)	17 (31.5)	28 (43.8)	8 (27.6)	35 (35.7)	17 (30.9)	35 (42.7)	18 (32.7)	45 (49.5)	25 (38.5)	13 (39.4)	28 (49.1)	18 (40.0)	26 (32.9)	28 (43.8)
	Good	36 (26.7)	13 (15.3)	6 (9.4)	9 (22.0)	4 (9.3)	13 (16.0)	20 (37.0)	9 (14.1)	7 (24.1)	11 (11.2)	3 (5.5)	20 (24.4)	15 (27.3)	21 (23.1)	17 (26.2)	10 (30.3)	20 (35.1)	9 (20.0)	13 (16.5)	17 (26.8)
	Excellent	38 (28.1)	16 (18.8)	3 (4.7)	2 (4.9)	4 (9.3)	11 (13.6)	11 (20.4)	5 (7.8)	9 (31.0)	4 (4.1)	3 (5.5)	17 (20.7)	19 (34.5)	12 (13.2)	6 (9.2)	2 (6.1)	6 (10.5)	6 (13.3)	3 (3.8)	8 (12.5)
Comparison with peer group health	Less healthy	10 (7.4)	7 (8.2)	25 (39.1)	12 (29.3)	11 (25.6)	17 (21.0)	5 (9.3)	20 (31.3)	4 (13.8)	43 (43.9)	31 (56.4)	9 (11.0)	7 (12.7)	11 (12.1)	14 (21.5)	7 (21.2)	3 (5.3)	10 (22.2)	26 (32.9)	8 (12.5)
	About as healthy	58 (43.0)	50 (58.8)	29 (45.3)	19 (46.3)	20 (46.5)	42 (51.9)	30 (55.6)	34 (53.1)	15 (51.7)	45 (45.9)	13 (23.6)	46 (56.1)	20 (36.4)	38 (41.8)	32 (49.2)	16 (48.5)	34 (59.6)	20 (44.4)	40 (50.6)	38 (59.4)
	More healthy	67 (49.6)	28 (32.9)	10 (15.6)	10 (24.4)	12 (27.9)	22 (27.2)	19 (35.2)	10 (15.6)	10 (34.5)	10 (10.2)	11 (20.0)	27 (32.9)	28 (50.9)	42 (46.2)	19 (29.2)	10 (30.3)	20 (35.1)	15 (33.3)	13 (16.5)	18 (28.1)
Smoking	No	87 (64.4)	57 (67.1)	46 (71.9)	31 (75.6)	24 (55.8)	56 (69.1)	39 (72.2)	47 (73.4)	23 (79.3)	68 (69.4)	42 (76.4)	58 (70.7)	39 (70.9)	64 (70.3)	51 (78.5)	24 (72.7)	38 (66.7)	32 (71.1)	59 (74.7)	40 (62.5)
	Yes	48 (35.6)	28 (32.9)	18 (28.1)	9 (22.0)	19 (44.2)	25 (30.9)	15 (27.8)	17 (26.6)	6 (20.7)	30 (30.6)	13 (23.6)	24 (29.3)	16 (29.1)	27 (29.7)	14 (21.5)	9 (27.3)	19 (33.3)	13 (28.9)	20 (25.3)	24 (37.5)
Arthritis or rheumatism	No	102 (75.6)	64 (75.3)	42 (65.6)	31 (75.6)	20 (46.5)	54 (66.7)	45 (83.3)	43 (67.2)	21 (72.4)	63 (64.3)	33 (60.0)	63 (76.8)	43 (78.2)	69 (75.8)	40 (61.5)	24 (72.7)	42 (73.7)	29 (64.4)	49 (62.0)	44 (68.8)
	Yes	33 (24.4)	21 (24.7)	22 (34.4)	10 (24.4)	23 (53.5)	26 (32.1)	9 (16.7)	21 (32.8)	8 (27.6)	35 (35.7)	22 (40.0)	19 (23.2)	12 (21.8)	22 (24.2)	25 (38.5)	9 (27.3)	15 (26.3)	16 (35.6)	30 (38.0)	20 (31.3)
Heart problem	No	116 (85.9)	64 (75.3)	45 (70.3)	33 (80.5)	34 (79.1)	63 (77.8)	46 (85.2)	53 (82.8)	26 (89.7)	73 (74.5)	38 (69.1)	60 (73.2)	46 (83.6)	71 (78.0)	46 (70.8)	27 (81.8)	46 (80.7)	36 (80.0)	56 (70.9)	51 (79.7)
	Yes	18 (13.3)	21 (24.7)	18 (29.7)	8 (19.5)	9 (20.9)	18 (22.2)	8 (14.8)	11 (17.2)	2 (6.9)	25 (25.5)	17 (30.9)	22 (26.8)	8 (14.5)	20 (22.0)	18 (27.7)	6 (18.2)	11 (19.3)	9 (20.0)	23 (29.1)	13 (20.3)
Stomach	No	106 (78.5)	63 (74.1)	43 (67.2)	31 (75.6)	31 (72.1)	61 (75.6)	47 (87.0)	46 (71.9)	27 (93.1)	77 (78.6)	38 (69.1)	72 (87.8)	48 (87.3)	72 (79.1)	50 (76.9)	22 (66.7)	44 (77.2)	32 (71.1)	54 (68.4)	54 (84.4)
	Yes	28 (20.7)	22 (25.9)	21 (32.8)	10 (24.4)	12 (27.9)	20 (24.7)	7 (13.0)	18 (28.1)	2 (6.9)	20 (20.4)	17 (30.9)	10 (12.2)	7 (12.7)	18 (19.8)	15 (23.1)	11 (33.3)	13 (22.8)	13 (28.9)	25 (31.6)	9 (14.1)
Giddiness	No	131 (97.0)	82 (96.5)	59 (92.2)	40 (97.6)	39 (90.7)	79 (97.5)	51 (94.4)	59 (92.2)	29 (100)	91 (92.9)	50 (90.9)	80 (97.6)	55 (100)	85 (93.4)	63 (96.9)	31 (93.9)	54 (94.7)	43 (95.6)	71 (89.9)	61 (95.3)
	Yes	4 (3.0)	3 (3.5)	4 (6.3)	1 (2.4)	2 (4.7)	2 (2.5)	1 (1.9)	4 (6.3)	0 (0)	6 (6.1)	3 (5.5)	2 (2.4)	0 (0)	4 (4.4)	2 (3.1)	1 (3.0)	3 (5.3)	1 (2.2)	7 (8.9)	3 (4.7)
High blood pressure	No	104 (77.0)	60 (70.6)	46 (71.9)	30 (73.2)	32 (74.4)	62 (76.5)	39 (72.2)	47 (73.4)	16 (55.2)	77 (78.6)	40 (72.7)	62 (75.6)	37 (67.3)	69 (75.8)	45 (69.2)	28 (84.8)	49 (86.0)	32 (71.1)	55 (69.6)	42 (65.6)
	Yes	31 (23.0)	23 (27.1)	18 (28.1)	11 (26.8)	10 (23.3)	19 (23.5)	15 (27.8)	17 (26.6)	13 (44.8)	21 (21.4)	15 (27.3)	20 (24.4)	18 (32.7)	22 (24.2)	19 (29.2)	5 (15.2)	8 (14.0)	13 (28.9)	23 (29.1)	22 (34.4)

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Appendix K (continued)

Variable	Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)	13 n (%)	14 n (%)	15 n (%)	16 n (%)	17 n (%)	18 n (%)	19 n (%)	20 n (%)
Urinary incontinence	No	124 (91.9)	79 (92.9)	52 (81.3)	38 (92.7)	33 (76.7)	75 (92.6)	49 (90.7)	54 (84.4)	24 (82.8)	78 (79.6)	43 (78.2)	76 (92.7)	52 (94.5)	78 (85.7)	55 (84.6)	28 (84.8)	53 (93.0)	41 (91.1)	65 (82.3)	57 (89.1)
	Yes	9 (6.7)	6 (7.1)	12 (18.8)	3 (7.3)	10 (23.3)	6 (7.4)	5 (9.3)	10 (15.6)	5 (17.2)	20 (20.4)	12 (21.8)	6 (7.3)	2 (3.6)	11 (12.1)	10 (15.4)	5 (15.2)	4 (7.0)	4 (8.9)	14 (17.7)	6 (9.4)
Walking problem	No difficult	116 (85.9)	66 (77.6)	42 (65.6)	25 (61.0)	28 (65.1)	61 (75.3)	44 (81.5)	42 (65.6)	21 (72.4)	47 (48.0)	31 (56.4)	58 (70.7)	47 (85.5)	74 (81.3)	52 (80.0)	26 (78.8)	50 (87.7)	33 (73.3)	50 (63.3)	52 (81.3)
	Yes, difficult	19 (14.1)	19 (22.4)	22 (34.4)	16 (39.0)	15 (34.9)	20 (24.7)	10 (18.5)	22 (34.4)	8 (27.6)	51 (52.0)	24 (43.6)	24 (29.3)	8 (14.5)	16 (17.6)	12 (18.5)	7 (21.2)	7 (12.3)	12 (26.7)	29 (36.7)	12 (18.8)
Walking aid	No	127 (94.1)	77 (90.6)	48 (75.0)	35 (85.4)	39 (90.7)	78 (96.3)	48 (88.9)	51 (79.7)	25 (86.2)	78 (79.6)	48 (87.3)	75 (91.5)	50 (90.9)	82 (90.1)	59 (90.8)	29 (87.9)	53 (93.0)	39 (86.7)	69 (87.3)	63 (98.4)
	Yes	7 (5.2)	8 (9.4)	16 (25.0)	6 (14.6)	4 (9.3)	3 (3.7)	6 (11.1)	13 (20.3)	4 (13.8)	20 (20.4)	7 (12.7)	7 (8.5)	5 (9.1)	9 (9.9)	6 (9.2)	4 (12.1)	4 (7.0)	6 (13.3)	10 (12.7)	1 (1.6)
Newspaper or journal	No	76 (56.3)	49 (57.6)	42 (65.6)	30 (73.2)	29 (67.4)	50 (61.7)	34 (63.0)	46 (71.9)	18 (62.1)	80 (81.6)	46 (83.6)	58 (70.7)	26 (47.3)	66 (72.5)	51 (78.5)	29 (87.9)	29 (50.9)	33 (73.3)	72 (91.1)	43 (67.2)
	Yes	58 (43.0)	36 (42.4)	22 (34.4)	11 (26.8)	14 (32.6)	31 (38.3)	20 (37.0)	18 (28.1)	10 (34.5)	18 (18.4)	9 (16.4)	24 (29.3)	29 (52.7)	25 (27.5)	14 (21.5)	4 (12.1)	28 (49.1)	12 (26.7)	7 (8.9)	21 (32.8)
Religious group	No	115 (85.2)	76 (89.4)	59 (92.2)	39 (95.1)	37 (86.0)	76 (93.8)	47 (87.0)	60 (93.8)	28 (96.6)	91 (92.9)	53 (96.4)	75 (91.5)	52 (94.5)	83 (91.2)	57 (87.7)	30 (90.9)	52 (91.2)	37 (82.2)	73 (92.4)	56 (87.5)
	Yes	20 (14.8)	9 (10.6)	5 (7.8)	2 (4.9)	6 (14.0)	5 (6.2)	7 (13.0)	4 (6.3)	1 (3.4)	7 (7.1)	2 (3.6)	7 (8.5)	3 (5.5)	8 (8.8)	8 (12.3)	3 (9.1)	5 (8.8)	8 (17.8)	6 (7.6)	8 (12.5)
Club or organization	No	125 (92.6)	76 (89.4)	61 (95.3)	41 (100)	40 (93.0)	69 (85.2)	51 (94.4)	62 (96.9)	26 (89.7)	91 (92.9)	54 (98.2)	76 (92.7)	47 (85.5)	86 (94.5)	62 (95.4)	33 (100)	53 (93.0)	42 (93.3)	77 (97.5)	60 (93.8)
	Yes	10 (7.4)	9 (10.6)	3 (4.7)	0 (0)	3 (7.0)	12 (14.8)	3 (5.6)	2 (3.1)	3 (10.3)	6 (6.1)	1 (1.8)	6 (7.3)	8 (14.5)	5 (5.5)	3 (4.6)	0 (0)	4 (7.0)	3 (6.7)	2 (2.5)	4 (6.3)
Pet	No	108 (80.0)	72 (84.7)	58 (90.6)	32 (78.0)	38 (88.4)	69 (85.2)	40 (74.1)	51 (79.7)	25 (86.2)	84 (85.7)	53 (96.4)	77 (93.9)	48 (87.3)	77 (84.6)	57 (87.7)	30 (90.9)	48 (84.2)	39 (86.7)	75 (94.9)	52 (81.3)
	Yes	26 (19.3)	13 (15.3)	6 (9.4)	9 (22.0)	5 (11.6)	11 (13.6)	14 (25.9)	12 (18.8)	3 (10.3)	14 (14.3)	2 (3.6)	4 (4.9)	7 (12.7)	14 (15.4)	8 (12.3)	3 (9.1)	9 (15.8)	6 (13.3)	4 (5.1)	12 (18.8)
TV or radio	No	6 (4.4)	3 (3.5)	7 (10.9)	3 (7.3)	4 (9.3)	2 (2.5)	1 (1.9)	4 (6.3)	1 (3.4)	14 (14.3)	7 (12.7)	9 (11.0)	1 (1.8)	3 (3.3)	3 (4.6)	7 (21.2)	1 (1.8)	0 (0)	18 (22.8)	2 (3.1)
	Yes	128 (94.8)	82 (96.5)	57 (89.1)	38 (92.7)	39 (90.7)	79 (97.5)	53 (98.1)	60 (93.8)	27 (93.1)	84 (85.7)	48 (87.3)	73 (89.0)	54 (98.2)	88 (96.7)	62 (95.4)	26 (78.8)	56 (98.2)	45 (100)	61 (77.2)	62 (96.9)
Friend	No	4 (3.0)	2 (2.4)	4 (6.3)	3 (7.3)	1 (2.3)	2 (2.5)	2 (2.5)	7 (10.9)	1 (3.4)	3 (3.1)	3 (5.5)	0 (0)	2 (3.6)	4 (4.4)	3 (4.6)	3 (9.1)	5 (8.8)	2 (4.4)	2 (2.5)	2 (3.1)
	Yes	108 (80.0)	69 (81.2)	44 (68.8)	24 (58.5)	36 (83.7)	54 (66.7)	44 (81.5)	44 (68.8)	19 (65.5)	65 (66.3)	33 (60.0)	65 (100)	45 (81.8)	65 (71.4)	54 (83.1)	21 (63.6)	36 (63.2)	30 (66.7)	52 (65.8)	51 (79.7)

Appendix M: The 10 clusters from cluster analysis in the NLSAA study in 1993.

Cluster	1 (n=43)			2 (n=25)			3 (n=25)			4 (n=65)			5 (n=49)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. As I grow older, things seem better than I thought they would be.	14 (32.6)	23 (53.5)	6 (14.0)	9 (36.0)	13 (52.0)	3 (12.0)	4 (16.0)	19 (76.0)	2 (8.0)	53 (81.5)	7 (10.8)	5 (7.7)	21 (42.9)	22 (44.9)	6 (12.2)
2. I have had more chances in life than most of the people I know.	21 (48.8)	16 (37.2)	6 (14.0)	1 (4.0)	24 (96.0)	0 (0)	0 (0)	23 (92.0)	2 (8.0)	54 (83.1)	4 (6.2)	7 (10.8)	22 (44.9)	19 (38.8)	8 (16.3)
3. This is the dreariest time of my life.	39 (90.7)	3 (7.0)	1 (2.3)	4 (16.0)	20 (80.0)	1 (4.0)	20 (80.0)	5 (20.0)	0 (0)	5 (7.7)	57 (87.7)	3 (4.6)	41 (83.7)	6 (12.2)	2 (4.1)
4. I am just as happy as when I was younger.	7 (16.3)	34 (79.1)	2 (4.7)	0 (0)	25 (100)	0 (0)	4 (16.0)	21 (84.0)	0 (0)	63 (96.9)	0 (0)	2 (3.1)	11 (22.4)	38 (77.6)	0 (0)
5. These are the best years of my life.	2 (4.7)	41 (95.3)	0 (0)	1 (4.0)	24 (96.0)	0 (0)	0 (0)	25 (100)	0 (0)	57 (87.7)	2 (3.1)	6 (9.2)	2 (4.1)	45 (91.8)	2 (4.1)
6. Most of the things I do are boring or monotonous.	11 (25.6)	32 (74.4)	0 (0)	0 (0)	25 (100)	0 (0)	13 (52.0)	11 (44.0)	1 (4.0)	1 (1.5)	63 (96.9)	1 (1.5)	43 (87.8)	3 (6.1)	3 (6.1)
7. The things I do are as interesting to me as they ever were.	40 (93.0)	1 (2.3)	2 (4.7)	24 (96.0)	0 (0)	1 (4.0)	14 (56.0)	10 (40.0)	1 (4.0)	65 (100)	0 (0)	0 (0)	14 (28.6)	31 (63.3)	4 (8.2)
8. As I look back on my life, I am fairly well satisfied.	40 (93.0)	3 (7.0)	0 (0)	24 (96.0)	1 (4.0)	0 (0)	6 (24.0)	16 (64.0)	3 (12.0)	63 (96.9)	1 (1.5)	1 (1.5)	43 (87.8)	4 (8.2)	2 (4.1)
9. I have made plans for things I will be doing in a month or a year from now.	32 (74.4)	10 (23.3)	1 (2.3)	5 (20.0)	20 (80.0)	0 (0)	5 (20.0)	20 (80.0)	0 (0)	27 (41.5)	36 (55.4)	2 (3.1)	6 (12.2)	42 (85.7)	1 (2.0)
10. When I think back over my life, I did not get most of the important things I wanted.	11 (25.6)	31 (72.1)	1 (2.3)	11 (44.0)	14 (56.0)	0 (0)	22 (88.0)	3 (12.0)	0 (0)	16 (24.6)	48 (73.8)	1 (1.5)	4 (8.2)	44 (89.8)	1 (2.0)
11. Compared with other people, I get down in the dumps too often.	8 (18.6)	31 (72.1)	4 (9.3)	0 (0)	23 (92.0)	2 (8.0)	17 (68.0)	8 (32.0)	0 (0)	2 (3.1)	63 (96.9)	0 (0)	18 (36.7)	31 (63.3)	0 (0)
12. I have pretty much what I expected out of life.	34 (79.1)	9 (20.9)	0 (0)	21 (84.0)	1 (4.0)	3 (12.0)	5 (20.0)	17 (68.0)	3 (12.0)	61 (93.8)	1 (1.5)	3 (4.6)	46 (93.9)	3 (6.1)	0 (0)
13. In spite of what people say, the life of the average person is getting worse, not better.	12 (27.9)	26 (60.5)	5 (11.6)	14 (56.0)	7 (28.0)	4 (16.0)	17 (68.0)	6 (24.0)	2 (8.0)	18 (27.7)	39 (60.0)	8 (12.3)	25 (51.0)	14 (28.6)	10 (20.4)
Life satisfaction standardized mean score		58.50			55.69			24.00			86.69			44.35	

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Appendix L (continued)

Item	Cluster 6 (n=23) Agree n (%)	6 (n=23) Disagree n (%)	6 (n=23) Don't know n (%)	7 (n=36) Agree n (%)	7 (n=36) Disagree n (%)	7 (n=36) Don't know n (%)	8 (n=37) Agree n (%)	8 (n=37) Disagree n (%)	8 (n=37) Don't know n (%)	9 (n=52) Agree n (%)	9 (n=52) Disagree n (%)	9 (n=52) Don't know n (%)	10 (n=27) Agree n (%)	10 (n=27) Disagree n (%)	10 (n=27) Don't know n (%)
1. As I grow older, things seem better than I thought they would be.	3 (13.0)	18 (78.3)	2 (8.7)	22 (61.1)	12 (33.3)	2 (5.6)	22 (59.5)	10 (27.0)	5 (13.5)	28 (53.8)	17 (32.7)	7 (13.5)	23 (85.2)	2 (7.4)	2 (7.4)
2. I have had more chances in life than most of the people I know.	19 (82.6)	2 (8.7)	2 (8.7)	1 (2.8)	33 (91.7)	2 (5.6)	36 (97.3)	0 (0)	1 (2.7)	1 (1.9)	49 (94.2)	2 (3.8)	27 (100)	0 (0)	0 (0)
3. This is the dreariest time of my life.	18 (78.3)	0 (0)	5 (21.7)	0 (0)	36 (100)	0 (0)	0 (0)	35 (94.6)	2 (5.4)	7 (13.5)	44 (84.6)	1 (1.9)	2 (7.4)	24 (88.9)	1 (3.7)
4. I am just as happy as when I was younger.	21 (91.3)	0 (0)	2 (8.7)	34 (94.4)	1 (2.8)	1 (2.8)	22 (59.5)	14 (37.8)	1 (2.7)	47 (90.4)	3 (5.8)	2 (3.8)	15 (55.6)	7 (25.9)	5 (18.5)
5. These are the best years of my life.	10 (43.5)	13 (56.5)	0 (0)	13 (36.1)	20 (55.6)	3 (8.3)	0 (0)	34 (91.9)	3 (8.1)	8 (15.4)	40 (76.9)	4 (7.7)	2 (7.4)	23 (85.2)	2 (7.4)
6. Most of the things I do are boring or monotonous.	1 (4.3)	20 (87.0)	2 (8.7)	0 (0)	36 (100)	0 (0)	2 (5.4)	35 (94.6)	0 (0)	7 (13.5)	45 (86.5)	0 (0)	0 (0)	27 (100)	0 (0)
7. The things I do are as interesting to me as they ever were.	20 (87.0)	1 (4.3)	2 (8.7)	35 (97.2)	0 (0)	1 (2.8)	35 (94.6)	2 (5.4)	0 (0)	40 (76.9)	11 (21.2)	1 (1.9)	25 (92.6)	2 (7.4)	0 (0)
8. As I look back on my life, I am fairly well satisfied.	23 (100)	0 (0)	0 (0)	34 (94.4)	1 (2.8)	1 (2.8)	36 (97.3)	0 (0)	1 (2.7)	47 (90.4)	4 (7.7)	1 (1.9)	26 (96.3)	0 (0)	1 (3.7)
9. I have made plans for things I will be doing in a month or a year from now.	2 (8.7)	21 (91.3)	0 (0)	36 (100)	0 (0)	0 (0)	37 (100)	0 (0)	0 (0)	4 (7.7)	48 (92.3)	0 (0)	0 (0)	27 (100)	0 (0)
10. When I think back over my life, I did not get most of the important things I wanted.	13 (56.5)	7 (30.4)	3 (13.0)	12 (33.3)	21 (58.3)	3 (8.3)	3 (8.1)	33 (89.2)	1 (2.7)	15 (28.8)	33 (63.5)	4 (7.7)	4 (14.8)	22 (81.5)	1 (3.7)
11. Compared with other people, I get down in the dumps too often.	5 (21.7)	18 (78.3)	0 (0)	0 (0)	35 (97.2)	1 (2.8)	2 (5.4)	35 (94.6)	0 (0)	0 (0)	51 (98.1)	1 (1.9)	1 (3.7)	26 (96.3)	0 (0)
12. I have pretty much what I expected out of life.	18 (78.3)	2 (8.7)	3 (13.0)	28 (77.8)	5 (13.9)	3 (8.3)	37 (100)	0 (0)	0 (0)	37 (71.2)	9 (17.3)	6 (11.5)	25 (92.6)	0 (0)	2 (7.4)
13. In spite of what people say, the life of the average person is getting worse, not better.	18 (78.3)	1 (4.3)	4 (17.4)	10 (27.8)	21 (58.3)	5 (13.9)	12 (32.4)	19 (51.4)	6 (16.2)	16 (30.8)	26 (50.0)	10 (19.2)	2 (7.4)	16 (59.3)	9 (33.3)
Life satisfaction standardized mean score		59.20			77.56			81.50			63.68			76.78	

Appendix N: The 10 clusters profile in the NLSAA study in 1993.

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)
Age	<80		17 (39.5)	11 (44.0)	12 (48.0)	34 (52.3)	16 (32.7)	9 (39.1)	24 (66.7)	17 (45.9)	26 (50.0)	6 (22.2)
	>80		26 (60.5)	14 (56.0)	13 (52.0)	31 (47.7)	33 (67.3)	14 (60.9)	12 (33.3)	20 (54.1)	26 (50.0)	21 (77.8)
Gender	Male		14 (32.6)	11 (44.0)	10 (40.0)	21 (32.3)	12 (24.5)	9 (39.1)	15 (41.7)	14 (37.8)	19 (36.5)	6 (22.2)
	Female		29 (67.4)	14 (56.0)	15 (60.0)	44 (67.7)	37 (75.5)	14 (60.9)	21 (58.3)	23 (62.2)	33 (63.5)	21 (77.8)
Marital status	Married		15 (34.9)	11 (44.0)	10 (40.0)	34 (52.3)	9 (18.4)	11 (47.8)	17 (47.2)	18 (48.6)	21 (40.4)	7 (25.9)
	Single		1 (2.3)	0 (0)	1 (4.0)	3 (4.6)	3 (6.1)	1 (4.3)	5 (13.9)	3 (8.1)	1 (1.9)	4 (14.8)
	Widowed		26 (60.5)	14 (56.0)	13 (52.0)	23 (35.4)	35 (71.4)	10 (43.5)	14 (38.9)	16 (43.2)	27 (51.9)	14 (51.9)
	Separated/divorced		1 (2.3)	0 (0)	1 (4.0)	5 (7.7)	2 (4.1)	1 (4.3)	0 (0)	0 (0)	3 (5.8)	2 (7.4)
Living status	Living alone		23 (53.5)	12 (48.0)	13 (52.0)	20 (30.8)	30 (61.2)	10 (43.5)	13 (36.1)	15 (40.5)	22 (42.3)	11 (40.7)
	Living with someone		20 (46.5)	13 (52.0)	12 (48.0)	45 (69.2)	18 (36.7)	13 (56.5)	23 (63.9)	22 (59.5)	30 (57.7)	16 (59.3)
Socioeconomic class	Professional/intermediate		12 (27.9)	2 (8.0)	4 (16.0)	6 (9.2)	5 (10.2)	3 (13.0)	7 (19.4)	14 (37.8)	8 (15.4)	5 (18.5)
	Skilled-non manual/skilled-manual		25 (58.1)	19 (76.0)	14 (56.0)	42 (64.6)	31 (63.3)	15 (65.2)	19 (52.8)	16 (43.2)	33 (63.5)	12 (44.4)
	Semiskilled/unskilled/others		6 (14.0)	4 (16.0)	7 (28.0)	16 (24.6)	13 (26.5)	5 (13.0)	10 (27.8)	7 (18.9)	11 (21.2)	10 (37.0)
Satisfied with income	Dissatisfied		4 (9.3)	3 (12.0)	6 (24.0)	5 (7.7)	6 (12.2)	5 (21.7)	3 (8.3)	6 (16.2)	16 (30.8)	1 (3.7)
	Satisfied		39 (90.7)	22 (88.0)	19 (76.0)	60 (92.3)	43 (87.8)	18 (78.3)	33 (91.7)	31 (83.8)	36 (69.2)	26 (96.3)
Loneliness	No lonely		18 (41.9)	9 (36.0)	5 (20.0)	41 (63.1)	11 (22.4)	11 (47.8)	25 (69.4)	24 (64.9)	26 (50.0)	13 (48.1)
	Lonely		25 (58.1)	16 (64.0)	20 (80.0)	24 (36.9)	38 (77.6)	12 (52.2)	11 (30.6)	13 (35.1)	26 (50.0)	14 (51.9)
Depression	Not depressed		11 (25.6)	13 (52.0)	4 (16.0)	40 (61.5)	11 (22.4)	6 (26.1)	20 (55.6)	23 (62.2)	26 (50.0)	14 (51.9)
	Depressed		32 (74.4)	12 (48.0)	21 (84.0)	25 (38.5)	38 (77.6)	17 (73.9)	16 (44.4)	14 (37.8)	26 (50.0)	13 (48.1)

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Appendix M (continued)

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)
Self-rated health	Poor		8 (18.6)	1 (4.0)	8 (32.0)	1 (1.5)	4 (8.2)	2 (8.7)	1 (2.8)	1 (2.7)	2 (3.8)	0 (0)
	Fair		11 (25.6)	7 (28.0)	7 (28.0)	5 (7.7)	19 (38.8)	8 (34.8)	1 (2.8)	6 (16.2)	9 (17.3)	5 (18.5)
	Average		7 (16.3)	7 (28.0)	4 (16.0)	11 (16.9)	11 (22.4)	6 (26.1)	10 (27.8)	7 (18.9)	15 (28.8)	5 (18.5)
	Good		15 (34.9)	6 (24.0)	5 (20.0)	35 (53.8)	13 (26.5)	4 (17.4)	18 (50.0)	13 (35.1)	22 (42.3)	16 (59.3)
	Excellent		2 (4.7)	4 (16.0)	1 (4.0)	13 (20.0)	2 (4.1)	3 (13.0)	6 (16.7)	10 (27.0)	4 (7.7)	1 (3.7)
Comparison with peer group health	Less healthy		7 (16.3)	3 (12.0)	7 (28.0)	3 (4.6)	6 (12.2)	3 (13.0)	1 (2.8)	0 (0)	4 (7.7)	1 (3.7)
	About as healthy		16 (37.2)	11 (44.0)	12 (48.0)	25 (38.5)	31 (63.3)	11 (47.8)	17 (47.2)	15 (40.5)	22 (42.3)	12 (44.4)
	More healthy		20 (46.5)	11 (44.0)	6 (24.0)	37 (56.9)	12 (24.5)	9 (39.1)	18 (50.0)	22 (59.5)	26 (50.0)	14 (51.9)
Smoking	No		34 (79.1)	20 (80.0)	21 (84.0)	54 (83.1)	38 (77.6)	20 (87.0)	30 (83.3)	33 (89.2)	44 (84.6)	23 (85.2)
	Yes		9 (20.9)	5 (20.0)	4 (16.0)	11 (16.9)	11 (22.4)	3 (13.0)	5 (13.9)	4 (10.8)	8 (15.4)	4 (14.8)
Arthritis or rheumatism	No		17 (39.5)	9 (36)	7 (28.0)	23 (35.4)	18 (36.7)	12 (52.2)	10 (27.8)	13 (35.1)	17 (32.7)	14 (51.9)
	Yes		26 (60.5)	16 (64.0)	17 (68.0)	42 (64.6)	31 (63.3)	11 (47.8)	26 (72.2)	24 (64.9)	35 (67.3)	13 (48.1)
Heart problem	No		30 (69.8)	17 (68.0)	18 (72.0)	54 (83.1)	42 (85.7)	19 (82.6)	25 (69.4)	31 (83.8)	38 (73.1)	24 (88.9)
	Yes		13 (30.2)	8 (32.0)	7 (28.0)	11 (16.9)	7 (14.3)	4 (17.4)	11 (30.6)	6 (16.2)	14 (26.9)	3 (11.1)
Stomach	No		35 (81.4)	18 (72.0)	13 (52.0)	55 (84.6)	36 (73.5)	17 (73.9)	31 (86.1)	31 (83.8)	37 (71.2)	22 (81.5)
	Yes		8 (18.6)	7 (28.0)	12 (48.0)	10 (15.4)	13 (26.5)	6 (26.1)	5 (13.9)	6 (16.2)	15 (28.8)	5 (18.5)
Giddiness	No		24 (55.8)	16 (64.0)	15 (60.0)	52 (80.0)	25 (51.0)	17 (73.9)	29 (80.6)	30 (81.1)	36 (69.2)	19 (70.4)
	Yes		19 (44.2)	9 (36.0)	10 (40.0)	13 (20.0)	24 (49.0)	6 (26.1)	7 (19.4)	7 (18.9)	16 (30.8)	8 (29.6)

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Appendix M (continued)

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)
High blood pressure	No		29 (67.4)	19 (76.0)	18 (72.0)	53 (81.5)	39 (79.6)	19 (82.6)	26 (72.2)	30 (81.1)	34 (65.4)	22 (81.5)
	Yes		13 (30.2)	6 (24.0)	7 (28.0)	12 (18.5)	10 (20.4)	4 (17.4)	10 (27.8)	7 (18.9)	17 (32.7)	5 (18.5)
Urinary incontinence	No		30 (69.8)	16 (64.0)	14 (56.0)	54 (83.1)	38 (77.6)	16 (69.6)	27 (75.0)	33 (89.2)	35 (67.3)	19 (70.4)
	Yes		13 (30.2)	8 (32.0)	11 (44.0)	11 (16.9)	11 (22.4)	7 (30.4)	9 (25.0)	4 (10.8)	17 (32.7)	8 (29.6)
Newspaper or journal	No		4 (9.3)	2 (8.0)	6 (24.0)	8 (12.3)	8 (16.3)	1 (4.3)	1 (2.8)	2 (5.4)	8 (15.4)	3 (11.1)
	Yes		39 (90.7)	23 (92.0)	19 (76.0)	57 (87.7)	41 (83.7)	22 (95.7)	35 (97.2)	35 (94.6)	44 (84.6)	24 (88.9)
Religious group	No		31 (72.1)	16 (64.0)	19 (76.0)	47 (72.3)	40 (81.6)	19 (82.6)	23 (63.9)	24 (64.9)	43 (82.7)	18 (66.7)
	Yes		12 (27.9)	9 (36.0)	6 (24.0)	18 (27.7)	9 (18.4)	4 (17.4)	13 (36.1)	13 (35.1)	9 (17.3)	9 (33.3)
Club or organization	No		25 (58.1)	11 (44.0)	15 (60.0)	42 (64.6)	29 (59.2)	11 (47.8)	15 (41.7)	19 (51.4)	34 (65.4)	17 (63.0)
	Yes		18 (41.9)	14 (56.0)	10 (40.0)	23 (35.4)	20 (40.8)	12 (52.2)	21 (58.3)	18 (48.6)	18 (34.6)	10 (37.0)
Pet	No		39 (90.7)	17 (68.0)	22 (88.0)	45 (69.2)	43 (87.8)	19 (82.6)	31 (86.1)	30 (81.1)	37 (71.2)	25 (92.6)
	Yes		4 (9.3)	8 (32.0)	3 (12.0)	20 (30.8)	6 (12.2)	4 (17.4)	5 (13.9)	7 (18.9)	15 (28.8)	2 (7.4)
TV or radio	No		0 (0)	0 (0)	0 (0)	1 (1.5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
	Yes		43 (100)	25 (100)	25 (100)	64 (98.5)	49 (100)	23 (100)	36 (100)	37 (100)	52 (100)	27 (100)
Friend	No		8 (18.6)	3 (12.0)	5 (20.0)	3 (4.6)	8 (16.3)	1 (4.3)	4 (11.1)	3 (8.1)	11 (21.2)	2 (7.4)
	Yes		35 (81.4)	22 (88.0)	20 (80.0)	62 (95.4)	41 (83.7)	22 (95.7)	32 (88.9)	34 (91.9)	40 (76.9)	25 (92.6)
Walking problem	No difficult		28 (65.1)	20 (80.0)	9 (36.0)	51 (78.5)	26 (53.1)	18 (78.3)	27 (75.0)	28 (75.7)	36 (69.2)	13 (48.1)
	Yes, difficult		15 (34.9)	5 (20.0)	15 (60.0)	13 (20.0)	21 (42.9)	5 (21.7)	9 (25.0)	7 (18.9)	15 (28.8)	12 (44.4)
Walking aid	No		25 (58.1)	16 (64.0)	9 (36.0)	50 (76.9)	19 (38.8)	11 (47.8)	26 (72.2)	30 (81.1)	36 (69.2)	16 (59.3)
	Yes		17 (39.5)	9 (36.0)	15 (60.0)	15 (23.1)	29 (59.2)	10 (43.5)	8 (22.2)	7 (18.9)	13 (25.0)	10 (37.0)

Appendix O: The 12 clusters from cluster analysis in the SHLSET study in 1993.

Cluster	1 (n=129)			2 (n=112)			3 (n=42)			4 (n=61)			5 (n=57)			6 (n=64)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.	0 (0)	129 (100)	0 (0)	8 (7.1)	0 (0)	104 (92.9)	32 (76.2)	0 (0)	10 (23.8)	0 (0)	61 (100)	0 (0)	0 (0)	57 (100)	0 (0)	0 (0)	59 (92.2)	5 (7.8)
2. As I look back on my life, I am fairly well satisfied.	0 (0)	129 (100)	0 (0)	3 (2.7)	7 (6.3)	102 (91.1)	0 (0)	40 (95.2)	2 (4.8)	0 (0)	61 (100)	0 (0)	0 (0)	56 (98.2)	1 (1.8)	0 (0)	63 (98.4)	1 (1.6)
5. These are the best years of my life.	0 (0)	129 (100)	0 (0)	0 (0)	11 (9.8)	101 (90.2)	42 (100)	0 (0)	0 (0)	59 (96.7)	0 (0)	2 (3.3)	56 (98.2)	0 (0)	1 (1.8)	0 (0)	64 (100)	0 (0)
8. I expect some interesting and pleasant things to happen to me in the future.	0 (0)	129 (100)	0 (0)	0 (0)	11 (9.8)	101 (90.2)	41 (97.6)	0 (0)	1 (2.4)	0 (0)	61 (100)	0 (0)	54 (94.7)	0 (0)	3 (5.3)	58 (90.6)	0 (0)	6 (9.4)
Life satisfaction standardized mean score		0.00			47.99			72.32			24.59			49.34			25.00	

Cluster	7 (n=239)			8 (n=80)			9 (n=34)			10 (n=88)			11 (n=28)			12 (n=69)		
Item	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)	Agree n (%)	Disagree n (%)	Don't know n (%)
1. I have had more breaks in life than most of the people I know.	239 (100)	0 (0)	0 (0)	80 (100)	0 (0)	0 (0)	4 (11.8)	27 (79.4)	3 (8.8)	0 (0)	79 (89.8)	9 (10.2)	28 (100)	0 (0)	0 (0)	0 (0)	53 (76.8)	16 (23.2)
2. As I look back on my life, I am fairly well satisfied.	239 (100)	0 (0)	0 (0)	80 (100)	0 (0)	0 (0)	31 (91.2)	1 (2.9)	2 (5.9)	88 (100)	0 (0)	0 (0)	0 (0)	28 (100)	0 (0)	64 (92.8)	0 (0)	5 (7.2)
5. These are the best years of my life.	239 (100)	0 (0)	0 (0)	0 (0)	80 (100)	0 (0)	17 (50.0)	17 (50.0)	0 (0)	88 (100)	0 (0)	0 (0)	0 (0)	28 (100)	0 (0)	0 (0)	66 (95.7)	3 (4.3)
8. I expect some interesting and pleasant things to happen to me in the future.	239 (100)	0 (0)	0 (0)	80 (100)	0 (0)	0 (0)	0 (0)	30 (88.2)	4 (11.8)	88 (100)	0 (0)	0 (0)	28 (100)	0 (0)	0 (0)	69 (100)	0 (0)	0 (0)
Life satisfaction standardized mean score		100.00			75.00			41.54			76.28			50.00			52.54	

Appendix P: The 12 clusters profile in the SHLSET study in 1993.

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)
Age	<80		88 (68.2)	53 (47.3)	27 (64.3)	35 (57.4)	40 (70.2)	43 (67.2)	167 (69.9)	48 (60.0)	19 (55.9)	64 (72.7)	15 (53.6)	54 (78.3)
	>80		41 (31.8)	59 (52.7)	15 (35.7)	26 (42.6)	17 (29.8)	20 (31.3)	72 (30.1)	32 (40.0)	15 (44.1)	24 (27.3)	13 (46.4)	15 (21.7)
Gender	Male		65 (50.4)	58 (51.8)	20 (47.6)	30 (49.2)	26 (45.6)	31 (48.4)	139 (58.2)	44 (55.0)	17 (50.0)	44 (50.0)	18 (64.3)	39 (56.5)
	Female		64 (49.6)	54 (48.2)	22 (52.4)	31 (50.8)	31 (54.4)	33 (51.6)	100 (41.8)	36 (45.0)	17 (50.0)	44 (50.0)	10 (35.7)	30 (43.5)
Marital status	Married		56 (43.4)	45 (40.2)	24 (57.1)	37 (60.7)	30 (52.6)	29 (45.3)	164 (68.6)	44 (55.0)	21 (61.8)	55 (62.5)	12 (42.9)	45 (65.2)
	Single		8 (6.2)	0 (0)	1 (2.4)	2 (3.3)	2 (3.5)	4 (6.3)	0 (0)	4 (5.0)	0 (0)	0 (0)	0 (0)	1 (1.4)
	Widowed		59 (45.7)	63 (56.3)	16 (38.1)	21 (34.4)	22 (38.6)	30 (46.9)	70 (29.3)	31 (38.8)	12 (35.3)	32 (36.4)	12 (42.9)	22 (31.9)
	Separated/divorced		6 (4.7)	4 (3.6)	1 (2.4)	1 (1.6)	2 (3.5)	1 (1.6)	5 (2.1)	1 (1.3)	1 (2.9)	1 (1.1)	4 (14.3)	1 (1.4)
Living status	Living alone		33 (25.6)	8 (7.1)	8 (19.0)	10 (16.4)	8 (14.0)	10 (15.6)	18 (7.5)	8 (10.0)	1 (2.9)	7 (8.0)	4 (14.3)	3 (4.3)
	Living with someone		96 (74.4)	101 (90.2)	34 (81.0)	51 (83.6)	49 (86.0)	53 (82.8)	221 (92.5)	72 (90.0)	32 (94.1)	81 (92.0)	24 (85.7)	66 (95.7)
Social class	Professional/intermediate		13 (10.1)	11 (9.8)	6 (14.3)	2 (3.3)	7 (12.3)	3 (4.7)	36 (15.1)	5 (6.3)	3 (8.8)	6 (6.8)	7 (25.0)	3 (4.3)
	Skilled-non manual/skilled-manual		14 (10.9)	15 (13.4)	5 (11.9)	10 (16.4)	5 (8.8)	5 (7.8)	31 (13.0)	15 (18.8)	2 (5.9)	7 (8.0)	0 (0)	10 (14.5)
	Semiskilled/unskilled/others		72 (55.8)	71 (63.4)	27 (64.3)	36 (59.0)	35 (61.4)	40 (62.5)	122 (51.0)	46 (57.5)	27 (79.4)	56 (63.6)	14 (50.0)	43 (62.3)
Satisfied with income	Dissatisfied		97 (75.2)	6 (5.4)	16 (38.1)	51 (83.6)	35 (61.4)	32 (50.0)	59 (24.7)	23 (28.8)	21 (61.8)	37 (42.0)	7 (25.0)	29 (42.0)
	Satisfied		32 (24.8)	9 (8.0)	26 (61.9)	10 (16.4)	22 (38.6)	32 (50.0)	180 (75.3)	57 (71.3)	13 (38.2)	51 (58.0)	21 (75.0)	40 (58.0)
Loneliness	No lonely		59 (45.7)	13 (11.6)	27 (64.3)	29 (47.5)	39 (68.4)	49 (76.6)	214 (89.5)	68 (85.0)	24 (70.6)	73 (83.0)	25 (89.3)	58 (84.1)
	Lonely		70 (54.3)	5 (4.5)	15 (35.7)	32 (52.5)	18 (31.6)	15 (23.4)	25 (10.5)	11 (13.8)	10 (29.4)	15 (17.0)	3 (10.7)	11 (15.9)
Depression	Not depressed		15 (11.6)	1 (0.9)	2 (4.8)	1 (1.6)	5 (8.8)	7 (10.9)	49 (20.5)	5 (6.3)	3 (8.8)	11 (12.5)	3 (10.7)	5 (7.2)
	Depressed		113 (87.6)	17 (15.2)	39 (92.9)	59 (96.7)	51 (89.5)	56 (87.5)	189 (79.1)	74 (92.5)	30 (88.2)	76 (86.4)	24 (85.7)	63 (91.3)

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Appendix O (continued)

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)
Self-rated health	Poor		22 (17.1)	0 (0)	0 (0)	5 (8.2)	1 (1.8)	1 (1.6)	2 (0.8)	1 (1.3)	2 (5.9)	2 (2.3)	1 (3.6)	2 (2.9)
	Fair		44 (34.1)	6 (5.4)	12 (28.6)	21 (34.4)	16 (28.1)	19 (29.7)	26 (10.9)	7 (8.8)	11 (32.4)	16 (18.2)	5 (17.9)	11 (15.9)
	Average		35 (27.1)	3 (2.7)	15 (35.7)	26 (42.6)	27 (47.4)	27 (42.2)	81 (33.9)	30 (37.5)	15 (44.1)	33 (37.5)	13 (46.4)	26 (37.7)
	Good		18 (14.0)	4 (3.6)	8 (19.0)	8 (13.1)	10 (17.5)	13 (20.3)	69 (28.9)	24 (30.0)	4 (11.8)	20 (22.7)	6 (21.4)	19 (27.5)
	Excellent		10 (7.8)	16 (14.3)	7 (16.7)	1 (1.6)	3 (5.3)	4 (6.3)	61 (25.5)	18 (22.5)	2 (5.9)	17 (19.3)	3 (10.7)	11 (15.9)
Comparison with peer group health	Less healthy		59 (45.7)	4 (3.6)	6 (14.3)	22 (36.1)	9 (15.8)	21 (32.8)	16 (6.7)	6 (7.5)	8 (23.5)	11 (12.5)	4 (14.3)	4 (5.8)
	About as healthy		50 (38.8)	9 (8.0)	23 (54.8)	32 (52.5)	36 (63.2)	33 (51.6)	133 (55.6)	37 (46.3)	20 (58.8)	53 (60.2)	13 (46.4)	42 (60.9)
	More healthy		19 (14.7)	1 (0.9)	13 (31.0)	7 (11.5)	12 (21.1)	10 (15.6)	89 (37.2)	36 (45.0)	5 (14.7)	22 (25.0)	11 (39.3)	22 (31.9)
Smoking	No		97 (75.2)	95 (84.8)	31 (73.8)	49 (80.3)	41 (71.9)	51 (79.7)	191 (79.9)	57 (71.3)	23 (67.8)	70 (79.5)	25 (89.3)	43 (62.3)
	Yes		32 (24.8)	17 (15.2)	11 (26.2)	12 (19.7)	16 (28.1)	13 (20.3)	48 (20.1)	23 (28.8)	11 (32.4)	18 (20.5)	3 (10.7)	26 (37.7)
Arthritis or rheumatism	No		92 (71.3)	88 (78.6)	29 (69.0)	44 (72.1)	37 (64.9)	47 (73.4)	190 (79.5)	65 (81.3)	23 (67.6)	69 (78.4)	24 (85.7)	45 (65.2)
	Yes		35 (27.1)	19 (17.0)	12 (28.6)	15 (24.6)	19 (33.3)	15 (23.4)	43 (18.0)	13 (16.3)	9 (26.5)	18 (20.5)	4 (14.3)	23 (33.3)
Heart problem	No		96 (74.4)	87 (77.7)	32 (76.2)	48 (78.7)	48 (84.2)	47 (73.4)	186 (77.8)	65 (81.3)	24 (70.6)	73 (83.0)	21 (75.0)	57 (82.6)
	Yes		30 (23.3)	22 (19.6)	10 (23.8)	7 (11.5)	8 (14.0)	11 (17.2)	48 (20.1)	15 (18.8)	8 (23.5)	14 (15.9)	7 (25.0)	12 (17.4)
Stomach	No		111 (86.0)	99 (88.4)	37 (88.1)	57 (93.4)	52 (91.2)	61 (95.3)	225 (94.1)	69 (86.3)	30 (88.2)	81 (92.0)	28 (100)	61 (88.4)
	Yes		18 (14.0)	13 (11.6)	5 (11.9)	4 (6.5)	5 (8.8)	3 (4.7)	14 (5.9)	11 (13.8)	4 (11.8)	7 (8.0)	0 (0)	8 (11.6)
Giddiness	No		129 (100)	112 (100)	42 (100)	61 (100)	56 (98.2)	63 (98.4)	239 (100)	80 (100)	33 (97.1)	88 (100)	28 (100)	69 (100)
	Yes		0 (0)	0 (0)	0 (0)	0 (0)	1 (1.8)	1 (1.6)	0 (0)	0 (0)	1 (2.9)	0 (0)	0 (0)	0 (0)
High blood pressure	No		86 (66.7)	68 (60.7)	29 (69.0)	35 (57.4)	29 (50.9)	47 (73.4)	164 (68.6)	54 (67.5)	20 (58.8)	69 (78.4)	19 (67.9)	48 (69.6)
	Yes		38 (29.5)	41 (36.6)	12 (28.6)	22 (36.1)	25 (43.9)	16 (25.0)	68 (28.5)	26 (32.5)	11 (32.4)	19 (21.6)	8 (28.6)	19 (27.5)

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Appendix O (continued)

Variable		Cluster	1 n (%)	2 n (%)	3 n (%)	4 n (%)	5 n (%)	6 n (%)	7 n (%)	8 n (%)	9 n (%)	10 n (%)	11 n (%)	12 n (%)
Urinary incontinence	No		107 (82.9)	71 (63.4)	39 (92.9)	49 (80.3)	51 (89.5)	57 (89.1)	219 (91.6)	69 (86.3)	28 (82.4)	85 (96.6)	23 (82.1)	63 (91.3)
	Yes		20 (15.5)	38 (33.9)	3 (7.1)	10 (16.4)	5 (8.8)	6 (9.4)	15 (6.3)	10 (12.5)	3 (8.8)	3 (3.4)	4 (14.3)	5 (7.2)
Walking problem	No difficult		78 (60.5)	43 (38.4)	33 (78.6)	39 (63.9)	46 (80.7)	47 (73.4)	206 (86.2)	68 (85.0)	22 (64.7)	77 (87.5)	19 (67.9)	56 (81.2)
	Yes, difficult		51 (39.5)	69 (61.6)	9 (21.4)	22 (36.1)	11 (19.3)	17 (26.6)	33 (13.7)	12 (15.0)	12 (15.0)	11 (12.5)	9 (32.1)	13 (18.8)
Walking aid	No		95 (73.6)	72 (64.3)	39 (92.9)	50 (82.0)	52 (91.2)	54 (84.4)	215 (90.0)	69 (86.3)	26 (76.5)	79 (89.8)	23 (82.1)	63 (91.3)
	Yes		34 (26.4)	39 (34.8)	3 (7.1)	11 (18.0)	5 (8.8)	10 (15.6)	24 (10.0)	11 (13.8)	8 (23.5)	9 (10.2)	5 (17.9)	6 (8.7)
Newspaper or journal	No		97 (75.2)	90 (80.4)	25 (59.5)	46 (75.4)	40 (70.2)	56 (87.5)	138 (57.7)	56 (70.0)	28 (82.4)	68 (77.3)	16 (57.1)	53 (76.8)
	Yes		32 (24.8)	22 (19.6)	17 (40.5)	15 (24.6)	17 (29.8)	8 (12.5)	101 (42.3)	24 (30.0)	6 (17.6)	20 (22.7)	12 (42.9)	16 (23.2)
Religious group	No		124 (96.1)	108 (96.4)	39 (92.9)	57 (93.4)	53 (93.0)	60 (93.8)	207 (86.6)	78 (97.5)	33 (97.1)	74 (84.1)	23 (82.1)	65 (94.2)
	Yes		5 (3.9)	4 (3.6)	3 (7.1)	4 (7.0)	4 (7.0)	4 (6.3)	32 (13.4)	2 (2.5)	1 (2.9)	14 (15.9)	5 (17.9)	4 (5.8)
Club or organization	No		124 (96.1)	110 (98.2)	41 (97.6)	59 (96.7)	52 (91.2)	61 (95.3)	215 (90.0)	76 (95.0)	32 (94.1)	83 (94.3)	27 (96.4)	67 (97.1)
	Yes		5 (3.9)	2 (1.8)	1 (2.4)	2 (3.3)	5 (8.8)	3 (4.7)	24 (10.0)	4 (5.0)	2 (5.9)	5 (5.7)	1 (3.6)	2 (2.9)
Pet	No		118 (91.5)	105 (93.8)	34 (81.0)	58 (95.1)	45 (78.9)	58 (90.6)	195 (81.6)	64 (80.0)	26 (76.5)	74 (84.1)	24 (85.7)	49 (71.0)
	Yes		11 (8.5)	7 (6.3)	8 (19.0)	3 (4.9)	12 (21.1)	6 (9.4)	44 (18.4)	16 (20.0)	8 (23.5)	14 (15.9)	4 (14.3)	20 (29.0)
Watching TV or listening radio	No		28 (21.7)	35 (31.3)	2 (4.8)	9 (14.8)	4 (7.0)	10 (15.6)	10 (4.2)	7 (8.8)	6 (17.6)	7 (8.0)	4 (14.3)	3 (4.3)
	Yes		101 (78.3)	77 (68.8)	40 (95.2)	52 (85.2)	53 (93.0)	54 (84.4)	229 (95.8)	73 (91.3)	28 (82.4)	81 (92.0)	24 (85.7)	66 (95.7)
Friend	No		40 (31.0)	12 (10.7)	10 (23.8)	19 (31.1)	19 (33.3)	17 (26.6)	55 (23.0)	29 (36.3)	9 (26.5)	16 (18.2)	13 (46.4)	14 (20.3)
	Yes		88 (68.2)	13 (11.6)	31 (73.8)	42 (68.9)	37 (64.9)	46 (71.9)	180 (75.3)	51 (63.8)	25 (73.5)	70 (79.5)	15 (53.6)	54 (78.3)

Appendix Q: Journal paper and conference posters.

Journal paper

Li, Chih-Ping (2007). A tentative discussion of the limitations of health information on the internet in Taiwan. *Asian Journal of Health and Information Sciences*, **2** (1-4), 103-115.

Conference posters

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