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RESEARCH PAPER

Subjective Well-Being and Its Association with Subjective Health Status, Age, Sex, Region, and Socio-economic Characteristics in a Chinese Population Study

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Abstract This study analyse how subjective well-being (SWB) in a Chinese population varies with subjective health status, age, sex, region and socio-economic characteristics. In the Household Health Survey 2010, face-to-face interviews were carried out in urban and rural counties in eastern, middle and western areas of China (n = 8,000, aged 15–102 years). To measure subjective health status, a global self-rated health question, the EQ-5D descriptive system, and a visual analogue scale of health status was included. To measure SWB, a validated Chinese version of a question on self-reported happiness, adopted from the World Values Survey, was included. SWB increased with socio-economic status (income and education), and was lower among unemployed individuals and divorced individuals. SWB also increased strongly with subjective health status. When health status was divided into different dimensions using the EQ-5D, the anxiety/depression dimension was the most important dimension for SWB. The reported SWB was also

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higher in rural counties than in urban counties in the same area, after controlling for socio-economic characteristics and subjective health status.

Keywords China · EQ-5D · General population · Health status · Socio-economic characteristics · Subjective well-being

Abbreviations

HHS	Household health survey
OLS	Ordinary least square
SRH	Self-rated health
SWB	Subjective well-being
VIF	Variance inflation factor

1 Background

Subjective well-being (SWB) refers to people's self-reported or experienced well-being (Kahneman and Krueger 2006; Stiglitz et al. 2009). A widely adopted definition of SWB is given by Diener, who defines SWB as 'people's evaluations of their life as a whole or of its various domains, e.g., health, work, family, income' or 'people's actual feelings, both positive feelings such as happiness, pleasure or negative feelings such as pain, worry and anger' (Diener 1984; Diener et al. 1999).

Most studies on SWB have been performed in Western countries (Camfield and Skevington 2008; Conceicão and Bandura 2008; Diener et al. 1999, 1999; Dolan et al. 2008; Frey 2002); however, there is an increasing interest in studying SWB in China as well (Chen and Davey 2008a; Shu and Zhu 2008). In China, most studies have been conducted in urban areas (Appleton and Song 2008; Chen and Davey 2008b, 2008b; Jiang et al. 2012; Monk-Turner and Turner 2011), with only a few available for rural areas (Davey et al. 2007; Knight et al. 2009; Knight and Gunatilaka 2010a). Findings from studies of SWB in China (Appleton and Song 2008; Böckerman et al. 2011; Jiang et al. 2012; Knight and Gunatilaka 2010a; Monk-Turner and Turner 2011; Shu and Zhu 2008) are similar to findings from Western countries (Conceicão and Bandura 2008; Diener 1984; Diener et al. 1999; Dolan et al. 2008). There is typically a U-shaped relationship between age and SWB, indicating lowest SWB among the middle-aged group. Women tend to have better SWB then men. Education and health status are positively associated with SWB, but being divorced or unemployed are negatively associated with SWB.

Studies in Western countries have found that the relationship between income and SWB is complex. In cross-section data there is typically a positive association between income and SWB (Camfield and Skevington 2008; Diener and Suh 1997; Layard et al. 2008). But, although income has increased over time SWB has typically not increased over time (Blanchflower and Oswald 2004; Easterlin 1995, 2001; Ferrer-i-Carbonell 2005). These findings have been confirmed in China as well: a positive association between income and SWB has been found for individuals in both urban and rural areas (Knight et al. 2009; Knight and Gunatilaka 2010a), but SWB has not increased over time even though income has increased over the past 30 years (Brockmann et al. 2008). A proposed explanation for this is that relative income might play a more important role for SWB than absolute income (Ferrer-i-Carbonell 2005; Ferrer-i-Carbonell and Frijters 2004; Luttmer 2005). This may also possibly explain why little difference in SWB was found between urban and rural areas in China,

as rural residents might compare their income to the local community, even though there is a large income gap between the urban and rural areas (Knight and Gunatilaka 2010a).

SWB can be measured either by single-item instruments or multi-component instruments. The latter are still under development, and there is no common agreement regarding which components should be taken into consideration (Australian Centre on Quality of Life, Deakin University 2013; Gallup-Healthways 2013; OECD 2013; Stiglitz et al. 2009).

Primarily three types of single-item instruments have been used to investigate SWB (Dolan et al. 2008; Kahneman and Krueger 2006; Oishi 2010): a general life-satisfaction item, e.g., 'All things considered, how satisfied are you with your life as a whole these days?' (Cheung and Leung 2004); Cantril's Ladder item, 'Where on the ladder would you say you personally stand at the present time?' (Graham et al. 2011); and a happiness item, e.g., 'Taking all things together, would you say you are very happy, quite happy, not very happy, or not at all happy?' (World Values Survey 2014).

However, the terms *SWB, life satisfaction* and *happiness* are often used interchangeably (Camfield and Skevington 2008; Conceicão and Bandura 2008; Knight and Gunatilaka 2010a). In the present study, a question on self-reported happiness, adopted from the world values survey (WVS) (World Values Survey 2014), is used to measure SWB. The WVS is a worldwide investigation of socio-cultural and political change that uses a national representative sample of 1,000 individuals aged 18 years and above in each country (World Values Survey 2014). In China, WVS studies have been conducted in five waves since 1990.

Although studies have investigated the association between health and SWB (Binder and Coad 2010; Conceicão and Bandura 2008; Diener and Chan 2011; Dolan et al. 2008), relatively little is known about the association between different dimensions of health and SWB. Existing studies suggest that the mental health dimension is more strongly associated with SWB than the physical health dimension (Dolan and Metcalfe 2012; Graham et al. 2011; Mukuria and Brazier 2013). In China, a positive association between health and SWB has been found as well (Appleton and Song 2008; Chyi and Mao 2011; Knight et al. 2009; Monk-Turner and Turner 2011). However, to the best of our knowledge, no study has investigated the relation between different dimensions of health and SWB in China. This study intends to bridge this knowledge gap by investigating this relation.

Different dimensions of health can be assessed using a generic health-related quality of life (HRQoL) measure. EQ-5D is such an instrument: it asks respondents to report their health status on five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression) (Rabin and Charro 2001). The Chinese Household Health Survey (HHS) 2010 included the question on happiness and the EQ-5D descriptive system, a visual analogue scale (VAS) of health status, and a global self-rated health (SRH) question.

2 Aim

The aim of the study was to analyse how SWB in a Chinese population varies with subjective health status (SRH, EQ-5D dimensions, and VAS), age, sex, region and socio-economic characteristics.

3 Materials and Methods

Data were derived from the HHS 2010 (n = 8,000, aged 15–102 years). The HHS 2010 used the same protocol as the National Health Services Survey 2008 (NHSS 2008); details

regarding the NHSS questionnaire, sample frame and interview procedure have been presented elsewhere (Sun et al. 2011a, 2011b). The HHS 2010 questionnaire was based on a subset of questions from NHSS 2008, plus an additional question on happiness.

From the counties sampled in NHSS 2008, the HHS 2010 selected two urban counties and three rural counties. In each county, 600 households were randomly selected, and all family members in a sampled household were interviewed individually.

Ethical permission has been granted by the Regional Ethics Committee, Stockholm, Sweden, for analyses of the study (Dnr: 2011/581-31/5).

3.1 Exclusion Criteria

In total, 9,677 respondents were included in the HHS 2010. Of these, those who were aged below 15 years were excluded (about 14 % of respondents), since EQ-5D questions should only be administered to respondents aged 15 years and above. Respondents who did not answer the questions by themselves were excluded (3 %). Respondents who did not answer the happiness question ($n = 4$), had missing answers on at least one of the EQ-5D dimensions ($n = 7$), had missing on SRH ($n = 5$), marital status ($n = 14$), occupational status ($n = 2$) or income ($n = 7$) were also excluded. After applying theses exclusion criteria, 8,000 respondents were included in the present study.

3.2 Measure of SWB

A validated Chinese version of a question on self-reported happiness, adopted from the WVS (World Values Survey 2014), was used to measure SWB. The question was framed as 'Taking all things together, would you say you are…' The four response options were: very happy, rather happy, not very happy or not at all happy.

3.3 Measure of Region

China is divided into three areas: eastern, middle and western areas (United Nations Development Programme 2005), previous studies showed that there is a gradient in socio-economic status and health status in China across these areas (Sun et al. 2011b; United Nations Development Programme 2005). In order to provide an overall picture regarding SWB in China, provinces from these different areas were selected. Three provinces were selected, from eastern, middle and western areas, respectively. These are Jiangsu Province in the eastern area, Henan Province in the middle area, and Gansu Province in the western area. The selected provinces represent the middle economic development level in each area, respectively. One urban county and one rural county were selected from Jiangsu Province and Henan Province, respectively, one rural county was selected from Gansu Province. The selected counties represent the middle economic development level in each province, urban and rural respectively.

3.4 Measures of Socio-economic Characteristics

Socio-economic characteristics were self reported, using the same questions as in the NHSS 2008. Marital status was classified into single, married, divorced and widowed. The highest accomplished educational level was classified into below primary school, primary school, junior middle school, senior middle school and college and above. Occupational status was

categorised into employed, unemployed, student and retired. Individual's annual income was assessed by dividing household annual income by the numbers of persons living in the household within the last half-year, regardless of age and occupational status. Respondents were then ranked from lowest to highest by their annual income and divided into five groups of equal size: the lowest income group had an income below 2,334 RMB, the second group from 2,334 to 4,166 RMB, the third group from 4,167 to 7,999 RMB, the fourth group from 8,000 to 11,999 RMB and the fifth and highest income group 12,000 RMB and above.

3.5 Measures of Subjective Health Status

The global SRH question used was—'How is your health today? Very good, good, fair, bad or very bad?' The EQ-5D descriptive system was used, which classifies respondents' health status into five dimensions (mobility, self-care, usual activities, pain/discomfort and anxiety/depression), with three severity levels (no problems, some problems and severe problems), which in total defines 243 health states (Rabin 2001). The VAS consisted of a horizontal 11 cm line where every 10th was marked and labelled 0, 10, 20, …, 100, with anchor points of 0 (worst health state) and 100 (best health state). The question was framed: 'On the scale please point out which point best represents your own health state today.' The scale was harmonised to fit in the questionnaire and hence differs from the EQ VAS.

3.6 Statistical Analyses

All statistical analyses were performed in SAS 9.2, and a 5 % significance level was used. To get a cardinal measure of SWB we converted the SWB categories as follows: 4—very happy, 3—happy, 2—not very happy and 1—not at all happy. Age was divided into 10-year age groups except for the oldest group that was 75–102 years. Calculations of mean SWB were stratified by age and sex. Both ordinary least squares (OLS) regression and ordered logit regression were used to estimate how SWB varied with age, sex, region, marital status, educational level, occupational status, income group, SRH, EQ-5D dimensions and VAS score (we present the OLS results in the main text, and the ordered logit results are included in the "Appendix"). For the OLS models, dummy variables were created for age groups, region, marital status, educational level, occupational status, income group, SRH, and EQ-5D dimensions. VAS was entered as a continuous variable. As the independent variables are correlated there is a potential problem of multi-collinearity. For the OLS models, the variance inflation factor (VIF) was therefore calculated, and a VIF value larger than 10 in absolute terms was considered an indication of severe multi-collinearity problems (Kutner et al. 2003). However, none of the models had a VIF value larger than 10 in absolute terms. Hence all the independent variables were kept in the models. Due to small number of respondents reporting being not at all happy (n = 39), the categories *not very happy* and *not at all happy* were merged together for ordered logit models, defined as *not happy*.

4 Results

4.1 Characteristics of Respondents

Characteristics of respondents are presented in Table 1. About 20 % of the respondents reported being very happy, and 71 % reported being rather happy.

Table 1 Characteristics of the respondents

	HHS 2010 (n = 8,000)	
	%	n
Subjective well-being		
Very happy	20.0	1,605
Rather happy	71.2	5,694
Not very happy	8.3	662
Not at all happy	0.5	39
Subjective well-being (mean + SD)	3.11	0.54
Sex		
Men	48.3	3,863
Women	51.7	4,137
Age group (years)		
15–24	13.6	1,087
25–34	11.9	954
35–44	22.3	1,781
45–54	18.6	1,487
55–64	17.4	1,394
65–74	11.0	880
75–102	5.2	417
Region		
Eastern/urban	20.4	1,633
Eastern/rural	30.1	2,404
Middle/urban	7.9	634
Middle/rural	20.3	1,624
Western/rural	21.3	1,705
Socio-economic characteristics		
Marital status		
Single	12.9	1,034
Married	79.0	6,317
Divorced	0.7	59
Widowed	7.4	590
Educational level		
Below primary school	22.8	1,826
Primary school	23.9	1,911
Junior middle school	32.5	2,599
Senior middle school	13.8	1,102
College and above	7.0	562
Occupational status		
Employed	74.1	5,927
Retired	13.8	1,106
Student	5.1	405
Unemployed	7.0	562
Income groups		
First group (low)	18.1	1,453
Second group	19.0	1,516

Table 1 continued

	HHS 2010 (n = 8,000)	
	%	n
Third group	21.9	1,754
Fourth group	20.2	1,614
Fifth group (high)	20.8	1,663
Subjective health status		
Self-rated health		
Very good	19.5	1,563
Good	54.0	4,318
Fair	23.3	1,865
Bad	3.0	239
Very bad	0.2	15
EQ-5D dimension		
Mobility		
Moderate problems	4.8	381
Severe problems	0.4	30
Self-care		
Moderate problems	2.4	195
Severe problems	0.4	33
Usual activities		
Moderate problems	4.3	344
Severe problems	0.9	68
Pain/discomfort		
Moderate problems	10.3	820
Severe problems	0.4	33
Anxiety/depression		
Moderate problems	8.3	660
Severe problems	0.5	39
VAS (mean + SD)	80.39	14.32

4.2 SWB by Age and Sex

Variation in SWB was analysed by age and sex (Table 3). Without any controls for region or socio-economic characteristics, SWB decreased with age and was significantly lower for women than for men. With controls for region and socio-economic characteristics SWB decreased with age until the 55–64 year age group and was then constant, and there was no significant difference between men and women. The difference in mean SWB between the youngest and the oldest age groups was 0.33 without controls for region and socio-economic characteristics and 0.24 with controls for region and socio-economic characteristics; corresponding to about half a standard deviation in SWB.

4.3 SWB by Region

Mean SWB by region is presented in Table 2, stratified by age group and sex. Mean SWB was highest in the eastern rural county and lowest in the western rural county. Within the

Table 2 SWB (mean + SD) by region and socio-economic characteristics, stratified by age group and sex

Men (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	547			449			853			719		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Region												
Eastern/urban	80	3.26	0.47	110	3.12	0.54	144	3.12	0.52	151	3.10	0.46
Eastern/rural	108	3.60	0.53	102	3.47	0.52	273	3.41	0.58	214	3.33	0.56
Middle/urban	32	3.34	0.48	36	3.28	0.45	80	3.06	0.37	61	3.05	0.34
Middle/rural	166	3.30	0.57	95	3.25	0.50	162	3.05	0.53	132	3.05	0.46
Western/rural	161	3.06	0.38	106	2.96	0.39	194	2.94	0.41	161	2.89	0.39
Socio-economic characteristics												
Marital status												
Single	439	3.31	0.52	60	3.27	0.52	33	2.85	0.71	17	3.12	0.70
Married	105	3.20	0.53	384	3.20	0.52	801	3.18	0.52	675	3.11	0.49
Divorced	2	2.50	0.71	4	2.75	0.50	13	2.85	0.69	11	2.82	0.40
Widowed	1	2.00	–	1	3.00	–	6	2.33	0.82	16	3.00	0.52
Educational level												
Below primary school	9	2.89	0.33	14	3.00	0.39	70	2.91	0.44	62	2.90	0.43
Primary school	74	3.08	0.43	66	2.94	0.39	169	3.04	0.49	146	2.99	0.49
Junior middle school	260	3.30	0.55	186	3.25	0.50	436	3.24	0.57	303	3.17	0.49
Senior middle school	140	3.36	0.50	90	3.18	0.53	120	3.16	0.50	168	3.15	0.51
College and above	64	3.33	0.54	93	3.35	0.56	58	3.10	0.41	40	3.20	0.41
Occupational status												
Employed	324	3.25	0.54	423	3.22	0.52	815	3.17	0.53	670	3.12	0.49
Retired	3	3.00	0.00	6	3.00	0.00	10	2.60	0.70	19	3.11	0.32
Student	197	3.36	0.50	3	3.33	0.58	–	–	–	–	–	–

Table 2 continued

Men (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	547			449			853			719		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Unemployed	23	3.17	0.49	17	2.88	0.49	28	2.82	0.61	30	2.87	0.63
Income groups												
First group (low)	116	3.10	0.46	73	3.00	0.47	149	2.95	0.41	109	2.83	0.48
Second group	142	3.20	0.43	92	3.11	0.50	152	2.98	0.48	128	2.98	0.38
Third group	119	3.35	0.63	98	3.30	0.52	181	3.23	0.56	160	3.13	0.50
Fourth group	81	3.41	0.49	104	3.26	0.48	182	3.21	0.59	155	3.15	0.49
Fifth group (high)	89	3.46	0.52	82	3.30	0.56	189	3.32	0.52	167	3.32	0.48
Men (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	671			442			182			3,863		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Region												
Eastern/urban	136	3.13	0.55	109	3.10	0.45	59	3.02	0.63	789	3.12	0.51
Eastern/rural	266	3.19	0.52	141	3.09	0.60	65	3.02	0.57	1,169	3.31	0.58
Middle/urban	44	3.05	0.37	38	2.97	0.16	13	3.08	0.28	304	3.10	0.38
Middle/rural	119	2.97	0.45	71	3.03	0.48	23	3.00	0.60	768	3.11	0.53
Western/rural	106	2.78	0.44	83	2.60	0.62	22	2.68	0.48	833	2.90	0.45
Socio-economic characteristics												
Marital status												
Single	24	3.00	0.59	16	2.44	0.73	4	3.25	0.50	593	3.24	0.57

Table 2 continued

Men (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	671			442			182			3,863		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Married	618	3.07	0.51	360	3.00	0.54	116	3.00	0.54	3,059	3.12	0.52
Divorced	4	3.00	0.00	1	3.00	–	62	2.92	0.64	35	2.83	0.51
Widowed	25	2.88	0.60	65	3.00	0.56	65	2.94	0.66	176	2.93	0.6
Educational level												
Below primary school	131	2.98	0.51	132	2.86	0.62	77	2.97	0.58	483	2.92	0.54
Primary school	302	3.06	0.52	177	3.03	0.56	21	3.10	0.30	1,011	3.03	0.51
Junior middle school	166	3.08	0.52	76	2.96	0.45	11	2.82	0.40	1,448	3.20	0.54
Senior middle school	52	3.13	0.49	28	3.07	0.47	8	3.25	0.46	609	3.20	0.51
College and above	20	3.20	0.41	29	3.21	0.41	50	3.00	0.57	312	3.26	0.49
Occupational status												
Employed	496	3.06	0.51	202	2.96	0.58	108	2.99	0.57	2,980	3.14	0.53
Retired	136	3.14	0.49	196	3.05	0.51	24	2.88	0.61	478	3.05	0.52
Student	–	–	–	–	–	–	–	–	–	200	3.36	0.50
Unemployed	39	2.77	0.54	44	2.82	0.62	40	2.85	0.58	205	2.87	0.58
Income groups												
First group (low)	112	2.82	0.47	103	2.86	0.61	26	2.96	0.60	702	2.92	0.50
Second group	106	2.89	0.50	79	2.82	0.64	39	2.90	0.60	725	3.01	0.50
Third group	169	3.11	0.48	85	2.99	0.59	31	3.10	0.54	851	3.17	0.56
Fourth group	159	3.13	0.49	72	3.13	0.41	46	3.09	0.55	784	3.20	0.52
Fifth group (high)	125	3.28	0.52	103	3.12	0.43	12	3.92	0.29	801	3.29	0.52

Table 2 continued

Women (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	540			505			928			768		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Region												
Eastern/urban	68	3.28	0.48	127	3.18	0.53	149	3.03	0.51	149	3.05	0.58
Eastern/rural	123	3.51	0.52	109	3.40	0.55	303	3.35	0.60	230	3.30	0.57
Middle/urban	33	3.18	0.39	42	3.07	0.51	80	3.14	0.38	67	3.09	0.38
Middle/rural	149	3.30	0.52	107	3.15	0.55	187	3.03	0.56	164	2.99	0.55
Western/rural	167	3.16	0.41	120	2.99	0.44	209	2.89	0.40	158	2.86	0.40
Socio-economic characteristics												
Marital status												
Single	372	3.35	0.49	35	3.23	0.49	12	2.92	0.29	8	3.00	0.53
Married	166	3.18	0.48	464	3.17	0.53	904	3.12	0.55	729	3.09	0.52
Divorced	1	3.00	–	5	2.60	0.55	8	2.50	0.76	3	2.67	0.58
Widowed	1	3.00	–	1	3.00	–	4	3.25	0.50	28	2.68	0.82
Educational level												
Below primary school	22	3.05	0.38	52	2.88	0.47	136	2.87	0.44	243	3.00	0.56
Primary school	86	3.10	0.41	75	3.11	0.45	257	3.13	0.49	190	3.04	0.58
Junior middle school	221	3.32	0.49	200	3.22	0.54	390	3.20	0.61	201	3.13	0.49
Senior middle school	151	3.39	0.50	84	3.23	0.52	92	3.03	0.54	112	3.21	0.54
College and above	60	3.33	0.51	94	3.21	0.57	53	3.11	0.38	22	3.05	0.49
Occupational status												
Employed	310	3.25	0.47	458	3.17	0.54	868	3.12	0.55	641	3.09	0.55
Retired	1	3.00	–	6	3.17	0.41	5	2.80	0.45	94	3.05	0.49
Student	200	3.40	0.50	3	3.67	0.58	1	3.00	–	–	–	–

Table 2 continued

Women (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	540			505			928			768		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Unemployed	29	3.14	0.58	38	3.11	0.45	54	2.93	0.58	33	2.91	0.46
Income groups												
First group (low)	119	3.16	0.45	95	3.08	0.48	144	2.89	0.43	116	2.91	0.54
Second group	141	3.26	0.44	95	3.03	0.54	179	2.96	0.48	152	2.93	0.48
Third group	118	3.36	0.53	103	3.23	0.60	191	3.18	0.59	165	3.07	0.54
Fourth group	87	3.29	0.50	116	3.22	0.49	190	3.21	0.60	173	3.14	0.51
Fifth group (high)	75	3.48	0.50	96	3.25	0.52	224	3.24	0.52	162	3.27	0.57
Women (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	723			438			235			4,137		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Region												
Eastern/urban	152	3.13	0.46	123	3.07	0.45	76	3.11	0.56	844	3.11	0.51
Eastern/rural	261	3.07	0.58	129	3.06	0.54	80	2.99	0.61	1,235	3.25	0.59
Middle/urban	54	3.00	0.27	38	3.03	0.16	16	2.88	0.34	330	3.08	0.37
Middle/rural	142	2.96	0.49	70	3.03	0.54	37	2.86	0.67	856	3.07	0.55
Western/rural	114	2.68	0.49	78	2.62	0.56	26	2.54	0.51	872	2.89	0.47
Socio-economic characteristics												
Marital status												
Single	7	3.00	0.00	7	3.00	0.82	–	–	–	441	3.31	0.50

Table 2 continued

Women (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	723			438			235			4,137		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Married	622	3.01	0.53	286	2.98	0.53	87	3.02	0.61	3,258	3.09	0.54
Divorced	2	3.00	0.00	4	3.50	0.58	1	3.00	–	24	2.79	0.66
Widowed	92	2.87	0.52	141	2.96	0.48	147	2.90	0.59	414	2.91	0.56
Educational level												
Below primary school	417	2.96	0.56	286	2.94	0.55	187	2.93	0.62	1,343	2.95	0.55
Primary school	170	3.00	0.52	87	2.99	0.52	35	2.91	0.45	900	3.06	0.51
Junior middle school	98	3.04	0.40	34	3.12	0.48	7	3.43	0.53	1,151	3.20	0.54
Senior middle school	31	3.23	0.43	20	3.05	0.22	3	3.33	0.58	493	3.23	0.52
College and above	7	3.00	0.00	11	3.18	0.40	3	3.00	0.00	250	3.20	0.50
Occupational status												
Employed	458	2.97	0.54	161	2.97	0.59	51	2.92	0.66	2,947	3.10	0.55
Retired	204	3.08	0.46	197	3.00	0.52	121	3.01	0.54	628	3.04	0.50
Student	–	–	–	1	3.00	–	–	–	–	205	3.40	0.50
Unemployed	61	2.90	0.60	79	2.94	0.40	63	2.86	0.64	357	2.95	0.54
Income groups												
First group (low)	131	2.73	0.45	93	2.82	0.57	53	2.72	0.60	751	2.91	0.51
Second group	114	2.96	0.53	77	2.86	0.64	33	2.76	0.61	791	3.00	0.53
Third group	188	2.99	0.54	87	3.01	0.44	51	2.94	0.61	903	3.12	0.56
Fourth group	145	3.13	0.52	77	3.09	0.40	42	3.07	0.56	830	3.17	0.53
Fifth group (high)	145	3.12	0.48	104	3.10	0.47	56	3.20	0.48	862	3.23	0.52

eastern area, SWB was higher in rural county than in urban county whereas within the middle area the SWB was similar in rural and urban counties. This can also be seen in the regressions in Table 3 with controls for age and sex. When controls for socio-economic characteristics were added, the SWB was significantly higher in rural than urban counties for both the eastern area and the middle area (but the lowest SWB was still observed in the western rural county).

4.4 SWB by Socio-economic Characteristics

Mean SWB by socio-economic characteristics is presented in Table 2, stratified by age group and sex. Those who were divorced or widowed had a lower mean compared to married or single respondents. Mean SWB increased with higher educational levels and income groups. Those who were unemployed had the lowest SWB.

In Table 4, variation in SWB was analysed by marital status, educational level, occupational status and income group, controlling for age, sex and region. For marital status SWB was lowest for divorced individuals. For occupational status SWB was lowest for unemployed individuals and highest for students. SWB increased with both education and income. These patterns were robust to controlling for all these variables simultaneously, although the sizes of the coefficients decreased somewhat. The difference in mean SWB between the highest and the lowest income groups was 0.25 without controls for region and socio-economic characteristics and 0.21 with controls for region and socio-economic characteristics.

4.5 SWB by Subjective Health Status

Mean SWB by subjective health status (SRH and EQ-5D dimensions) is presented in Table 5, stratified by age and sex. Mean SWB increased with increasing SRH. For the five EQ-5D dimensions, mean SWB typically also decreased with more problems in a dimension.

Table 6 shows the regression analyses of variation in SWB by SRH, EQ-5D dimensions and VAS score. The regression models were estimated both with and without controlling for region and socio-economic characteristics. SWB increased for each category of SRH, with a difference in SWB between very good and very bad SRH of 1.68 (without controls for region and socio-economic characteristics) and 1.58 (with controls for region and socio-economic characteristics). These differences are substantial and equal to about three standard deviations in SWB. SWB also increased significantly with the VAS measure of health status. The coefficient on VAS implies a difference in SWB between best health state (100 on the VAS) and worst health state (0 on the VAS) of 1.65 (without controls for region and socio-economic characteristics) and 1.41 (with controls for region and socio-economic characteristics).

For the EQ-5D most of the coefficients for moderate and severe problems within each dimension had a negative sign, consistent with a lower SWB for individuals with moderate or severe problems compared to individuals with no problems. However, the results were only fully consistent for the mobility dimension and the anxiety/depression dimension; implying a larger negative coefficient for severe problems than for moderate problems. The coefficients were largest for the anxiety/depression dimension with a difference in SWB of 0.50 between no problems and moderate problems and a difference in SWB of 1.10 between no problems and severe problems (with controls for region and

Table 3 Variation in SWB by age, sex and region, OLS regressions

	Model 1		Model 2		Model 3		Model 4	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Intercept	3.2898	0.0161***	3.3056	0.0171***	3.1057	0.0192***	2.9638	0.0298***
Age group (years)[a]								
25–34	−0.1053	0.0236***	−0.1043	0.0236***	−0.1273	0.0227***	−0.0848	0.0285**
35–44	−0.1584	0.0204***	−0.1576	0.0204***	−0.2008	0.0197***	−0.1527	0.0274***
45–54	−0.1983	0.0212***	−0.1977	0.0212***	−0.2400	0.0204***	−0.1826	0.0283***
55–64	−0.2625	0.0215***	−0.2618	0.0215***	−0.3336	0.0208***	−0.2339	0.0300***
65–74	−0.3102	0.0241***	−0.3102	0.0241***	−0.3648	0.0233***	−0.2384	0.0334***
75–102	−0.3282	0.0306***	−0.3260	0.0306***	−0.4072	0.0296***	−0.2360	0.0409***
Sex[b]	–	–	−0.0318	0.0119**	−0.0312	0.0114**	−0.0092	0.0119
Region[c]								
Eastern/urban	–	–	–	–	0.2673	0.0178***	0.0714	0.0264**
Eastern/rural	–	–	–	–	0.4297	0.0163***	0.2909	0.0221***
Middle/urban	–	–	–	–	0.2276	0.0237***	0.0543	0.0307
Middle/rural	–	–	–	–	0.2013	0.0177***	0.1686	0.0188***
Socio-economic characteristics								
Marital status[d]								
Married	–	–	–	–	–	–	0.0136	0.0262
Divorced	–	–	–	–	–	–	−0.2182	0.0702**
Widowed	–	–	–	–	–	–	−0.0633	0.0356
Educational level[e]								
Primary school	–	–	–	–	–	–	0.0264	0.0177
Junior school	–	–	–	–	–	–	0.0955	0.0195***
Senior school	–	–	–	–	–	–	0.1087	0.0244***
College and above	–	–	–	–	–	–	0.1131	0.0310***

Table 3 continued

	Model 1		Model 2		Model 3		Model 4	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Occupational status[f]								
Retired	–	–	–	–	–	–	0.0243	0.0216
Student	–	–	–	–	–	–	0.1017	0.0331**
Unemployed	–	–	–	–	–	–	−0.1169	0.0240***
Income groups[g]								
Second group	–	–	–	–	–	–	0.0318	0.0188
Third group	–	–	–	–	–	–	0.1058	0.0215***
Fourth group	–	–	–	–	–	–	0.1352	0.0248***
Fifth group	–	–	–	–	–	–	0.2135	0.0258***
Obs	8,000		8,000		8,000		8,000	
Adj R^2	0.0317		0.0324		0.1111		0.1333	

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

Table 4 Variation in SWB by socio-economic characteristics, controlling for age, sex and region, OLS regressions

	Model 1		Model 2		Model 3		Model 4		Model 5	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Intercept	3.1111	0.0201***	2.9981	0.0246***	3.0656	0.0222***	3.0708	0.0211***	2.9638	0.0298***
Age group (years)[a]										
25–34	−0.1147	0.0278***	−0.1160	0.0227***	−0.0858	0.0253***	−0.1242	0.0225***	−0.0848	0.0285**
35–44	−0.1861	0.0267***	−0.1709	0.0201***	−0.1602	0.0228***	−0.2048	0.0196***	−0.1527	0.0274***
45–54	−0.2233	0.0274***	−0.1980	0.0210***	−0.2027	0.0235***	−0.2419	0.0203***	−0.1826	0.0283***
55–64	−0.3129	0.0276***	−0.2516	0.0231***	−0.2989	0.0242***	−0.3227	0.0207***	−0.2339	0.0300***
65–74	−0.3295	0.0300***	−0.2732	0.0258***	−0.3280	0.0274***	−0.3481	0.0232***	−0.2384	0.0334***
75–102	−0.3469	0.0369***	−0.2973	0.0326***	−0.3642	0.0338***	−0.3821	0.0296***	−0.2360	0.0409***
Sex[b]	−0.0265	0.0115*	−0.0066	0.0119	−0.0280	0.0114*	−0.0314	0.0113**	−0.0092	0.0119
Region[c]										
Eastern/urban	0.2622	0.0178***	0.1913	0.0204***	0.2647	0.0186***	0.1003	0.0248***	0.0714	0.0264**
Eastern/rural	0.4262	0.0163***	0.3943	0.0168***	0.4308	0.0162***	0.2972	0.0220***	0.2909	0.0221***
Middle/urban	0.2292	0.0238***	0.1352	0.0266***	0.2285	0.0245***	0.0913	0.0284**	0.0543	0.0307
Middle/rural	0.1968	0.0176***	0.1638	0.0183***	0.2223	0.0178***	0.1790	0.0180***	0.1686	0.0188***
Socio-economic characteristics										
Marital status[d]										
Married	−0.0167	0.0250	–	–	–	–	–	–	0.0136	0.0262
Divorced	−0.2766	0.0705***	–	–	–	–	–	–	−0.2182	0.0702**
Widowed	−0.1120	0.0350**	–	–	–	–	–	–	−0.0633	0.0356
Educational level[e]										
Primary school	–	–	0.0502	0.0177**	–	–	–	–	0.0264	0.0177
Junior school	–	–	0.1348	0.0193***	–	–	–	–	0.0955	0.0195***
Senior school	–	–	0.1585	0.0242***	–	–	–	–	0.1087	0.0244***
College and above	–	–	0.1764	0.0304***	–	–	–	–	0.1131	0.0310***

Table 4 continued

	Model 1		Model 2		Model 3		Model 4		Model 5	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Occupational status[f]										
Retired	–	–	–	–	0.0427	0.0215*	–	–	0.0243	0.0216
Student	–	–	–	–	0.1076	0.0316***	–	–	0.1017	**
Unemployed	–	–	–	–	−0.1477	0.0240***	–	–	−0.1169	0.0240***
Income groups[g]										
Second group	–	–	–	–	–	–	0.0384	0.0188*	0.0318	0.0188
Third group	–	–	–	–	–	–	0.1238	0.0214***	0.1058	0.0215***
Fourth group	–	–	–	–	–	–	0.1627	0.0247***	0.1352	0.0248***
Fifth group	–	–	–	–	–	–	0.2539	0.0253***	0.2135	0.0258***
Obs	8,000		8,000		8,000		8,000		8,000	
Adj R^2	0.1141		0.1178		0.1181		0.1225		0.1333	

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

Table 5 SWB (mean + SD) by subjective health status, stratified by age group and sex

Men (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	547			449			853			719		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Subjective health status												
Self-rated health												
Very good	203	3.69	0.50	138	3.61	0.53	206	3.64	0.49	120	3.68	0.48
Good	312	3.06	0.36	259	3.08	0.35	505	3.07	0.38	439	3.05	0.36
Fair	31	2.90	0.40	46	2.83	0.44	131	2.81	0.57	153	2.86	0.48
Bad	1	2.00	–	6	2.17	0.41	11	2.09	0.30	6	2.33	0.52
Very bad	–	–	–	–	–	–	–	–	–	1	2.00	–
EQ-5D dimension												
Mobility												
No problems	542	3.29	0.53	439	3.21	0.50	834	3.17	0.52	701	3.12	0.49
Moderate problems	4	3.25	0.50	8	3.00	0.93	17	2.53	0.72	17	2.76	0.56
Severe problems	1	3.00	–	2	2.00	0.00	2	2.00	0.00	1	2.00	–
Self-care												
No problems	538	3.29	0.53	444	3.21	0.52	843	3.16	0.53	705	3.11	0.49
Moderate problems	8	3.13	0.35	3	3.00	0.00	8	2.50	0.53	13	2.77	0.60
Severe problems	1	3.00	–	2	2.00	0.00	2	3.00	1.41	1	3.00	–
Usual activities												
No problems	540	3.29	0.53	441	3.22	0.51	834	3.16	0.53	701	3.12	0.49
Moderate problems	6	2.83	0.41	6	2.67	0.82	14	2.86	0.66	17	2.59	0.51
Severe problems	1	3.00	–	2	2.00	0.00	5	2.40	0.55	1	3.00	–
Pain/discomfort												
No problems	539	3.29	0.53	434	3.22	0.50	822	3.18	0.51	668	3.13	0.49

Table 5 continued

Men (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	547			449			853			719		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Moderate problems	8	2.88	0.35	14	2.71	0.73	30	2.43	0.68	51	2.75	0.48
Severe problems	–	–	–	1	2.00	–	1	2.00	–	–	–	–
Anxiety/depression												
No problems	533	3.30	0.52	431	3.24	0.49	801	3.20	0.49	665	3.15	0.46
Moderate problems	13	2.69	0.48	16	2.38	0.50	49	2.49	0.68	52	2.54	0.50
Severe problems	1	2.00	–	2	2.00	0.00	3	1.67	0.58	2	2.00	0.00
Men (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	671			442			182			3,863		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Subjective health status												
Self-rated health												
Very good	92	3.59	0.58	34	3.74	0.45	68	3.10	0.46	805	3.66	0.51
Good	372	3.09	0.37	192	3.06	0.32	80	2.84	0.54	2,147	3.07	0.37
Fair	186	2.81	0.49	186	2.88	0.54	20	2.55	0.51	813	2.84	0.51
Bad	19	2.47	0.61	30	2.27	0.78	2	3.00	0.00	93	2.34	0.62
Very bad	2	2.50	0.71	407	3.00	0.55	–	–	–	5	2.60	0.55

Table 5 continued

Men (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	671			442			182			3,863		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
EQ-5D dimension												
Mobility												
No problems	628	3.09	0.50	32	2.84	0.51	140	3.06	0.56	3,691	3.14	0.52
Moderate problems	41	2.76	0.54	3	1.67	0.58	42	2.71	0.55	161	2.76	0.59
Severe problems	2	2.00	0.00	420	3.00	0.54	–	–	–	11	2.00	0.45
Self-care												
No problems	650	3.08	0.50	18	2.67	0.69	162	3.02	0.56	3,762	3.14	0.53
Moderate problems	16	2.56	0.63	4	2.00	0.82	17	2.59	0.62	83	2.69	0.60
Severe problems	5	3.00	0.71	–	–	–	3	2.67	0.58	18	2.61	0.78
Usual activities												
No problems	626	3.09	0.50	408	3.02	0.52	145	3.06	0.55	3,695	3.15	0.52
Moderate problems	39	2.64	0.54	27	2.56	0.75	31	2.74	0.58	140	2.67	0.61
Severe problems	6	2.67	0.52	7	2.29	0.76	6	2.33	0.52	28	2.43	0.57
Pain/discomfort												
No problems	583	3.13	0.48	369	3.06	0.48	139	3.06	0.55	3,554	3.17	0.51
Moderate problems	86	2.65	0.57	68	2.60	0.72	43	2.70	0.56	300	2.65	0.61
Severe problems	2	2.50	0.71	5	2.40	0.89	–	–	–	9	2.33	0.71
Anxiety/depression												
No problems	608	3.13	0.45	385	3.07	0.45	151	3.11	0.51	3,574	3.18	0.49
Moderate problems	59	2.41	0.59	52	2.48	0.73	30	2.37	0.49	271	2.47	0.60
Severe problems	4	2.25	0.50	5	1.40	0.55	1	2.00	–	18	1.83	0.51

Table 5 continued

Women (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	540			505			928			768		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Subjective health status												
Self-rated health												
Very good	197	3.64	0.48	137	3.64	0.51	197	3.68	0.50	114	3.66	0.56
Good	310	3.10	0.37	300	3.06	0.36	554	3.03	0.40	422	3.10	0.36
Fair	33	3.06	0.35	62	2.79	0.52	162	2.78	0.51	209	2.80	0.51
Bad	–	–	–	6	2.00	0.63	15	2.33	0.62	19	2.32	0.58
Very bad	–	–	–	–	–	–	–	–	–	4	1.75	0.96
EQ-5D dimension												
Mobility												
No problems	534	3.30	0.49	499	3.17	0.53	902	3.12	0.54	742	3.10	0.53
Moderate problems	6	3.00	0.00	6	3.17	0.41	24	2.71	0.62	24	2.54	0.66
Severe problems	–	–	–	–	–	–	2	3.00	0.00	2	2.00	0.00
Self-care												
No problems	530	3.30	0.49	501	3.17	0.53	917	3.11	0.55	755	3.08	0.54
Moderate problems	9	3.11	0.33	4	3.25	0.50	9	2.78	0.44	11	2.73	0.47
Severe problems	1	3.00	–	–	–	–	2	3.00	0.00	2	2.00	0.00
Usual activities												
No problems	532	3.30	0.49	495	3.18	0.52	901	3.12	0.54	733	3.10	0.53
Moderate problems	7	3.00	0.00	–	–	–	25	2.68	0.63	32	2.63	0.55
Severe problems	1	3.00	–	10	2.60	0.84	2	3.00	0.00	3	2.33	0.58
Pain/discomfort												
No problems	526	3.30	0.49	481	3.19	0.50	865	3.14	0.53	660	3.15	0.50

Table 5 continued

Women (n)	Age group (years)											
	15–24			25–34			35–44			45–54		
	540			505			928			768		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Moderate problems	14	3.07	0.27	23	2.70	0.88	59	2.64	0.61	104	2.69	0.61
Severe problems	–	–	–	1	3.00	–	4	2.75	0.50	4	1.75	0.50
Anxiety/depression												
No problems	523	3.31	0.49	473	3.22	0.48	856	3.17	0.51	701	3.15	0.48
Moderate problems	17	2.82	0.39	29	2.48	0.74	71	2.42	0.58	62	2.44	0.56
Severe problems	–	–	–	3	2.00	1.00	1	3.00	–	5	1.40	0.55

Women (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	723			438			235			4,137		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Subjective health status												
Self-rated health												
Very good	68	3.69	0.47	25	3.68	0.48	20	3.85	0.37	758	3.66	0.50
Good	354	3.06	0.34	166	3.10	0.38	65	3.11	0.40	2,171	3.07	0.37
Fair	258	2.82	0.51	208	2.88	0.50	120	2.85	0.51	1,052	2.83	0.51
Bad	41	2.44	0.67	36	2.58	0.60	29	2.45	0.57	146	2.43	0.62
Very bad	2	1.50	0.71	3	2.00	1.00	1	1.00	–	10	1.70	0.82
EQ-5D dimension												
Mobility												
No problems	675	3.02	0.50	372	3.05	0.48	174	3.06	0.53	3,898	3.12	0.53

Table 5 continued

Women (n)	Age group (years)											
	55–64			65–74			75–102			Total		
	723			438			235			4,137		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
Moderate problems	46	2.63	0.64	62	2.60	0.59	52	2.69	0.67	220	2.66	0.62
Severe problems	2	2.00	1.41	4	2.50	0.58	9	2.33	0.50	19	2.37	0.60
Self-care												
No problems	701	3.01	0.51	408	3.03	0.48	198	2.99	0.57	4,010	3.11	0.53
Moderate problems	21	2.43	0.81	28	2.29	0.60	30	2.77	0.73	112	2.63	0.69
Severe problems	1	3.00	–	2	2.50	0.71	7	2.43	0.53	15	2.53	0.52
Usual activities												
No problems	672	3.02	0.50	388	3.05	0.47	172	3.03	0.56	3,893	3.12	0.52
Moderate problems	47	2.64	0.67	40	2.45	0.64	43	2.84	0.69	204	2.66	0.65
Severe problems	4	2.25	0.96	10	2.40	0.52	20	2.50	0.51	40	2.48	0.55
Pain/discomfort												
No problems	581	3.06	0.46	325	3.07	0.45	155	3.10	0.51	3,593	3.15	0.50
Moderate problems	137	2.71	0.65	108	2.71	0.63	75	2.71	0.65	520	2.71	0.64
Severe problems	5	3.00	1.00	5	2.80	0.45	5	2.00	0.00	24	2.50	0.72
Anxiety/depression												
No problems	625	3.07	0.46	365	3.08	0.44	184	3.10	0.48	3,727	3.16	0.49
Moderate problems	95	2.55	0.65	68	2.53	0.56	47	2.43	0.62	389	2.50	0.60
Severe problems	3	2.00	1.00	5	1.80	0.84	4	2.00	0.82	21	1.86	0.79

Table 6 Variation in SWB by subjective health status, controlling for age, sex, region and socio-economic characteristics, OLS regressions

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Intercept	3.6782	0.0165***	3.4404	0.0278***	3.3147	0.0159***	3.0598	0.0282***	1.8215	0.0402***	1.8783	0.0461***
Age group (years)[a]												
25–34	−0.0369	0.0197	−0.0423	0.0247	−0.0853	0.0218***	−0.0496	0.0268	−0.0493	0.0215*	−0.0363	0.0271
35–44	−0.0394	0.0172*	−0.0547	0.0237**	−0.1285	0.0189***	−0.1046	0.0258***	−0.0534	0.0188**	−0.0609	0.0262*
45–54	−0.0141	0.0180	−0.0316	0.0246	−0.1508	0.0197***	−0.1210	0.0266***	−0.0386	0.0197	−0.0476	0.0272
55–64	−0.0172	0.0185	−0.0350	0.0262	−0.1851	0.0201***	−0.1518	0.0283***	−0.0549	0.0203**	−0.0620	0.0290*
65–74	0.0175	0.0210	0.0078	0.0294	−0.2010	0.0226***	−0.1413	0.0316***	−0.0309	0.0230	−0.0277	0.0325
75–102	0.0350	0.0265	0.0342	0.0358	−0.1696	0.0291***	−0.1142	0.0389**	−0.0045	0.0290	0.0091	0.0396
Sex[b]	0.0010	0.0099	0.0087	0.0103	−0.0092	0.0110	0.0036	0.0112	−0.0050	0.0109	0.0004	0.0113
Region[c]												
Eastern/urban	–	–	0.0229	0.0228	–	–	0.0015	0.0250	–	–	−0.1160	0.0258***
Eastern/rural	–	–	0.1240	0.0193***	–	–	0.2138	0.0210***	–	–	0.0722	0.0222**
Middle/urban	–	–	0.0461	0.0266	–	–	−0.0322	0.0291	–	–	−0.0945	0.0296**
Middle/rural	–	–	0.1034	0.0163***	–	–	0.1291	0.0178***	–	–	0.0527	0.0182**
Socio-economic characteristics												
Marital status[d]												
Married	–	–	0.0289	0.0226	–	–	−0.0088	0.0246	–	–	0.0332	0.0248
Divorced	–	–	−0.1284	0.0607*	–	–	−0.1728	0.0660**	–	–	−0.1861	0.0666**
Widowed	–	–	−0.0341	0.0307	–	–	−0.0504	0.0335	–	–	−0.0255	0.0338
Educational level[e]												
Primary school	–	–	0.0171	0.0153	–	–	0.0009	0.0167	–	–	0.0009	0.0168
Junior school	–	–	0.0489	0.0169**	–	–	0.0704	0.0184***	–	–	0.0489	0.0186**
Senior school	–	–	0.0649	0.0211**	–	–	0.0817	0.0230***	–	–	0.0633	0.0232**
College and above	–	–	0.0783	0.0268**	–	–	0.0967	0.0291***	–	–	0.0638	0.0294*
Occupational status[f]												
Retired	–	–	0.0506	0.0187**	–	–	0.0303	0.0203	–	–	0.0445	0.0205*
Student	–	–	0.0675	0.0286*	–	–	0.0973	0.0311**	–	–	0.0945	0.0314**

Table 6 continued

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Unemployed	–	–	−0.0175	0.0208	–	–	−0.0809	0.0227***	–	–	−0.0334	0.0229
Income groups[g]												
Second group	–	–	0.0098	0.0162	–	–	0.0163	0.0177	–	–	−0.0046	0.0178
Third group	–	–	0.0709	0.0185***	–	–	0.0901	0.0202***	–	–	0.0734	0.0204***
Fourth group	–	–	0.0762	0.0214***	–	–	0.1195	0.0233***	–	–	0.0934	0.0236***
Fifth group	–	–	0.1515	0.0223***	–	–	0.1938	0.0242***	–	–	0.1803	0.0245***
Subjective health status												
Self-rated health[h]												
Good	−0.5917	0.0133***	−0.5328	0.0135***	–	–	–	–	–	–	–	–
Fair	−0.8358	0.0162***	−0.7646	0.0166***	–	–	–	–	–	–	–	–
Bad	−1.2815	0.0317***	−1.1786	0.0318***	–	–	–	–	–	–	–	–
Very bad	−1.6802	0.1152***	−1.5764	0.1134***	–	–	–	–	–	–	–	–
EQ-5D dimension[i]												
Mobility												
Moderate problems	–	–	–	–	−0.0117	0.0366	−0.0075	0.0352	–	–	–	–
Severe problems	–	–	–	–	−0.2536	0.1254*	−0.2420	0.1206*	–	–	–	–
Self-care												
Moderate problems	–	–	–	–	−0.0085	0.0448	−0.0264	0.0433	–	–	–	–
Severe problems	–	–	–	–	0.2591	0.1271*	0.2265	0.1225	–	–	–	–
Usual activities												
Moderate problems	–	–	–	–	−0.0101	0.0388	0.0626	0.0376	–	–	–	–
Severe problems	–	–	–	–	−0.1084	0.0867	−0.0380	0.0838	–	–	–	–
Pain/discomfort												
Moderate problems	–	–	–	–	−0.1736	0.0225***	−0.1593	0.0217***	–	–	–	–
Severe problems	–	–	–	–	−0.0208	0.0956	−0.0558	0.0920	–	–	–	–
Anxiety/depression												
Moderate problems	–	–	–	–	−0.5587	0.0231***	−0.5015	0.0224***	–	–	–	–

Table 6 continued

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE	β-estimate	SE
Severe problems	–	–	–	–	−1.1975	0.0853***	−1.0990	0.0822***	–	–	–	–
VAS value[j]	–	–	–	–	–	–	–	–	0.0165	0.0004***	0.0141	0.0005***
Obs	8,000		8,000		8,000		8,000		8,000		8,000	
Adj R^2	0.3267		0.3539		0.1730		0.2360		0.1944	–	0.2201	–

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

[h] Base line category: very good

[i] Base line category: no problems

[j] VAS as continuours variable 0–100

socio-economic characteristics; without these controls the coefficients were somewhat larger).

From Table 6 we can also see that controlling for subjective health status is important for the variation in SWB with age. After controlling for SRH, region and socio-economic characteristics, SWB was relatively constant with age, and only one age coefficient was significant (35–44 years with a negative coefficient). The pattern was similar when VAS was used as the health measure, with only two significant age coefficients (35–44 and 55–64 years with negative coefficients). When EQ-5D was used as the health measure SWB decreased with age until the 35–44 year age group and was then about constant with age. Especially when we controlled for SRH or VAS there was even a tendency for a U-shaped pattern with respect to age, with lower SWB in the middle-aged age groups. A U-shaped age pattern is the most typical result in previous studies (Appleton and Song 2008; Conceicão and Bandura 2008; Diener et al. 1999; Dolan et al. 2008; Jiang et al. 2012; Knight et al. 2009; Monk-Turner and Turner 2011).

After controlling for subjective health status (and region and socio-economic characteristics), divorced individuals still had the lowest SWB among the marital status categories (Table 6). But SWB was no longer significantly lower for unemployed individuals compared to employed individuals, with a control for SRH or VAS (with a control for EQ-5D the coefficient for unemployed was still significant). Lower subjective health status thus seems to be an important factor for the lower SWB of unemployed individuals. Students still had a higher SWB than employed individuals after controlling for subjective health status. SWB increased with both education and income even after controlling for subjective health status, although the size of the coefficients decreased. The difference in SWB between the highest and the lowest income category was now between 0.15 and 0.19, depending on which of the three health measures were controlled for.

4.6 Ordered Logit Models

Tables 7, 8 and 9 of Appendices show results from the ordered logit models; the sign and significance of the coefficients are similar to that for the OLS models, with only a few exceptions[1]. This is in line with previous studies using both OLS and ordered logit or ordered probit models (Ferrer-i-Carbonell and Frijters 2004; Graham et al. 2011; Knight and Gunatilaka 2010a; Mukuria and Brazier 2013).

5 Discussion

Most of our findings are consistent with previous studies in China: education and income are positively associated with SWB (Appleton and Song 2008; Chen and Davey 2008a; Knight et al. 2009; Knight and Gunatilaka 2010a); being divorced or unemployed has a negative association with SWB (Jiang et al. 2012; Shu and Zhu 2008); health status is

[1] Table 6 and Table 9 of Appendix, Model 3, coefficients for having severe problems on the mobility and self-care dimensions (significant in OLS, but not in ordered logit models); Model 4, coefficient for having severe problems on the mobility dimension (significant in OLS, but not in ordered logit models) and for having moderate problems on the usual activities dimension (significant in ordered logit models, but not in OLS).

positively associated with SWB (Appleton and Song 2008; Chyi and Mao 2011; Knight et al. 2009; Monk-Turner and Turner 2011).

In our study, SWB decreased with increasing age when not controlling for other variables. After controlling for region and socio-economic characteristics SWB decreased with age until the age group 55–64 years and was then approximately constant. Other studies have found a U-shaped relationship between age and SWB, with the lowest SWB between 30 to 50 years, depending on the study settings (Appleton and Song 2008; Dolan et al. 2008; Jiang et al. 2012; Knight and Gunatilaka 2010a; Monk-Turner and Turner 2011). However, after controlling for also subjective health status (SRH or VAS), SWB was relatively constant with age, with a tendency for a somewhat lower SWB in the middle-aged age groups and a U-shaped age pattern, which is similar to previous findings in China (Appleton and Song 2008; Knight et al. 2009; Knight and Gunatilaka 2010a). Contrary to previous studies in China we found that women had lower SWB than men, but after controlling for region and socio-economic characteristics this difference was not significant.

We found that income was consistently positively associated with SWB, and that the income gradient still existed after controlling for region, other socio-economic characteristics and subjective health status. However, although there is a large income gap between urban and rural areas (Davey et al. 2007; Knight et al. 2009; Knight and Gunatilaka 2010a), we found that the SWB was not higher in the urban counties for the eastern and middle areas. For the eastern area SWB was even higher in the rural than in the urban county. After controlling for socio-economic characteristics this was the case also for middle area. After controlling also for subjective health status, the SWB was still higher in the eastern and middle rural counties. There are several possible explanations for this. First, family and community support is stronger in rural areas compared to urban areas, and rural residents feel better about personal safety (Davey et al. 2007). Second, during the process of rapid economic progress, urban residents have been influenced more by certain problems: for example, the withdrawal of institutional support from publicly owned work units, the risk of unemployment and the increasing gap between different social classes (Appleton and Song 2008; Jiang et al. 2012; Knight and Gunatilaka 2010a). Finally, the perception of relative status—which is assessed by comparing one's current situation over time, or with other individuals in the local community—may be important for current SWB (Dolan et al. 2008; Easterlin 1995; Ferrer-i-Carbonell 2005; Wildman and Jones 2003). In rural areas, due to limited information and narrow reference groups (people from the same village), residents might have lower expectations. Meanwhile, income, living and health conditions have increased over time and there is an expectation for improvement in the future as well; therefore, rural residents may have a positive perception of their relative status (Davey et al. 2007; Knight et al. 2009). In contrast to this, urban residents might have more information and broader reference groups (at a provincial or national level). High expectations among urban residents and the widening gap in social status in urban areas may give rise to a sense of relative deprivation, which makes people feel unhappy or dissatisfied with their lives (Appleton and Song 2008; Knight and Gunatilaka 2010a).

We found a strong positive association between subjective health status and SWB, an effect that remained after controlling for age, sex, region and socio-economic characteristics. This is similar to previous studies (Appleton and Song 2008; Davey et al. 2007; Dolan and Metcalfe 2012; Graham et al. 2011; Jiang et al. 2012; Mukuria and Brazier 2013). Furthermore, in our study we also investigated the association between five different dimensions of health and SWB and found the strongest

association for the anxiety/depression dimension. This finding is in line with previous studies: when individuals' current experiences are referred to, the mental health dimension has a larger impact than the physical health dimension, not only on health valuation (Burström et al. 2013; Dolan 2008; Leidl and Reitmeir 2011), but also on SWB (Dolan and Metcalfe 2012; Graham et al. 2011; Mukuria and Brazier 2013). One possible explanation could be that the ability to adapt is different for physical and mental health dimensions, with the latter being more difficult to adapt to (Dolan and Kahneman 2008; Mukuria and Brazier 2013).

The definition of SWB remains complex and culture-related (Lu 2006; Oishi 2010). In a comparison study of perception of SWB between East Asian and Western countries, Lu and Gilmour have discussed the influence of culture on SWB (Lu 2006). Generally, residents of East Asian countries tend to report better SWB than residents of Western countries, with similar or higher GNPs, which might be due to culture differences. East Asian cultures possess a stronger socially orientated SWB: happiness should be based on the fulfilment of social role obligations (Lu 2006). In contrast, Western cultures possess a stronger individual-orientated SWB: one should be responsible for one's own SWB and actively strive for it (Shu and Zhu 2008). In China, a qualitative study by Lu also revealed that Chinese people's perception of happiness is different from that of people from Western cultures (Lu 2001). For example, Chinese culture emphasizes the importance of keeping low desires and being sincerely grateful for life; in it, the relationship between happiness and unhappiness is seen as a 'never-ending cyclic process' that enables people to more easily accept the current situation.

Both life satisfaction and happiness questions can be used to measure SWB; however, they might represent different aspects of SWB. It would be interesting to investigate further the relation between these two types of questions in China. We used the happiness question from the WVS, which contains four categories. Other happiness questions use three (Yang 2008) or five categories (Knight and Gunatilaka 2010a), or ask about duration of feeling happy (Monk-Turner and Turner 2011). Differences in the design of the SWB question might influence the results and add difficulties in comparison with other studies. Previous studies regarding SWB are mainly quantitative (Conceicão and Bandura 2008; Dolan et al. 2008). However, qualitative studies are needed for further understanding and interpretation (White et al. 2012). Furthermore, as SWB is a culture-related concept (Lu 2006; Oishi 2010), qualitative studies amongst different population groups would facilitate the understanding of how well the existing measures truly capture the concept of well-being. There are also limitations with respect to defining socio-economic status, interviewer bias and ceiling effects of the EQ-5D instrument which have been discussed elsewhere (Sun et al. 2011a, 2011b).

Inner-immigrants in China refer to persons who have family registration (*Hukou*) in rural areas but who live in urban areas. This group is characterised by having a low level of education, poor economic conditions and a low standard of living. We were unable to include this group in the present study. However, some studies have investigated SWB among inner-immigrants in China (Akay et al. 2012; Jiang et al. 2012; Knight and Gunatilaka 2010b; Nielsen et al. 2009). These studies have found that SWB among the inner-immigrants was not only worse than that among other urban residents but also worse than that among rural residents. This could reflect their low income in comparison to other

urban residents (Akay et al. 2012; Jiang et al. 2012) and a broader reference group compared to rural residents (Akay et al. 2012; Knight and Gunatilaka 2010a).

This study has contributed to our knowledge about SWB in China and the relation between SWB and different dimensions of health. In line with other studies, we found that SWB varies with socio-economic characteristics in the expected way, that is, respondents with higher educational and income level had better SWB, respondents being divorced or unemployed had worse SWB. SWB varies strongly with subjective health status (self-rated health, EQ-5D dimensions and VAS). Of the dimension of health, the anxiety/depression dimension was the most important for SWB. The reported SWB was also higher in the rural county than in the urban county in the same areas, after controlling for socio-economic characteristics and subjective health status, which may be due to different expectations and different comparisons in rural and urban areas. Further studies using a qualitative approach, could shed light on how the concept of SWB is understood in different population groups.

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Appendix

See Tables 7, 8 and 9.

Table 7 Variation in SWB by age, sex and region, ordered logit regressions, HHS 2010

	Model 1		Model 2		Model 3		Model 4	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept 1	−0.7164	0.0624***	−0.6532	0.0668***	−1.6498	0.0870***	−2.3430	0.1373***
Intercept 2	3.1189	0.0747***	3.1851	0.0791***	2.5276	0.0889***	1.9401	0.1344***
Age group (years)[a]								
25–34	−0.3924	0.0931***	−0.3892	0.0932***	−0.5236	0.0963***	−0.3611	0.1252**
35–44	−0.5960	0.0812***	−0.5943	0.0812***	−0.8306	0.0843***	−0.6458	0.1211***
45–54	−0.7811	0.0854***	−0.7804	0.0854***	−1.0210	0.0883***	−0.7930	0.1253***
55–64	−1.0600	0.0881***	−1.0585	0.0881***	−1.4513	0.0917***	−1.0315	0.1340***
65–74	−1.2368	0.1002***	−1.2381	0.1002***	−1.5656	0.1035***	−1.0258	0.1503***
75–102	−1.3577	0.1287***	−1.3512	0.1287***	−1.8032	0.1335***	−1.0834	0.1851***
Sex[b]	–	–	−0.1275	0.0491**	−0.1328	0.0498**	−0.0308	0.0530
Region[c]								
Eastern/urban	–	–	–	–	1.2280	0.0823***	0.3516	0.1203**
Eastern/rural	–	–	–	–	1.9762	0.0774***	1.3651	0.1029***
Middle/urban	–	–	–	–	1.0166	0.1085***	0.2234	0.1406
Middle/rural	–	–	–	–	0.9484	0.0812***	0.8179	0.0878***
Socio-economic characteristics								
Marital status[d]								
Married	–	–	–	–	–	–	0.0469	0.1161
Divorced	–	–	–	–	–	–	−0.9977	0.3123**
Widowed	–	–	–	–	–	–	−0.2738	0.1596
Educational level[e]								
Primary school	–	–	–	–	–	–	0.1387	0.0810
Junior school	–	–	–	–	–	–	0.4665	0.0890***
Senior school	–	–	–	–	–	–	0.5273	0.1103***

Table 7 continued

	Model 1		Model 2		Model 3		Model 4	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
College and above	–	–	–	–	–	–	0.5590	0.1382***
Occupational status[f]								
Retired	–	–	–	–	–	–	0.1215	0.0985
Student	–	–	–	–	–	–	0.3967	0.1408**
Unemployed	–	–	–	–	–	–	−0.5605	0.1109***
Income groups[g]								
Second group	–	–	–	–	–	–	0.1368	0.0862
Third group	–	–	–	–	–	–	0.5267	0.0986***
Fourth group	–	–	–	–	–	–	0.6352	0.1131***
Fifth group	–	–	–	–	–	–	0.9603	0.1171***
Obs	8,000		8,000		8,000		8,000	

Intercepts: estimated log odds when the predictor variables are evaluated at zero; Intercept 1 Very happy vs (rather happy and not happy); Intercept 2 (Very happy and rather happy) vs not happy

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

Table 8 Variation in SWB by socio-economic characteristics, controlling for age, sex and region, ordered logit regressions

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept 1	−1.6285	0.0908***	−2.1638	0.1129***	−1.8228	0.1007***	−1.8301	0.0974***	−2.3430	0.1373***
Intercept 2	2.5636	0.0929***	2.0455	0.1104***	2.3888	0.1016	2.3927	0.0974***	1.9401	0.1344***
Age group (years)[a]										
25–34	−0.4653	0.1197***	−0.4789	0.0970***	−0.3636	0.1089***	−0.5215	0.0968***	−0.3611	0.1252**
35–44	−0.7646	0.1156***	−0.7026	0.0867***	−0.6774	0.0986***	−0.8629	0.0849***	−0.6458	0.1211***
45–54	−0.9457	0.1191***	−0.8370	0.0913***	−0.8850	0.1021***	−1.0461	0.0888***	−0.7930	0.1253***
55–64	−1.3592	0.1213***	−1.0848	0.1021***	−1.3318	0.1065***	−1.4176	0.0922***	−1.0315	0.1340***
65–74	−1.4108	0.1324***	−1.1558	0.1150***	−1.4343	0.1219***	−1.5072	0.1045***	−1.0258	0.1503***
75–102	−1.5427	0.1648***	−1.3170	0.1465***	−1.6569	0.1518***	−1.7145	0.1346***	−1.0834	0.1851***
Sex[b]	−0.1140	0.0503*	−0.0206	0.0521	−0.1192	0.0501*	−0.1332	0.0500**	−0.0308	0.0530
Region[c]										
Eastern/urban	1.2105	0.0825***	0.8876	0.0931***	1.2273	0.0864***	0.4796	0.1126***	0.3516	0.1203**
Eastern/rural	1.9649	0.0774***	1.8197	0.0796***	2.0004	0.0779***	1.3745	0.1015***	1.3651	0.1029***
Middle/urban	1.0217	0.1088***	0.6054	0.1210***	1.0249	0.1127***	0.3946	0.1296**	0.2234	0.1406
Middle/rural	0.9325	0.0814***	0.7797	0.0839***	1.0552	0.0827***	0.8513	0.0835***	0.8179	0.0878***
Socio-economic characteristics										
Marital status[d]										
Married	−0.0805	0.1080	–	–	–	–	–	–	0.0469	0.1161
Divorced	−1.2420	0.3086***	–	–	–	–	–	–	−0.9977	0.3123**
Widowed	−0.4895	0.1537**	–	–	–	–	–	–	−0.2738	0.1596
Educational level[e]										
Primary school	–	–	0.2410	0.0798**	–	–	–	–	0.1387	0.0810
Junior school	–	–	0.6340	0.0871***	–	–	–	–	0.4665	0.0890***
Senior school	–	–	0.7371	0.1084***	–	–	–	–	0.5273	0.1103***

Table 8 continued

	Model 1		Model 2		Model 3		Model 4		Model 5	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
College and above	–	–	0.8156	0.1347***	–	–	–	–	0.5590	0.1382***
Occupational status[f]										
Retired	–	–	–	–	0.2084	0.0964*	–	–	0.1215	0.0985
Student	–	–	–	–	0.4107	0.1321**	–	–	0.3967	0.1408**
Unemployed	–	–	–	–	−0.6853	0.1099***	–	–	−0.5605	0.1109***
Income groups[g]										
Second group	–	–	–	–	–	–	0.1691	0.0861*	0.1368	0.0862
Third group	–	–	–	–	–	–	0.6122	0.0981***	0.5267	0.0986***
Fourth group	–	–	–	–	–	–	0.7572	0.1123***	0.6352	0.1131***
Fifth group	–	–	–	–	–	–	1.1352	0.1148***	0.9603	0.1171***
Obs	8,000		8,000		8,000		8,000		8,000	

Intercepts: estimated log odds when the predictor variables are evaluated at zero; Intercept 1 Very happy vs (rather happy and not happy); Intercept 2 (Very happy and rather happy) vs not happy

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

Table 9 Variation in SWB by health status, controlling for age, sex, region and socio-economic characteristics, ordered logit regressions

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Intercept 1	0.8063	0.0860***	−0.5928	0.1575***	−0.6779	0.0680***	−2.0592	0.1421***	−8.0124	0.2222***	−7.9273	0.2513***
Intercept 2	5.8324	0.1123***	4.6880	0.1645***	3.7279	0.0883***	2.6942	0.1449***	−3.4041	0.1942***	−3.1596	0.2259***
Age group (years)[a]												
25–34	−0.1944	0.1081	−0.2365	0.1411	−0.3726	0.0951***	−0.2593	0.1281*	−0.2111	0.0971*	−0.1834	0.1282
35–44	−0.2020	0.0947*	−0.2939	0.1364*	−0.5436	0.0828***	−0.5074	0.1240***	−0.2063	0.0849*	−0.2881	0.1244*
45–54	−0.0762	0.0997	−0.1682	0.1418	−0.6678	0.0873***	−0.5993	0.1286***	−0.1650	0.0900	−0.2502	0.1298
55–64	−0.1066	0.1024	−0.1962	0.1510	−0.8523	0.0905***	−0.7776	0.1382***	−0.2563	0.0934**	−0.3326	0.1395*
65–74	0.1269	0.1168	0.0831	0.1687	−0.8892	0.1034***	−0.6996	0.1557***	−0.1104	0.1074	−0.1479	0.1570
75–102	0.1597	0.1459	0.1387	0.2043	−0.8067	0.1342***	−0.6438	0.1930***	−0.0572	0.1361	−0.0583	0.1924
Sex[b]	0.0093	0.0552	0.0621	0.0592	−0.0401	0.0505	0.0216	0.0548	−0.0205	0.0508	0.0101	0.0543
Region[c]												
Eastern area/urban	–	–	0.1724	0.1319	–	–	0.0705	0.1251	–	–	−0.5306	0.1262***
Eastern area/rural	–	–	0.7643	0.1131***	–	–	1.1110	0.1061***	–	–	0.4133	0.1089***
Middle area/urban	–	–	0.2779	0.1551	–	–	−0.1435	0.1473	–	–	−0.4686	0.1461**
Middle area/rural	–	–	0.6299	0.0959***	–	–	0.6892	0.0918***	–	–	0.3007	0.0902***
Socio-economic characteristics												
Marital status[d]												
Married	–	–	0.1333	0.1290	–	–	−0.0378	0.1182	–	–	0.1583	0.1187
Divorced	–	–	−0.7649	0.3467*	–	–	−0.9179	0.3465**	–	–	−0.9789	0.3287**
Widowed	–	–	−0.1795	0.1744	–	–	−0.2154	0.1651	–	–	−0.0859	0.1636
Educational level[e]												
Primary school	–	–	0.1054	0.0884	–	–	0.0098	0.0845	–	–	0.0153	0.0829
Junior school	–	–	0.3176	0.0977**	–	–	0.3653	0.0920***	–	–	0.2652	0.0910**
Senior school	–	–	0.4062	0.1222***	–	–	0.4293	0.1134***	–	–	0.3475	0.1124**

Table 9 continued

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
College and above	–	–	0.5230	0.1545***	–	–	0.5126	0.1417***	–	–	0.3731	0.1416**
Occupational status[f]												
Retired	–	–	0.3169	0.1077**	–	–	0.1833	0.1017	–	–	0.2638	0.1005**
Student	–	–	0.3622	0.1624*	–	–	0.4020	0.1424**	–	–	0.3948	0.1431**
Unemployed	–	–	−0.0955	0.1188	–	–	−0.4434	0.1169***	–	–	−0.1761	0.1138
Income groups [g]												
Second group	–	–	0.0467	0.0938	–	–	0.0966	0.0913	–	–	−0.0340	0.0881
Thrid group	–	–	0.4417	0.1069***	–	–	0.5010	0.1019***	–	–	0.4002	0.1000***
Fourth group	–	–	0.4512	0.1236***	–	–	0.6134	0.1164***	–	–	0.4801	0.1149***
Fifth group	–	–	0.8497	0.1288***	–	–	0.9354	0.1201***	–	–	0.8613	0.1189***
Subjective health status												
Self-rated health[h]												
Good	−2.7388	0.0717***	−2.5181	0.0739***	–	–	–	–	–	–	–	–
Fair	−4.3431	0.1043***	−4.0989	0.1076***	–	–	–	–	–	–	–	–
Bad	−6.1078	0.1644***	−5.7880	0.1712***	–	–	–	–	–	–	–	–
Very bad	−6.5426	0.5579***	−6.2357	0.5704***	–	–	–	–	–	–	–	–
EQ-5D dimension[i]												
Mobility												
Moderate problems	–	–	–	–	−0.0759	0.1686	−0.0835	0.1729	–	–	–	–
Severe problems	–	–	–	–	−1.0674	0.6314	−1.0318	0.6182	–	–	–	–
Self-care												
Moderate problems	–	–	–	–	−0.0399	0.2025	−0.1405	0.2122	–	–	–	–
Severe problems	–	–	–	–	0.9626	0.6036	0.8316	0.6090	–	–	–	–
Usual activities												
Moderate problems	–	–	–	–	0.0366	0.1754	0.4145	0.1827*	–	–	–	–

Table 9 continued

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
Severe problems	–	–	–	–	−0.5561	0.4222	−0.2344	0.4288	–	–	–	–
Pain/discomfort												
Moderate problems	–	–	–	–	−0.7753	0.1074***	−0.7550	0.1107***	–	–	–	–
Severe problems	–	–	–	–	−0.3593	0.4624	−0.5473	0.4773	–	–	–	–
Anxiety/depression												
Moderate problems	–	–	–	–	−2.5534	0.1077***	−2.4149	0.1115***	–	–	–	–
Severe problems	–	–	–	–	−4.2133	0.4759***	−3.9102	0.4877***	–	–	–	–
VAS value [j]	–	–	–	–	–	–	–	–	0.0805	0.0023***	0.0701	0.0025***
Obs	8,000		8,000		8,000		8,000		8,000		8,000	

Intercepts: estimated log odds when the predictor variables are evaluated at zero; Intercept 1 Very happy vs (rather happy and not happy); Intercept 2 (Very happy and rather happy) vs not happy

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

[a] Base line category: age group 15–24 years

[b] Base line category: men

[c] Base line category: western/rural

[d] Base line category: single

[e] Base line category: below primary school

[f] Base line category: employed

[g] Base line category: first group (low)

[h] Base line category: very good

[i] Base line category: no problems

[j] VAS as continuours variable 0–100

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