

ONLINE APPENDIX

Wellbeing Adjusted Life Years

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Chapter 2: Bridging the greatest wellbeing divides

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Chapter 6: Symptoms of wellbeing

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TABLE OF CONTENTS

CHAPTER 4

Table A1: Summary statistics and variable descriptions (SHARE)	3
Table A2: Control variables frequency table and descriptions (SHARE)	4
Table A3: Representation of disease variables in waves (SHARE)	6
Table A4: Representation of disease variables in countries (SHARE)	7
Table A5: Life satisfaction and disease (OLS)	8
Table A6: Life satisfaction and context variables (OLS)	9
Table A7: Life satisfaction and disease robustness check (Fixed effects)	10

CHAPTER 6

Table A8: Symptom variable descriptions and summary statistics (SHARE)	11
Table A9: Symptom predictors of life satisfaction (SHARE)	13
Table A10: Life satisfaction and symptoms of disease (OLS)	15

CHAPTER 7

Table A11: Summary statistics and variable descriptions (Fox Insight)	16
Table A12: Life satisfaction of Parkinson's patients in years since diagnosis (Figure 7.1)	17
Table A13: Life satisfaction depending on years since Parkinson's diagnosis (OLS)	18
Table A14: Life satisfaction of Parkinson's patients and healthy population (OLS)	19
Table A15: Wellbeing burden of Parkinson's disease for patients diagnosed at different ages (Figure 7.3)	20
Table A16: Changes in life satisfaction depending on treatment and years since diagnosis (Figure 7.4)	22
Table A17: Life satisfaction and Parkinson's treatments (OLS)	26

CHAPTER 8

Table A18: Life satisfaction and pollution in European cities (Eurobarometer)	27
Table A19: Summary statistics and variable descriptions (Eurobarometer)	29
Table A20: Life satisfaction and pollution in European cities (OLS)	32

CHAPTER 4

Table A1: Summary statistics and variable descriptions (SHARE)

	Observations	Mean	Std. Dev.	Min	Max
Life satisfaction ¹	279000	7.582	1.83	0	10
Depression ²	223000	.176	.38	0	1
Alzheimer's ³	276000	.014	.118	0	1
Anxiety disorders ³	188000	.05	.217	0	1
Arthritis ³	85729	.242	.429	0	1
Asthma ³	42452	.048	.214	0	1
Cataracts ³	271000	.057	.231	0	1
Diabetes ³	272000	.128	.334	0	1
High cholesterol ³	258000	.173	.379	0	1
Hypertension ³	241000	.314	.464	0	1
Lung disease ³	270000	.06	.237	0	1
Osteoarthritis ³	176000	.188	.391	0	1
Osteoporosis ³	42165	.081	.273	0	1
Parkinson's ³	278000	.007	.086	0	1
Rheumatoid arthritis ³	181000	.085	.279	0	1
Stroke ³	275000	.026	.158	0	1
Ulcer ³	273000	.025	.155	0	1
Age	279000	66.991	10.074	45	99
Log (household income + x) ⁴	279000	7.768	4.145	0	16.123
Log (household net worth + y) ⁴	279000	16.139	.038	14.373	17.65
Household debt	279000	.018	.134	0	1
Male	279000	.438	.496	0	1
Female	279000	.562	.496	0	1

¹ "On a scale from 0 to 10 where 0 means completely dissatisfied and 10 means completely satisfied, how satisfied are you with your life?" [0 = Completely dissatisfied / 10 = Completely satisfied]

² Based on the 13-point EURO-D scale using a cutoff of 5 points or higher as indicative of depression. For additional details and discussion see Box 5.1 in Chapter 5 of the report.

³ "Do you currently have any of the conditions on this card? With this we mean that a doctor has told you that you have this condition, and that you are either currently being treated for or bothered by this condition."

- Alzheimer's disease, dementia, organic brain syndrome, senility or any other serious memory impairment
- Affective or emotional disorders, including anxiety, nervous or psychiatric problems
- Arthritis
- Asthma
- Cataracts
- Diabetes or high blood sugar
- High blood cholesterol
- High blood pressure or hypertension
- Chronic lung disease such as chronic bronchitis or emphysema
- Osteoarthritis, or other rheumatism
- Osteoporosis
- Parkinson's disease
- Rheumatoid arthritis
- A stroke or cerebral vascular disease
- Stomach or duodenal ulcer, peptic ulcer

⁴ Constants added to adjust for zero income (x = 1) and negative net worth (y = 10,000,000).

Table A2: Control variables frequency table and descriptions (SHARE)

	Observations	Percent	Cumulative
Area - A big city	39825	14.28	14.28
Area - The suburbs or outskirts of a big city	29133	10.44	24.72
Area - A large town	45388	16.27	40.99
Area - A small town	68511	24.56	65.54
Area - A rural area or village	96124	34.46	100.00
Age - 45-49	3370	1.21	1.21
Age - 50-54	26508	9.50	10.71
Age - 55-59	44053	15.79	26.50
Age - 60-64	49542	17.76	44.26
Age - 65-69	47969	17.19	61.45
Age - 70-74	39932	14.31	75.77
Age - 75-79	31345	11.24	87.00
Age - 80-84	21512	7.71	94.71
Age - 85-89	10934	3.92	98.63
Age - 90-94	3294	1.18	99.81
Age - 95-99	522	0.19	100.00
Civil status - Married, living with spouse	193756	69.45	69.45
Civil status - Registered partnership	4109	1.47	70.92
Civil status - Married, not living with spouse	3380	1.21	72.14
Civil status - Never married	14648	5.25	77.39
Civil status - Divorced	22410	8.03	85.42
Civil status - Widowed	40678	14.58	100.00
Children - 0	76718	27.50	27.50
Children - 1	39667	14.22	41.72
Children - 2	92605	33.19	74.91
Children - 3	43358	15.54	90.45
Children - 4	16016	5.74	96.19
Children - 5	6001	2.15	98.35
Children - 6+	4616	1.65	100.00
Education - None	11541	4.14	4.14
Education - Isced-97 code 1	51689	18.53	22.66
Education - Isced-97 code 2	51038	18.29	40.96
Education - Isced-97 code 3	94156	33.75	74.71
Education - Isced-97 code 4	12351	4.43	79.14
Education - Isced-97 code 5	56120	20.12	99.25
Education - Isced-97 code 6	2086	0.75	100.00
Employment - Retired	162580	58.28	58.28
Employment - Employed or self-employed	70933	25.43	83.70
Employment - Unemployed	7745	2.78	86.48
Employment - Permanently sick	9374	3.36	89.84
Employment - Homemaker	24468	8.77	98.61
Employment - Other	3881	1.39	100.00
Austria	16234	5.82	5.82
Belgium	23585	8.45	65.21
Bulgaria	1935	0.69	96.56
Croatia	4776	1.71	95.17
Cyprus	1160	0.42	96.97
Czech Republic	20851	7.47	72.68
Denmark	15493	5.55	48.25
Estonia	21277	7.63	93.46
Finland	1782	0.64	97.61
France	19730	7.07	42.70
Germany	17500	6.27	12.09

Greece	11116	3.98	52.24
Hungary	44451	1.60	79.84
Ireland	999	0.36	76.73
Italy	19859	7.12	35.63
Latvia	1677	0.60	98.21
Lithuania	1935	0.69	95.86
Luxembourg	4209	1.51	78.24
Malta	1180	0.42	98.63
Netherlands	9293	3.33	20.81
Poland	10294	3.69	76.37
Portugal	3872	1.39	81.22
Romania	1945	0.70	99.33
Slovakia	1866	0.67	100.00
Slovenia	12846	4.60	85.83
Spain	21470	7.70	28.51
Sweden	15037	5.39	17.48
Switzerland	12609	4.52	56.76
Wave - 2	32808	11.76	11.76
Wave - 4	54840	19.66	31.42
Wave - 5	59866	21.46	52.88
Wave - 6	61850	22.17	75.05
Wave - 7	69617	24.95	100.00
2006	7505	2.69	2.69
2007	25303	9.07	11.76
2010	1537	0.55	12.31
2011	51559	18.48	30.79
2012	1744	0.63	31.42
2013	59866	21.46	52.88
2015	61850	22.17	75.05
2017	69606	24.95	100.00
2018	11	0.00	100.00

Table A3: Representation of disease variables in waves (SHARE)

	1	2	3	4	5	6	7
Arthritis		X		X			
Asthma		X		X			
Depression		X		X	X	X	X
Alzheimer's		X		X	X	X	X
Anxiety disorders					X	X	X
Cataracts		X		X	X	X	X
High cholesterol		X		X	X	X	X
Diabetes		X		X	X	X	X
Hypertension		X		X	X	X	X
Lung disease		X		X	X	X	X
Osteoarthritis					X	X	X
Osteoporosis		X		X	X	X	X
Parkinson's		X		X	X	X	X
Rheumatoid arthritis					X	X	X
Stroke		X		X	X	X	X
Ulcer		X		X	X	X	X

Table A5: Life satisfaction and disease (OLS)

		Life satisfaction		Obs.	R-squared
(1)	Depression	-1.321***	(0.012)	224278	0.218
(2)	Anxiety disorders	-0.939***	(0.023)	191365	0.151
(3)	Parkinson's	-0.687***	(0.054)	281192	0.142
(4)	Alzheimer's	-0.671***	(0.038)	279541	0.144
(5)	Stroke	-0.515***	(0.027)	278134	0.142
(6)	Rheumatoid arthritis	-0.498***	(0.019)	183678	0.147
(7)	Ulcer	-0.458***	(0.026)	276405	0.141
(8)	Lung disease	-0.423***	(0.019)	273091	0.144
(9)	Arthritis	-0.413***	(0.015)	86267	0.160
(10)	Osteoporosis	-0.377***	(0.032)	43389	0.163
(11)	Osteoarthritis	-0.362***	(0.013)	179030	0.147
(12)	Asthma	-0.301***	(0.041)	43725	0.160
(13)	Diabetes	-0.285***	(0.013)	275653	0.144
(14)	Cataracts	-0.244***	(0.017)	274645	0.142
(15)	Hypertension	-0.155***	(0.009)	245350	0.137
(16)	High cholesterol	-0.145***	(0.010)	261365	0.141

*** $p < 0.01$, Each row represents a separate regression with life satisfaction as the dependent variable. Clustered robust standard errors are reported in parentheses. Constant estimated but not reported. Control variables included in each regression for gender, age, marital status, number of children, employment, education, country, wealth, income, and year. Samples include adults over the age of 45 from 28 European countries. Estimated using the following OLS regression equation:

$$\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Disease}_i + \beta_2 X_i^j + \varepsilon_i$$

where β_1 represents the estimated coefficient of each disease on life satisfaction for each individual i , X_i^j represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.

Table A6: Life satisfaction and context variables (OLS)

Life satisfaction	
Divorced	-0.440*** (0.023)
Debt	-0.656*** (0.044)
No college	-0.200*** (0.018)
Unemployed	-0.641*** (0.039)
Obs.	99020
R-squared	0.223

*** $p < 0.01$. OLS regression with life satisfaction as the dependent variable. Clustered robust standard errors are reported in parentheses. Constant estimated but not reported. Additional control variables included for gender, age, number of children, country, income, year, and remaining categories for marital status, education, and employment. Married used as the reference category for divorced. Household debt coded as a dummy variable for negative (=0) or non-negative (=1) household net worth. Bachelor's degree or equivalent tertiary education level (ISCED-5) used as the reference category for no college (ISCED-3). Employed full-time used as the reference category for unemployed. Health status also controlled by including additional independent variables for depression, anxiety disorders, rheumatoid arthritis, osteoarthritis, Alzheimer's, Parkinson's, diabetes, lung disease, hypertension, high cholesterol, stroke, ulcers, cataracts, and anxiety disorders. Sample includes adults over the age of 45 from 28 European countries.

Table A7: Life satisfaction and disease robustness check (Fixed effects)

		Life satisfaction		Obs.	R-squared
(1)	Depression	-0.620***	(0.012)	224278	0.034
(2)	Alzheimer's	-0.361***	(0.037)	279541	0.011
(3)	Anxiety disorders	-0.259***	(0.023)	191365	0.011
(4)	Stroke	-0.192***	(0.025)	278134	0.011
(5)	Parkinson's	-0.161**	(0.065)	281192	0.011
(6)	Diabetes	-0.135***	(0.024)	275653	0.011
(7)	Rheumatoid arthritis	-0.125***	(0.028)	183678	0.010
(8)	Arthritis	-0.079**	(0.032)	86267	0.024
(9)	Hypertension	-0.075***	(0.011)	245350	0.011
(10)	Ulcer	-0.074***	(0.024)	276405	0.010
(11)	Osteoarthritis	-0.070***	(0.022)	179030	0.010
(12)	Lung disease	-0.070**	(0.027)	273091	0.010
(13)	Cataracts	-0.061***	(0.015)	274645	0.011
(14)	High cholesterol	-0.055***	(0.012)	261365	0.010
(15)	Osteoporosis	-0.018	(0.095)	43389	0.041
(16)	Asthma	0.100	(0.150)	43725	0.041

** p<0.05, *** p<0.01. Each row represents a separate regression with life satisfaction as the dependent variable. Standard errors presented in parenthesis. Constant estimated but not reported. Control variables included in each regression for age, marital status, number of children, employment, education, wealth, income, and year. Gender and country omitted due to collinearity. Samples include adults over the age of 45 from 28 European countries. Osteoporosis and asthma did not return significant estimates as they are only present in two SHARE waves. Estimated using the following fixed effects regression equation:

$$\text{Life satisfaction}_{it} = \beta_0 + \beta_1 \text{Disease}_{it} + \beta_2 X_{it} + \alpha_i + v_{it}$$

where β_1 represents the estimated coefficient of each one period change in disease status on life satisfaction for each individual i in time t . Time periods are considered in terms of SHARE waves. X_{it} represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant while α_i captures unobserved time-invariant individual effects, and v_{it} is the error term.

CHAPTER 6

Table A8: Symptom variable descriptions and summary statistics (SHARE)

Variable	Description	Obs	Mean	SD	Min	Max	Mean	SD	Min	Max
			<i>Original</i>				<i>Rescaled</i>			
bmi	Body mass index	337000	26.897	4.674	11.944	157.394	0	1	-3.199	27.92
chronic	Number of chronic diseases	337000	1.76	1.589	0	14	0	1	-1.107	7.701
eyesightr	Eyesight reading	274000	2.741	1.132	1	5	0	1	-1.538	1.996
gali	Limitation with activities	337000	0.462	0.499	0	1	0	1	-0.926	1.08
hearing	Hearing	274000	2.655	1.048	1	5	0	1	-1.579	2.237
height	Height	337000	167.84	9.109	105	210	0	1	-6.899	4.628
lifex	Chances of living in ten years	206000	63.949	29.752	0	100	0	1	-2.149	1.212
mh002	Sad or depressed last month	267000	0.395	0.489	0	1	0	1	-0.807	1.239
mh003	Hopes for the future	267000	0.827	0.379	0	1	0	1	-2.184	0.458
mh004	Suicidal feelings or wish to be dead	267000	0.072	0.259	0	1	0	1	-0.279	3.583
mh005	Feels guilty	267000	2.102	0.458	1	3	0	1	-2.405	1.958
mh006	Blame for what	42536	1.855	0.352	1	2	0	1	-2.428	0.412
mh007	Trouble sleeping	267000	1.656	0.475	1	2	0	1	-1.38	0.725
mh008	Less or same interest in things	267000	1.946	0.34	1	3	0	1	-2.78	3.095
mh010	Irritability	267000	0.279	0.449	0	1	0	1	-0.623	1.606
mh011	Appetite	268000	1.93	0.309	1	3	0	1	-3.01	3.465
mh013	Fatigue	267000	0.356	0.479	0	1	0	1	-0.743	1.345
mh014	Concentration on entertainment	267000	1.877	0.328	1	2	0	1	-2.672	0.374
mh015	Concentration on reading	266000	1.858	0.349	1	2	0	1	-2.462	0.406
mh016	Enjoyment	267000	1.869	0.337	1	2	0	1	-2.58	0.388
mh017	Tearfulness	267000	0.249	0.432	0	1	0	1	-0.575	1.739
mh018	Depression ever	124000	0.224	0.417	0	1	0	1	-0.537	1.862
mh019	Age depression symptoms first time	21690	43.374	15.481	0	96	0	1	-2.802	3.399
mh020	Ever treated for depression by doctor	27768	0.529	0.499	0	1	0	1	-1.061	0.943
mh021	Ever admitted to mental hospital	27764	0.091	0.288	0	1	0	1	-0.316	3.16
mh022	Ever told affective or emotional	94198	0.102	0.303	0	1	0	1	-0.337	2.968
mh023	Fear of the worst happening	121000	1.585	0.89	1	4	0	1	-0.657	2.713
mh024	Nervous	122000	2.022	1.002	1	4	0	1	-1.02	1.974
mh025	Hands trembling	122000	1.343	0.763	1	4	0	1	-0.45	3.481
mh026	Fear of dying	121000	1.254	0.636	1	4	0	1	-0.4	4.316
mh027	Felt faint	122000	1.489	0.851	1	4	0	1	-0.575	2.95
mh034	Feels lack of companionship	143000	1.401	0.634	1	3	0	1	-0.633	2.523
mh035	Feels left out	143000	1.271	0.543	1	3	0	1	-0.5	3.186
mh036	Feels isolated	143000	1.214	0.499	1	3	0	1	-0.429	3.577
mh037	Feels lonely	143000	2.683	0.589	1	3	0	1	-2.86	0.538
ph004	Long-term illness	335000	0.515	0.5	0	1	0	1	-1.031	0.97
ph046	Hearing	273000	2.655	1.048	1	5	0	1	-1.579	2.238
ph048d1	Difficulties: walking 100 meters	335000	0.115	0.319	0	1	0	1	-0.36	2.779
ph048d10	Difficulties: picking up a small	335000	0.043	0.203	0	1	0	1	-0.212	4.709
ph048d2	Difficulties: sitting two hours	335000	0.11	0.313	0	1	0	1	-0.351	2.846
ph048d3	Difficulties: getting up from chair	335000	0.192	0.394	0	1	0	1	-0.488	2.049
ph048d4	Difficulties: climbing several flights	335000	0.291	0.454	0	1	0	1	-0.64	1.561
ph048d5	Difficulties: climbing one flight stairs	335000	0.135	0.342	0	1	0	1	-0.396	2.528
ph048d6	Difficulties: stooping, kneeling	335000	0.309	0.462	0	1	0	1	-0.669	1.495

ph048d7	Difficulties: reaching or extend	335000	0.097	0.297	0	1	0	1	-0.329	3.043
ph048d8	Difficulties: pulling or pushing	335000	0.158	0.365	0	1	0	1	-0.434	2.305
ph048d9	Difficulties: lifting or carrying	335000	0.218	0.413	0	1	0	1	-0.527	1.897
ph048dno	Difficulties: none of these	335000	0.504	0.5	0	1	0	1	-1.008	0.992
ph049d1	Difficulties: dressing	335000	0.081	0.273	0	1	0	1	-0.297	3.365
ph049d10	Difficulties: telephone calls	335000	0.024	0.155	0	1	0	1	-0.158	6.313
ph049d11	Difficulties: taking medications	335000	0.024	0.154	0	1	0	1	-0.158	6.343
ph049d12	Difficulties: doing work around	335000	0.121	0.327	0	1	0	1	-0.372	2.689
ph049d13	Difficulties: managing money	335000	0.048	0.215	0	1	0	1	-0.226	4.431
ph049d2	Difficulties: walking across a room	335000	0.026	0.16	0	1	0	1	-0.165	6.074
ph049d3	Difficulties: bathing or showering	335000	0.062	0.242	0	1	0	1	-0.258	3.873
ph049d4	Difficulties: eating, cutting up	335000	0.022	0.147	0	1	0	1	-0.15	6.671
ph049d5	Difficulties: getting in or out	335000	0.044	0.204	0	1	0	1	-0.213	4.689
ph049d6	Difficulties: using the toilet	335000	0.028	0.165	0	1	0	1	-0.17	5.892
ph049d7	Difficulties: using a map	335000	0.084	0.278	0	1	0	1	-0.303	3.296
ph049d8	Difficulties: preparing a hot me	335000	0.046	0.21	0	1	0	1	-0.22	4.551
ph049d9	Difficulties: shopping for groceries	335000	0.073	0.26	0	1	0	1	-0.28	3.571
ph049dno	Difficulties: none of these	335000	0.787	0.41	0	1	0	1	-1.92	0.521
ph059d1	Use of aids: a cane or walking stick	61711	0.173	0.379	0	1	0	1	-0.458	2.184
ph059d10	Use of aids: incontinence pads	43278	0.067	0.25	0	1	0	1	-0.268	3.727
ph059d2	Use of aids: a zimmer frame	61711	0.063	0.242	0	1	0	1	-0.258	3.869
ph059d3	Use of aids: a manual wheelchair	61711	0.03	0.172	0	1	0	1	-0.177	5.654
ph059d4	Use of aids: an electric wheelchair	61711	0.005	0.074	0	1	0	1	-0.074	13.495
ph059d5	Use of aids: a buggy or scooter	61711	0.008	0.087	0	1	0	1	-0.088	11.427
ph059d6	Use of aids: special eating utensil	61711	0.004	0.062	0	1	0	1	-0.063	15.971
ph059d7	Use of aids: a personal alarm	61711	0.033	0.178	0	1	0	1	-0.184	5.423
ph059d8	Use of aids: bars/grabs/rails	43278	0.079	0.269	0	1	0	1	-0.292	3.421
ph059d9	Use of aids: raised toilet seat	43278	0.049	0.216	0	1	0	1	-0.227	4.407
ph059dno	Use of aids: none of these	61711	0.725	0.447	0	1	0	1	-1.623	0.616
ph059dot	Use of aids: other	43278	0.019	0.135	0	1	0	1	-0.137	7.282
ph085	Level of pain	65980	2.019	0.673	1	3	0	1	-1.514	1.457
ph087d1	Pain location: back	66034	0.508	0.5	0	1	0	1	-1.017	0.983
ph087d2	Pain location: hips	66034	0.216	0.412	0	1	0	1	-0.525	1.903
ph087d3	Pain location: knees	66034	0.373	0.484	0	1	0	1	-0.771	1.297
ph087d4	Pain location: other joints	66034	0.328	0.47	0	1	0	1	-0.699	1.43
ph087d5	Pain location: mouth/teeth	66034	0.023	0.149	0	1	0	1	-0.152	6.559
ph087d6	Pain location: other parts of the body	66034	0.242	0.428	0	1	0	1	-0.565	1.77
ph087d7	Pain location: all over	66034	0.073	0.26	0	1	0	1	-0.28	3.57
ph088	Bothered by joint pain	23017	0.936	0.246	0	1	0	1	-3.809	0.263
ph089d1	Bothered by frailty: falling down	210000	0.078	0.268	0	1	0	1	-0.29	3.445
ph089d2	Bothered by frailty: fear of falling	210000	0.132	0.339	0	1	0	1	-0.39	2.561
ph089d3	Bothered by frailty: dizziness	210000	0.157	0.364	0	1	0	1	-0.432	2.316
ph089d4	Bothered by frailty: fatigue	210000	0.228	0.42	0	1	0	1	-0.544	1.838
ph089dno	Bothered by frailty: none	210000	0.625	0.484	0	1	0	1	-1.292	0.774
phinact	Physical inactivity	273000	0.122	0.327	0	1	0	1	-0.372	2.689
weight	Weight	337000	75.907	14.987	40	230	0	1	-2.396	10.282

Sample restricted to patients with at least one of the following health conditions: depression, anxiety disorders, Parkinson's, Alzheimer's, stroke, rheumatoid arthritis, ulcer, lung disease, arthritis, osteoporosis, osteoarthritis, asthma, diabetes, cataracts, hypertension, or high cholesterol. Additional details regarding symptom questions and variable descriptions can be found at www.share-project.org.

Table A9: Symptom predictors of life satisfaction (SHARE)

	Variable	Description	(1) Coefficient	(2) Coefficient ranking	(3) Partial R ²	(4) Partial R ² ranking	(5) Overall score
1	mh037	Feels lonely	0.26	1	0.072	1	2
2	mh002	Sad or depressed last month	0.252	2	0.068	2	4
3	mh035	Feels left out	0.244	4	0.065	4	8
4	mh036	Feels isolated from others	0.24	5	0.068	3	8
5	mh024	Nervous	0.235	6	0.064	5	11
6	lifex	Living in ten years	0.246	3	0.049	10	13
7	mh027	Felt faint	0.221	7	0.062	6	13
8	mh023	Fear of the worst happening	0.206	9	0.057	7	16
9	mh034	Feels lack of companionship	0.214	8	0.051	9	17
10	mh004	Suicidal feelings or wish to be dead	0.192	12	0.056	8	20
11	mh003	Hopes for the future	0.197	11	0.048	11	22
12	mh013	Fatigue	0.2	10	0.048	12	22
13	mh018	Depression ever	0.192	13	0.047	13	26
14	mh010	Irritability	0.169	16	0.038	17	33
15	mh016	Enjoyment	0.166	18	0.039	16	34
16	mh025	Hands trembling	0.158	21	0.042	14	35
17	mh026	Fear of dying	0.152	23	0.041	15	38
18	mh007	Trouble sleeping	0.161	20	0.035	19	39
19	ph089dno	Bothered by frailty: none	0.181	14	0.026	25	39
20	gali	Limitation with activities	0.167	17	0.027	23	40
21	ph049dno	Difficulties: none of these	0.176	15	0.025	26	41
22	mh017	Tearfulness	0.154	22	0.032	22	44
23	ph089d4	Bothered by frailty: fatigue	0.162	19	0.023	28	47
24	mh014	Concentration on entertainment	0.144	28	0.033	20	48
25	mh015	Concentration on reading	0.145	27	0.033	21	48
26	mh022	Ever told affective or emotional	0.143	30	0.036	18	48
27	ph049d12	Difficulties: doing work around	0.148	25	0.023	29	54
28	ph048d4	Difficulties: climbing several flights	0.146	26	0.019	32	58
29	ph048d9	Difficulties: lifting or carrying	0.144	29	0.019	33	62
30	ph048dno	Difficulties: none of these	0.152	24	0.017	39	63
31	mh008	Less or same interest in things	0.121	41	0.027	24	65
32	ph048d8	Difficulties: pulling or pushing	0.138	31	0.019	35	66
33	ph048d1	Difficulties: walking 100 meters	0.134	33	0.019	34	67
34	phinact	Physical inactivity	0.128	38	0.023	30	68
35	ph049d9	Difficulties: shopping for groceries	0.134	34	0.019	36	70
36	ph048d5	Difficulties: climbing one flight	0.131	35	0.018	37	72
37	ph048d6	Difficulties: stooping, kneeling	0.13	36	0.016	41	77
38	chronic	Number of chronic diseases	0.135	32	0.014	46	78
39	eyesightr	Eyesight reading	0.121	42	0.018	38	80
40	ph049d3	Difficulties: bathing or showering	0.124	40	0.017	40	80
41	mh011	Appetite	0.095	55	0.021	31	86
42	ph004	Long-term illness	0.125	39	0.012	47	86
43	ph048d3	Difficulties: getting up from chair	0.119	43	0.015	44	87
44	hearing	Hearing	0.106	49	0.016	42	91
45	ph049d1	Difficulties: dressing	0.114	46	0.015	45	91
46	ph046	Hearing	0.106	50	0.016	43	93
47	ph049d8	Difficulties: preparing a hot meal	0.107	48	0.012	48	96
48	ph089d2	Bothered by frailty: fear of falling	0.116	45	0.011	51	96

49	ph049d5	Difficulties: getting in or out	0.102	51	0.012	49	100
50	ph089d3	Bothered by frailty: dizziness	0.108	47	0.01	53	100
51	mh006	Blame for what	0.038	75	0.025	27	102
52	ph048d7	Difficulties: reaching or extend	0.101	53	0.012	50	103
53	ph049d7	Difficulties: using a map	0.102	52	0.011	52	104
54	ph085	Level of pain	0.13	37	-0.001	69	106
55	ph048d2	Difficulties: sitting two hours	0.096	54	0.01	54	108
56	ph049d13	Difficulties: managing money	0.091	56	0.009	56	112
57	ph049d2	Difficulties: walking across a room	0.088	58	0.009	57	115
58	ph049d6	Difficulties: using the toilet	0.089	57	0.009	58	115
59	ph059dno	Use of aids: none of these	0.119	44	-0.011	73	117
60	ph048d10	Difficulties: picking up a small	0.073	61	0.007	59	120
61	ph089d1	Bothered by frailty: falling down	0.085	59	0.005	62	121
62	ph049d4	Difficulties: eating, cutting up	0.07	62	0.006	61	123
63	ph049d11	Difficulties: taking medications	0.059	66	0.004	63	129
64	ph049d10	Difficulties: telephone calls	0.056	69	0.003	65	134
65	ph087d7	Pain location: all over	0.067	64	-0.01	72	136
66	mh021	Ever admitted to mental hospital	0.056	70	-0.006	70	140
67	ph059d1	Use of aids: a cane or walking stick	0.078	60	-0.017	80	140
68	ph088	Bothered by joint pain	0.038	76	0.004	64	140
69	mh020	Ever treated for depression by doctor	0.05	71	-0.006	71	142
70	ph059d2	Use of aids: a zimmer frame	0.068	63	-0.018	81	144
71	mh005	Feels guilty	0.001	90	0.01	55	145
72	mh019	Age depression symptoms first time	0.005	87	0.007	60	147
73	ph059d3	Use of aids: a manual wheelchair	0.062	65	-0.019	82	147
74	ph087d2	Pain location: hips	0.04	73	-0.013	74	147
75	ph087d6	Pain location: other parts of the body	0.04	74	-0.013	75	149
76	height	Height	0.019	85	0	66	151
77	ph087d5	Pain location: mouth/teeth	0.036	77	-0.013	76	153
78	ph059d8	Use of aids: bars/grabs/rails	0.058	67	-0.025	87	154
79	bmi	Body mass index	0.003	89	0	67	156
80	ph059d10	Use of aids: incontinence pads	0.058	68	-0.026	88	156
81	weight	Weight	0.004	88	0	68	156
82	ph087d4	Pain location: other joints	0.028	80	-0.014	77	157
83	ph087d3	Pain location: knees	0.022	82	-0.014	78	160
84	ph059d4	Use of aids: an electric wheelchair	0.034	78	-0.021	83	161
85	ph059d9	Use of aids: raised toilet seat	0.047	72	-0.027	89	161
86	ph059d7	Use of aids: a personal alarm	0.032	79	-0.021	85	164
87	ph059d5	Use of aids: a buggy or scooter	0.025	81	-0.021	84	165
88	ph087d1	Pain location: back	0.014	86	-0.014	79	165
89	ph059d6	Use of aids: special eating utensils	0.022	83	-0.021	86	169
90	ph059dot	Use of aids: other	0.022	84	-0.028	90	174

Each row contains coefficients and partial R^2 estimates from separate regressions with life satisfaction as the dependent variable. All variables rescaled to have a mean of 0 and standard deviation of 1. Column (1) contains the absolute value of symptom coefficient estimates from the OLS linear regression model: $\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Symptom}_i + \beta_2 X_i + \varepsilon_i$, where β_1 represents the estimated coefficient of each symptom on life satisfaction for each individual i . X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation. Control variables included in each regression for age, marital status, number of children, employment, education, wealth, income, and year. Samples include adults over the age of 45 from 28 European countries diagnosed with one or more of the following health conditions: depression, anxiety disorders, Parkinson's, Alzheimer's, stroke, rheumatoid arthritis, ulcer, lung disease, arthritis, osteoporosis, osteoarthritis, asthma, diabetes, cataracts, hypertension, or high cholesterol. Additional details regarding symptom questions and variable descriptions can be found at www.share-project.org. Column (2) contains an overall ranking of coefficients according to their magnitude. Column (3) contains partial R^2 estimates indicating the amount of variance explained by each symptom variable in each regression model. Column (4) offers a ranking of all partial R^2 values. Finally, column (5) scores each symptom according to their ranked values: (7) = (4) + (6). Symptoms are then ranked in order of importance from the lowest to highest score.

Table A10: Life satisfaction and symptoms of disease (OLS)

		Life satisfaction		Obs.	R-squared
(1)	Loneliness	-1.491***	(0.027)	133291	0.185
(2)	Sad or depressed <i>mh002</i>	-0.887***	(0.008)	219636	0.204
(3)	Hopefulness <i>mh003</i>	-0.859***	(0.013)	219212	0.179
(4)	Enjoyment <i>mh016</i>	-0.827***	(0.014)	219402	0.172
(5)	Usual activities <i>ph049dno</i>	-0.798***	(0.011)	281681	0.168
(6)	Fatigue <i>mh013</i>	-0.746***	(0.009)	219592	0.186

*** $p < 0.01$, Each row represents a separate regression with life satisfaction as the dependent variable. Clustered robust standard errors are reported in parentheses. Constant estimated but not reported. Control variables included in each regression for gender, age, marital status, number of children, employment, education, country, wealth, income, and year. Samples include adults over the age of 45 from 28 European countries. Loneliness created from the sum of mh036 (feels isolated), mh035 (feels left out), and mh034 (feels lack of companionship) on a resulting scale of 1 to 9 and coded as a dummy variable where scores greater than 6 out of 9 are considered to be indicative of loneliness (=1). Estimates obtained using the following OLS regression equation:

$$\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Symptom}_i + \beta_2 X_i + \varepsilon_i$$

where β_1 represents the estimated coefficient of each symptom on life satisfaction for each individual i . X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.

CHAPTER 7

Table A11: Summary statistics and variable descriptions (Fox Insight)

Variable	Range	Observations	Percentage
Age	20-24	6	0.02 %
Age	25-29	12	0.03 %
Age	30-34	32	0.09 %
Age	35-39	145	0.39 %
Age	40-44	358	0.96 %
Age	45-49	667	1.78 %
Age	50-54	1505	4.02 %
Age	55-59	3057	8.16 %
Age	60-64	5452	14.55 %
Age	65-69	7825	20.88 %
Age	70-74	9253	24.69 %
Age	75-79	5808	15.5 %
Age	80-84	2483	6.63 %
Age	85-89	697	1.86 %
Age	90-94	156	0.42 %
Age	95-99	13	0.03 %
Age	100-104	2	0.01 %
Education	Associate's degree (AS, AAS, AA, etc.)	3068	8.47 %
Education	Bachelor's degree (BA, BS, AB, etc.)	10526	29.04 %
Education	Doctorate degree (PhD, EdD, etc)	2125	5.86 %
Education	High school degree (GED or equivalent)	2731	7.54 %
Education	Less than a high school degree	171	0.47 %
Education	Master's degree (MA, MS, MENG, MSW, etc.)	8964	24.73 %
Education	Professional school degree (MD, DDC, JD, etc)	2472	6.82 %
Education	Some college (1-4 years, no degree)	6185	17.07 %
Employment	Employed, full-time	6715	18.61 %
Employment	Employed, part-time	2551	7.07 %
Employment	Retired	24898	69.02 %
Employment	Unemployed	1911	5.3 %
Gender	Female	16505	45.46 %
Gender	Male	19802	54.54 %
Income	\$20,000 to \$34,999	3008	9.54 %
Income	\$35,000 to \$49,000	3565	11.3 %
Income	\$50,000 to \$74,999	6110	19.37 %
Income	\$75,000 to \$99,999	5511	17.48 %
Income	Less than \$20,000	1507	4.78 %
Income	More than \$100,000	11835	37.53 %
Years since diagnosed	0	12799	34.16 %
Years since diagnosed	5	15350	40.97 %
Years since diagnosed	10	6039	16.12 %
Years since diagnosed	15	2137	5.7 %
Years since diagnosed	20	792	2.11 %
Years since diagnosed	25	202	0.54 %
Years since diagnosed	30	106	0.28 %
Years since diagnosed	35	27	0.07 %
Years since diagnosed	70	19	0.05 %

Table A12: Life satisfaction of Parkinson's patients in years since diagnosis (Figure 7.1)

Years since diagnosed	Observations	Average life satisfaction	Standard deviation
0	2722	0.758	0.428
1	3582	0.785	0.411
2	3891	0.791	0.407
3	2697	0.779	0.415
4	2831	0.788	0.409
5	1925	0.761	0.427
6	1891	0.773	0.419
7	1248	0.773	0.419
8	1263	0.734	0.442
9	835	0.745	0.436
10	948	0.742	0.438
11	627	0.71	0.454
12	566	0.67	0.471
13	415	0.708	0.455
14	428	0.689	0.463
15	298	0.695	0.461
16	265	0.694	0.462
17	195	0.703	0.458
18	225	0.698	0.46
19	150	0.613	0.489
20	101	0.693	0.464

Sample includes patients diagnosed between the ages of 60 and 64.
Life satisfaction represented as percent satisfied with life.

Table A13: Life satisfaction depending on years since Parkinson's diagnosis (OLS)

Variable	Life satisfaction
(Intercept)	0.968*** (0.291)
Employment - Retired	-0.027*** (0.009)
Employment - Employed, full-time	0.001 (0.01)
Employment - Unemployed	-0.169*** (0.013)
Income - More than \$100,000	0.104*** (0.008)
Income - \$50,000 to \$74,999	0.044*** (0.008)
Income - \$75,000 to \$99,999	0.057*** (0.009)
Income - Less than \$20,000	-0.126*** (0.012)
Income - \$20,000 to \$34,999	-0.038*** (0.01)
Education - Professional school degree (MD, DDC, JD, etc)	0.167*** (0.033)
Education - Master's degree (MA, MS, MENG, MSW, etc.)	0.215*** (0.032)
Education - Some college (1-4 years, no degree)	0.154*** (0.032)
Education - Bachelor's degree (BA, BS, AB, etc.)	0.191*** (0.032)
Education - Doctorate degree (PhD, EdD, etc)	0.227*** (0.033)
Education - Associate's degree (AS, AAS, AA, etc.)	0.163*** (0.033)
Education - High school degree (GED or equivalent)	0.122*** (0.033)
Gender - Male	-0.035*** (0.005)
Years since diagnosed - 10	-0.006 (0.007)
Years since diagnosed - 15	-0.047*** (0.01)
Years since diagnosed - 20	-0.042*** (0.015)
Years since diagnosed - 25	-0.148*** (0.027)
Years since diagnosed - 30	-0.159*** (0.042)
Years since diagnosed - 35	-0.191** (0.084)
Years since diagnosed - 40	-0.237** (0.106)
Years since diagnosed - 5	0.005 (0.005)
Years since diagnosed - 70	-0.048 (0.102)
Age - 20-24	-0.387 (0.408)
Age - 25-29	-0.462 (0.312)
Age - 30-34	-0.406 (0.299)
Age - 35-39	-0.336 (0.292)
Age - 40-44	-0.396 (0.29)
Age - 45-49	-0.542 (0.289)
Age - 50-54	-0.414 (0.289)
Age - 55-59	-0.407 (0.289)
Age - 60-64	-0.38 (0.289)
Age - 65-69	-0.377 (0.289)
Age - 70-74	-0.356 (0.289)
Age - 75-79	-0.359 (0.289)
Age - 80-84	-0.363 (0.289)
Age - 85-89	-0.405 (0.289)
Age - 90-94	-0.441 (0.29)
Age - 95-99	-0.385 (0.305)

** p<0.05, *** p<0.01. Results of a single regression containing 33,921 observations of Parkinson's patients. Life satisfaction represented as percent satisfied with life. Robust standard errors are reported in parentheses. Samples include Parkinson's patients in United States from the Fox Insight database. R-squared = 0.06. Estimates obtained using the following OLS regression equation:

$$\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Years since diagnosed}_i + \beta_2 X_i + \varepsilon_i$$

where β_1 represents the life satisfaction between patients diagnosed i years ago and patients diagnosed this year. X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.

Table A14: Life satisfaction of Parkinson's patients and healthy population (OLS)

Variable	Life satisfaction
(Intercept)	0.336*** (0.114)
Employment - Retired	0.157*** (0.009)
Employment - Employed, full-time	0.17*** (0.009)
Employment - Employed, part-time	0.183*** (0.01)
Income - More than \$100,000	0.25*** (0.009)
Income - \$50,000 to \$74,999	0.188*** (0.01)
Income - \$35,000 to \$49,000	0.137*** (0.01)
Income - \$20,000 to \$34,999	0.097*** (0.011)
Income - \$75,000 to \$99,999	0.203*** (0.01)
Education - Professional school degree (MD, DDC, JD, etc)	0.141*** (0.029)
Education - Masters degree (MA, MS, MENG, MSW, etc.)	0.186*** (0.028)
Education - Some college (1-4 years, no degree)	0.125*** (0.028)
Education - Associates degree (AS, AAS, AA, etc.)	0.128*** (0.029)
Education - Bachelors degree (BA, BS, AB, etc.)	0.165*** (0.028)
Education - Doctorate degree (PhD, EdD, etc)	0.198*** (0.029)
Education - High school degree (GED or equivalent)	0.096*** (0.029)
Gender - Male	-0.036*** (0.004)
Age - 100-104	0.382 (0.302)
Age - 105-109	0.083 (0.227)
Age - 20-24	0.1 (0.196)
Age - 25-29	0.042 (0.135)
Age - 30-34	0.03 (0.121)
Age - 35-39	0.06 (0.115)
Age - 40-44	-0.008 (0.112)
Age - 45-49	-0.084 (0.111)
Age - 50-54	-0.023 (0.111)
Age - 55-59	-0.026 (0.111)
Age - 60-64	0 (0.11)
Age - 65-69	-0.008 (0.11)
Age - 70-74	0.01 (0.11)
Age - 75-79	0.005 (0.11)
Age - 80-84	0.013 (0.11)
Age - 85-89	-0.009 (0.111)
Age - 90-94	-0.058 (0.113)
Age - 95-99	0.016 (0.137)
Parkinson's diagnosis	-0.039*** (0.005)

** p<0.05, *** p<0.01. Results of a single regression containing 45,283 observations. Life satisfaction represented as percent satisfied with life. Robust standard errors are reported in parentheses. Samples includes Parkinson's patients and healthy population in the United States from the Fox Insight database. R-squared = 0.06. Estimates obtained using the following OLS regression equation:

$$\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Parkinson's diagnosis}_i + \beta_2 X_i + \varepsilon_i$$

where β_1 represents the life satisfaction gap between Parkinson's patients and general population. X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.

Table A15: Wellbeing burden of Parkinson's disease for patients diagnosed at different ages (Figure 7.3)

(1) Age	(2) Years since diagnosed	(3) Years in this state	(4) Actual wellbeing (% satisfied)	(5) Potential wellbeing (% satisfied)	(6) WALYs lost (per year)
Patients diagnosed at 40-44 years old					
40-44	0-4	5	75.78 (±4.56)	79.83 (±3.74)	0.05 (±0.01)
45-49	5-9	5	59.14 (±3.4)	69.5 (±2.77)	0.15 (±0.01)
50-54	10-14	5	69.67 (±2.46)	74.96 (±1.98)	0.07 (±0.01)
55-59	15-19	5	65.42 (±2.32)	73.97 (±1.57)	0.12 (±0.01)
60-64	20-24	5	69.07 (±3.03)	77.25 (±1.32)	0.11 (±0.02)
65-69	25-29	3.6	58.63 (±5.21)	76.47 (±1.26)	0.23 (±0.06)
65-69	25-29	1.4		76.47 (±1.26)	1 (±0)
70-74	30-34	5		75.79 (±1.19)	1 (±0)
75-79	35-39	5		79.74 (±1.42)	1 (±0)
80-84	40-44	0.9		78.16 (±1.68)	1 (±0)
Total WALYs lost:					15.95
Patients diagnosed at 45-49 years old					
45-49	0-4	5	61.34 (±3.42)	72.32 (±2.77)	0.15 (±0.01)
50-54	5-9	5	74.5 (±2.28)	78.45 (±1.94)	0.05 (±0.01)
55-59	10-14	5	71.56 (±1.84)	76 (±1.52)	0.06 (±0.01)
60-64	15-19	5	69.55 (±2.03)	78.27 (±1.27)	0.11 (±0.01)
65-69	20-24	5	67.73 (±2.97)	74.85 (±1.22)	0.1 (±0.02)
70-74	25-29	0.2	64.86 (±5.17)	82.85 (±1.14)	0.22 (±0.05)
70-74	25-29	4.8		82.85 (±1.14)	1 (±0)
75-79	30-34	5		81.57 (±1.2)	1 (±0)
80-84	35-39	1.3		78.16 (±1.68)	1 (±0)
Total WALYs lost:					13.79
Patients diagnosed at 50-54 years old					
50-54	0-4	5	73.96 (±2.31)	78.36 (±1.93)	0.06 (±0.01)
55-59	5-9	5	75.54 (±1.66)	78.68 (±1.5)	0.04 (±0.01)
60-64	10-14	5	75.34 (±1.49)	79.84 (±1.24)	0.06 (±0.01)
65-69	15-19	5	72.91 (±1.92)	80.82 (±1.16)	0.1 (±0.01)
70-74	20-24	2.4	74.9 (±2.92)	82.34 (±1.1)	0.09 (±0.02)
70-74	20-24	2.6		82.34 (±1.1)	1 (±0)
75-79	25-29	5		82.09 (±1.24)	1 (±0)
80-84	30-34	1.8		78.22 (±1.69)	1 (±0)
Total WALYs lost:					11.13
Patients diagnosed at 55-59 years old					
55-59	0-4	5	75.23 (±1.73)	78.76 (±1.49)	0.04 (±0.01)
60-64	5-9	5	78.8 (±1.26)	82.12 (±1.2)	0.04 (±0.01)
65-69	10-14	5	77.24 (±1.33)	80.97 (±1.13)	0.05 (±0.01)
70-74	15-19	4.6	74.75 (±1.87)	82.57 (±1.08)	0.09 (±0.01)
70-74	15-19	0.4		82.57 (±1.08)	1 (±0)
75-79	20-24	5		80.75 (±1.2)	1 (±0)
80-84	25-29	2.6		80.83 (±1.66)	1 (±0)
Total WALYs lost:					9.11
Patients diagnosed at 60-64 years old					
60-64	0-4	5	77.25 (±1.37)	80.87 (±1.2)	0.04 (±0.01)
65-69	5-9	5	79.06 (±1.09)	81.55 (±1.11)	0.03 (±0.01)
70-74	10-14	5	78.77 (±1.26)	82.47 (±1.07)	0.04 (±0.01)
75-79	15-19	1.5	74.32 (±1.98)	81.94 (±1.19)	0.09 (±0.01)
75-79	15-19	3.5		81.94 (±1.19)	1 (±0)

80-84	20-24	3.5		81.99 (± 1.52)	1 (± 0)
				Total WALYs lost:	7.76
Patients diagnosed at 65-69 years old					
65-69	0-4	5	77.36 (± 1.21)	80.25 (± 1.11)	0.04 (± 0.01)
70-74	5-9	5	81.15 (± 0.99)	83.7 (± 1.06)	0.03 (± 0.01)
75-79	10-14	3.5	79.08 (± 1.41)	82.58 (± 1.17)	0.04 (± 0.01)
75-79	10-14	1.5		82.58 (± 1.17)	1 (± 0)
80-84	15-19	4.7		79.12 (± 1.53)	1 (± 0)
				Total WALYs lost:	6.50
Patients diagnosed at 70-74 years old					
70-74	0-4	5	79.49 (± 1.16)	82.53 (± 1.06)	0.04 (± 0.01)
75-79	5-9	5	80.44 (± 1.17)	82.83 (± 1.17)	0.03 (± 0.01)
80-84	10-14	0.5	77.69 (± 1.81)	82.38 (± 1.52)	0.06 (± 0.01)
80-84	10-14	4.5		82.38 (± 1.52)	1 (± 0)
85-89	15-19	1.1		80.37 (± 2.57)	1 (± 0)
				Total WALYs lost:	5.96
Patients diagnosed at 75-79 years old					
75-79	0-4	5	79.03 (± 1.33)	81.88 (± 1.17)	0.03 (± 0.01)
80-84	5-9	3.1	79.12 (± 1.64)	82.7 (± 1.52)	0.04 (± 0.01)
80-84	5-9	1.9		82.7 (± 1.52)	1 (± 0)
85-89	10-14	2.7		77.74 (± 2.57)	1 (± 0)
				Total WALYs lost:	4.82
Patients diagnosed at 80-84 years old					
80-84	0-4	5	78.18 (± 1.75)	82.22 (± 1.51)	0.05 (± 0.01)
85-89	5-9	1	73.47 (± 3.05)	79.03 (± 2.57)	0.07 (± 0.01)
85-89	5-9	3.8		79.03 (± 2.57)	1 (± 0)
				Total WALYs lost:	4.02
Patients diagnosed at 85-89 years old					
85-89	0-4		72.57 (± 3.11)	78.73 (± 2.57)	0.08 (± 0.01)
85-89	0-4			78.73 (± 2.57)	1 (± 0)
90-94	5-9			70.81 (± 5.11)	1 (± 0)
				Total WALYs lost:	3.18
Patients diagnosed at 90-94 years old					
90-94	0-4		70.73 (± 6.04)	75.6 (± 5.13)	0.06 (± 0.02)
90-94	0-4			75.6 (± 5.13)	1 (± 0)
95-99	5-9			81.76 (± 15.9)	1 (± 0)
				Total WALYs lost:	2.83

Parkinson's patient data from the United States drawn from the Fox Insight database. Life expectancies based on estimates provided by the Global Burden of Disease study. Wellbeing measured as percent of patients satisfied with their lives. WALYs lost calculated using formula (3.2):
WALYs lost = actual wellbeing / potential wellbeing.

Table A16: Changes in life satisfaction depending on treatment and years since diagnosis (Figure 7.4)

Years since diagnosed	Treatment	Group	Obs.	Average life satisfaction	Std. Dev	Change in life satisfaction
0	Azilect (Rasagiline)	Not treated	1363	0.743	0.437	0
1	Azilect (Rasagiline)	Not treated	6166	0.767	0.423	0.024
2	Azilect (Rasagiline)	Not treated	11059	0.794	0.404	0.051
3	Azilect (Rasagiline)	Not treated	8112	0.798	0.402	0.055
4	Azilect (Rasagiline)	Not treated	9439	0.787	0.409	0.044
5	Azilect (Rasagiline)	Not treated	6187	0.775	0.418	0.031
6	Azilect (Rasagiline)	Not treated	5563	0.764	0.425	0.021
7	Azilect (Rasagiline)	Not treated	4022	0.752	0.432	0.009
8	Azilect (Rasagiline)	Not treated	3916	0.789	0.408	0.045
9	Azilect (Rasagiline)	Not treated	2830	0.762	0.426	0.019
10	Azilect (Rasagiline)	Not treated	2513	0.727	0.446	-0.016
11	Azilect (Rasagiline)	Not treated	1878	0.726	0.446	-0.017
12	Azilect (Rasagiline)	Not treated	1757	0.702	0.458	-0.041
13	Azilect (Rasagiline)	Not treated	1029	0.637	0.481	-0.107
14	Azilect (Rasagiline)	Not treated	1236	0.687	0.464	-0.056
15	Azilect (Rasagiline)	Not treated	869	0.743	0.437	0
16	Azilect (Rasagiline)	Not treated	878	0.702	0.458	-0.042
17	Azilect (Rasagiline)	Not treated	562	0.706	0.456	-0.037
18	Azilect (Rasagiline)	Not treated	512	0.705	0.456	-0.038
19	Azilect (Rasagiline)	Not treated	555	0.71	0.454	-0.033
23	Azilect (Rasagiline)	Not treated	161	0.609	0.49	-0.135
0	Azilect (Rasagiline)	Treated	102	0.824	0.383	0
1	Azilect (Rasagiline)	Treated	891	0.852	0.355	0.028
2	Azilect (Rasagiline)	Treated	2534	0.862	0.345	0.039
3	Azilect (Rasagiline)	Treated	2326	0.88	0.325	0.056
4	Azilect (Rasagiline)	Treated	3289	0.85	0.357	0.026
5	Azilect (Rasagiline)	Treated	2463	0.859	0.348	0.036
6	Azilect (Rasagiline)	Treated	2577	0.859	0.348	0.035
7	Azilect (Rasagiline)	Treated	1832	0.844	0.363	0.021
8	Azilect (Rasagiline)	Treated	1672	0.878	0.327	0.054
9	Azilect (Rasagiline)	Treated	1158	0.86	0.347	0.037
10	Azilect (Rasagiline)	Treated	1060	0.825	0.38	0.002
11	Azilect (Rasagiline)	Treated	783	0.852	0.355	0.028
12	Azilect (Rasagiline)	Treated	658	0.771	0.421	-0.053
13	Azilect (Rasagiline)	Treated	524	0.828	0.378	0.005
14	Azilect (Rasagiline)	Treated	382	0.798	0.402	-0.025
15	Azilect (Rasagiline)	Treated	277	0.744	0.437	-0.08
16	Azilect (Rasagiline)	Treated	227	0.815	0.389	-0.009
17	Azilect (Rasagiline)	Treated	147	0.83	0.377	0.006
18	Azilect (Rasagiline)	Treated	154	0.922	0.269	0.099
19	Azilect (Rasagiline)	Treated	139	0.842	0.366	0.018
23	Azilect (Rasagiline)	Treated	103	0.883	0.322	0.06
1	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	6579	0.778	0.415	0
2	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	12385	0.807	0.395	0.029
3	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	9505	0.819	0.385	0.041
4	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	11357	0.802	0.398	0.024
5	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	7562	0.795	0.404	0.017
6	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	7214	0.795	0.404	0.016
7	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	4989	0.767	0.423	-0.011
8	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	4686	0.802	0.398	0.024
9	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	3576	0.793	0.405	0.015
10	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	2981	0.751	0.432	-0.027
11	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	2274	0.756	0.43	-0.022
12	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	2090	0.717	0.45	-0.061
13	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	1340	0.698	0.459	-0.08
14	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	1366	0.71	0.454	-0.068
15	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	907	0.762	0.426	-0.016
16	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	877	0.701	0.458	-0.077
17	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	580	0.764	0.425	-0.014
18	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	496	0.754	0.431	-0.024

19	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	588	0.745	0.436	-0.033
21	Mirapex, Mirapexin or Sifrol (Pramipexole)	Not treated	197	0.69	0.464	-0.088
1	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	478	0.774	0.419	0
2	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	1208	0.808	0.394	0.034
3	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	933	0.787	0.41	0.013
4	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	1371	0.815	0.389	0.041
5	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	1088	0.823	0.382	0.049
6	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	926	0.79	0.407	0.016
7	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	865	0.862	0.345	0.088
8	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	902	0.882	0.322	0.108
9	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	412	0.767	0.423	-0.007
10	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	592	0.782	0.413	0.008
11	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	387	0.806	0.396	0.032
12	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	325	0.742	0.438	-0.033
13	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	213	0.723	0.449	-0.051
14	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	252	0.73	0.445	-0.044
15	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	239	0.674	0.47	-0.1
16	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	228	0.816	0.389	0.042
17	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	129	0.589	0.494	-0.185
18	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	170	0.759	0.429	-0.015
19	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	106	0.689	0.465	-0.085
21	Mirapex, Mirapexin or Sifrol (Pramipexole)	Treated	110	0.873	0.335	0.099
1	Requip (Ropinirole)	Not treated	6677	0.783	0.412	0
2	Requip (Ropinirole)	Not treated	12845	0.806	0.395	0.023
3	Requip (Ropinirole)	Not treated	9902	0.813	0.39	0.03
4	Requip (Ropinirole)	Not treated	11990	0.802	0.399	0.018
5	Requip (Ropinirole)	Not treated	7945	0.792	0.406	0.009
6	Requip (Ropinirole)	Not treated	7327	0.797	0.402	0.014
7	Requip (Ropinirole)	Not treated	5354	0.773	0.419	-0.01
8	Requip (Ropinirole)	Not treated	4957	0.818	0.386	0.035
9	Requip (Ropinirole)	Not treated	3605	0.79	0.407	0.007
10	Requip (Ropinirole)	Not treated	3307	0.752	0.432	-0.031
11	Requip (Ropinirole)	Not treated	2366	0.76	0.427	-0.023
12	Requip (Ropinirole)	Not treated	2079	0.719	0.45	-0.065
13	Requip (Ropinirole)	Not treated	1294	0.713	0.453	-0.071
14	Requip (Ropinirole)	Not treated	1408	0.702	0.457	-0.081
15	Requip (Ropinirole)	Not treated	974	0.742	0.438	-0.041
16	Requip (Ropinirole)	Not treated	975	0.722	0.448	-0.061
1	Requip (Ropinirole)	Treated	380	0.682	0.466	0
2	Requip (Ropinirole)	Treated	748	0.821	0.384	0.139
3	Requip (Ropinirole)	Treated	536	0.868	0.339	0.186
4	Requip (Ropinirole)	Treated	738	0.829	0.377	0.148
5	Requip (Ropinirole)	Treated	705	0.872	0.334	0.191
6	Requip (Ropinirole)	Treated	813	0.768	0.423	0.086
7	Requip (Ropinirole)	Treated	500	0.862	0.345	0.18
8	Requip (Ropinirole)	Treated	631	0.792	0.406	0.111
9	Requip (Ropinirole)	Treated	383	0.794	0.405	0.112
10	Requip (Ropinirole)	Treated	266	0.805	0.397	0.123
11	Requip (Ropinirole)	Treated	295	0.786	0.411	0.105
12	Requip (Ropinirole)	Treated	336	0.732	0.444	0.051
13	Requip (Ropinirole)	Treated	259	0.645	0.48	-0.037
14	Requip (Ropinirole)	Treated	210	0.786	0.411	0.104
15	Requip (Ropinirole)	Treated	172	0.75	0.434	0.068
16	Requip (Ropinirole)	Treated	130	0.746	0.437	0.065
1	Rytary or Numient (C-L oral, ER)	Not treated	6911	0.777	0.416	0
2	Rytary or Numient (C-L oral, ER)	Not treated	13252	0.809	0.393	0.032
3	Rytary or Numient (C-L oral, ER)	Not treated	9950	0.819	0.385	0.041
4	Rytary or Numient (C-L oral, ER)	Not treated	12074	0.808	0.394	0.03
5	Rytary or Numient (C-L oral, ER)	Not treated	7952	0.807	0.395	0.03
6	Rytary or Numient (C-L oral, ER)	Not treated	7433	0.794	0.404	0.017
7	Rytary or Numient (C-L oral, ER)	Not treated	5247	0.783	0.412	0.006
8	Rytary or Numient (C-L oral, ER)	Not treated	5015	0.815	0.388	0.038
9	Rytary or Numient (C-L oral, ER)	Not treated	3454	0.801	0.399	0.024
10	Rytary or Numient (C-L oral, ER)	Not treated	2994	0.748	0.434	-0.029

11	Rytary or Numient (C-L oral, ER)	Not treated	2320	0.753	0.431	-0.024
12	Rytary or Numient (C-L oral, ER)	Not treated	2080	0.718	0.45	-0.059
13	Rytary or Numient (C-L oral, ER)	Not treated	1353	0.706	0.456	-0.071
14	Rytary or Numient (C-L oral, ER)	Not treated	1416	0.695	0.461	-0.082
15	Rytary or Numient (C-L oral, ER)	Not treated	973	0.751	0.432	-0.026
16	Rytary or Numient (C-L oral, ER)	Not treated	888	0.723	0.448	-0.054
18	Rytary or Numient (C-L oral, ER)	Not treated	559	0.732	0.443	-0.046
19	Rytary or Numient (C-L oral, ER)	Not treated	586	0.732	0.443	-0.045
1	Rytary or Numient (C-L oral, ER)	Treated	146	0.808	0.395	0
2	Rytary or Numient (C-L oral, ER)	Treated	341	0.721	0.449	-0.087
3	Rytary or Numient (C-L oral, ER)	Treated	488	0.766	0.424	-0.042
4	Rytary or Numient (C-L oral, ER)	Treated	654	0.726	0.446	-0.082
5	Rytary or Numient (C-L oral, ER)	Treated	698	0.701	0.458	-0.108
6	Rytary or Numient (C-L oral, ER)	Treated	707	0.793	0.405	-0.015
7	Rytary or Numient (C-L oral, ER)	Treated	607	0.761	0.427	-0.047
8	Rytary or Numient (C-L oral, ER)	Treated	573	0.815	0.389	0.007
9	Rytary or Numient (C-L oral, ER)	Treated	534	0.723	0.448	-0.085
10	Rytary or Numient (C-L oral, ER)	Treated	579	0.798	0.402	-0.01
11	Rytary or Numient (C-L oral, ER)	Treated	341	0.833	0.374	0.025
12	Rytary or Numient (C-L oral, ER)	Treated	335	0.734	0.442	-0.074
13	Rytary or Numient (C-L oral, ER)	Treated	200	0.67	0.471	-0.138
14	Rytary or Numient (C-L oral, ER)	Treated	202	0.842	0.366	0.033
15	Rytary or Numient (C-L oral, ER)	Treated	173	0.699	0.46	-0.109
16	Rytary or Numient (C-L oral, ER)	Treated	217	0.733	0.444	-0.076
18	Rytary or Numient (C-L oral, ER)	Treated	107	0.879	0.328	0.07
19	Rytary or Numient (C-L oral, ER)	Treated	108	0.759	0.43	-0.049
1	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	6537	0.786	0.41	0
2	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	12243	0.814	0.389	0.028
3	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	9198	0.824	0.38	0.039
4	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	10730	0.814	0.389	0.028
5	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	6956	0.793	0.405	0.007
6	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	6539	0.796	0.403	0.01
7	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	4651	0.785	0.411	-0.001
8	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	4275	0.816	0.387	0.03
9	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	2939	0.798	0.402	0.012
10	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	2642	0.766	0.424	-0.02
11	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	1888	0.789	0.408	0.003
12	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	1828	0.716	0.451	-0.07
13	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	1175	0.717	0.45	-0.068
14	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	1161	0.726	0.446	-0.06
15	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	781	0.754	0.431	-0.032
16	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	805	0.711	0.454	-0.075
17	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	532	0.733	0.443	-0.053
18	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	522	0.738	0.44	-0.048
19	Sinemet CR (Carbidopa-levodopa oral, ER)	Not treated	493	0.775	0.418	-0.011
1	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	520	0.681	0.467	0
2	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1350	0.744	0.436	0.064
3	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1240	0.755	0.43	0.074
4	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1998	0.749	0.434	0.068
5	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1694	0.822	0.383	0.141
6	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1601	0.788	0.409	0.107
7	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1203	0.766	0.423	0.086
8	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1313	0.813	0.39	0.132
9	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	1049	0.77	0.421	0.089
10	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	931	0.729	0.445	0.049
11	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	773	0.701	0.458	0.02
12	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	587	0.736	0.441	0.055
13	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	378	0.651	0.477	-0.03
14	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	457	0.681	0.467	0
15	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	365	0.721	0.449	0.04
16	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	300	0.763	0.426	0.083
17	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	177	0.729	0.446	0.048
18	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	144	0.819	0.386	0.139
19	Sinemet CR (Carbidopa-levodopa oral, ER)	Treated	201	0.642	0.481	-0.039

1	Symmetrel (Amantadine)	Not treated	6848	0.778	0.416	0
2	Symmetrel (Amantadine)	Not treated	12989	0.807	0.395	0.029
3	Symmetrel (Amantadine)	Not treated	9865	0.819	0.385	0.041
4	Symmetrel (Amantadine)	Not treated	11814	0.801	0.4	0.023
5	Symmetrel (Amantadine)	Not treated	7873	0.801	0.399	0.023
6	Symmetrel (Amantadine)	Not treated	7320	0.795	0.404	0.017
7	Symmetrel (Amantadine)	Not treated	5053	0.773	0.419	-0.005
8	Symmetrel (Amantadine)	Not treated	4861	0.808	0.394	0.03
9	Symmetrel (Amantadine)	Not treated	3374	0.775	0.417	-0.003
10	Symmetrel (Amantadine)	Not treated	3007	0.747	0.435	-0.031
11	Symmetrel (Amantadine)	Not treated	2263	0.764	0.425	-0.014
12	Symmetrel (Amantadine)	Not treated	1966	0.708	0.455	-0.07
13	Symmetrel (Amantadine)	Not treated	1177	0.717	0.451	-0.061
14	Symmetrel (Amantadine)	Not treated	1269	0.701	0.458	-0.077
15	Symmetrel (Amantadine)	Not treated	879	0.71	0.454	-0.068
16	Symmetrel (Amantadine)	Not treated	807	0.694	0.461	-0.084
17	Symmetrel (Amantadine)	Not treated	553	0.712	0.453	-0.066
18	Symmetrel (Amantadine)	Not treated	489	0.73	0.444	-0.048
19	Symmetrel (Amantadine)	Not treated	484	0.69	0.463	-0.088
20	Symmetrel (Amantadine)	Not treated	240	0.704	0.457	-0.074
1	Symmetrel (Amantadine)	Treated	209	0.775	0.419	0
2	Symmetrel (Amantadine)	Treated	604	0.806	0.396	0.031
3	Symmetrel (Amantadine)	Treated	573	0.775	0.418	0
4	Symmetrel (Amantadine)	Treated	914	0.84	0.367	0.065
5	Symmetrel (Amantadine)	Treated	777	0.777	0.416	0.002
6	Symmetrel (Amantadine)	Treated	820	0.789	0.408	0.014
7	Symmetrel (Amantadine)	Treated	801	0.833	0.373	0.058
8	Symmetrel (Amantadine)	Treated	727	0.862	0.345	0.087
9	Symmetrel (Amantadine)	Treated	614	0.875	0.331	0.099
10	Symmetrel (Amantadine)	Treated	566	0.807	0.395	0.032
11	Symmetrel (Amantadine)	Treated	398	0.759	0.428	-0.016
12	Symmetrel (Amantadine)	Treated	449	0.775	0.418	0
13	Symmetrel (Amantadine)	Treated	376	0.652	0.477	-0.124
14	Symmetrel (Amantadine)	Treated	349	0.756	0.43	-0.019
15	Symmetrel (Amantadine)	Treated	267	0.854	0.354	0.079
16	Symmetrel (Amantadine)	Treated	298	0.809	0.394	0.034
17	Symmetrel (Amantadine)	Treated	156	0.801	0.4	0.026
18	Symmetrel (Amantadine)	Treated	177	0.825	0.381	0.05
19	Symmetrel (Amantadine)	Treated	210	0.843	0.365	0.068
20	Symmetrel (Amantadine)	Treated	125	0.712	0.455	-0.063

Parkinson's patient data from the United States drawn from the Fox Insight database. Life satisfaction represented as percent satisfied with life. Change in life satisfaction measured using first year of diagnosis as a benchmark. C-L short for Carbidopa-levodopa. ER short for extended release.

Table A17: Life satisfaction and Parkinson's treatments (OLS)

Treatment	Life satisfaction	Std. Error	Obs.	R-squared
Sinemet (Cabidopa-levodopa oral)	0.023**	0.01	2971	0.041
Sinemet CR (Carbidopa-levodopa oral, extended release)	-0.018	0.013	1894	0.048
Rytary or Numient (Caricopa-levodopa oral, extended release)	-0.045**	0.018	781	0.083
Comtan (Entacapone)	-0.031	0.026	462	0.059
Azilect (Rasagiline)	0.026	0.015	1216	0.065
Deprenyl (Selegiline)	0.036	0.025	429	0.181
Mirapex, Mirapexin or Sifrol (Pramipexole)	-0.023	0.019	877	0.063
Requip (Ropinirole)	0	0.022	767	0.083
Symmetrel (Amantadine)	-0.012	0.014	1277	0.052

** p<0.05, *** p<0.01. Each row represents a separate regression containing longitudinal data from Parkinson's patients in the United States. Coefficients represent the difference in average life satisfaction before and after taking the treatment. Life satisfaction represented as percent satisfied with life. Clustered robust standard errors are reported in parentheses. Constant estimated but not reported. Control variables included in each regression for gender, age, employment, education, income, and years since diagnosed. Samples include Parkinson's patients in United States. Estimates obtained using the following OLS regression equation:

$$\text{Life satisfaction when treated}_i - \text{Life satisfaction when not treated}_i = \beta_0 + \beta_1 \text{Treatment}_i + \beta_2 X_i + \varepsilon_i$$

where β_1 represents the estimated coefficient of each treatment on life satisfaction for each individual i . X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.

CHAPTER 8

Table A18: Life satisfaction and pollution in European cities (Eurobarometer)

City	Variable	Average life satisfaction (2013)	Pollution levels (2013)	Observations	Average life satisfaction (2015)	Pollution levels (2015)	Observations
Amsterdam	Annual mean PM10 µg/m ³	3,446	24	498	3,396	20	502
Amsterdam	Annual mean PM2.5 µg/m ³	3,446	15	498	3,396	14	502
Antwerp	Annual mean PM10 µg/m ³	3,351	27	498	3,45	23	505
Antwerp	Annual mean PM2.5 µg/m ³	3,351	17	498	3,45	14	505
Athens	Annual mean PM10 µg/m ³	2,362	40	996	2,502	41	791
Athens	Annual mean PM2.5 µg/m ³	2,362	22	996	2,502	23	791
Barcelona	Annual mean PM10 µg/m ³	3,119	24	496	3,085	28	494
Barcelona	Annual mean PM2.5 µg/m ³	3,119	15	496	3,085	17	494
Belfast	Annual mean PM10 µg/m ³	3,388	17	495	3,466	18	498
Belfast	Annual mean PM2.5 µg/m ³	3,388	12	495	3,466	9	498
Berlin	Annual mean PM10 µg/m ³	3,31	24	500	3,309	23	499
Berlin	Annual mean PM2.5 µg/m ³	3,31	16	500	3,309	17	499
Bialystok	Annual mean PM10 µg/m ³	3,208	25	496	3,226	27	501
Bialystok	Annual mean PM2.5 µg/m ³	3,208	20	496	3,226	20	501
Bologna	Annual mean PM10 µg/m ³	3,085	25	495	3,04	27	494
Bologna	Annual mean PM2.5 µg/m ³	3,085	17	495	3,04	19	494
Bordeaux	Annual mean PM10 µg/m ³	3,126	25	499	3,209	22	498
Bordeaux	Annual mean PM2.5 µg/m ³	3,126	16	499	3,209	15	498
Bratislava	Annual mean PM10 µg/m ³	3,091	24	496	3,147	25	495
Bratislava	Annual mean PM2.5 µg/m ³	3,091	17	496	3,147	17,5	495
Bucuresti	Annual mean PM10 µg/m ³	2,874	31	500	2,845	31	497
Bucuresti	Annual mean PM2.5 µg/m ³	2,874	21	500	2,845	21	497
Budapest	Annual mean PM10 µg/m ³	2,533	29	501	2,793	30	493
Budapest	Annual mean PM2.5 µg/m ³	2,533	20	501	2,793	21	493
Burgas	Annual mean PM10 µg/m ³	2,874	36	499	3,002	34	495
Burgas	Annual mean PM2.5 µg/m ³	2,874	22	499	3,002	21	495
Cardiff	Annual mean PM10 µg/m ³	3,405	19	494	3,449	14	497
Cardiff	Annual mean PM2.5 µg/m ³	3,405	13	494	3,449	10	497
Cluj- napoc	Annual mean PM10 µg/m ³	2,998	27	499	3,126	28	499
Cluj- napoc	Annual mean PM2.5 µg/m ³	2,998	19	499	3,126	17	499
Dortmund	Annual mean PM10 µg/m ³	3,406	25	498	3,435	22	494
Dortmund	Annual mean PM2.5 µg/m ³	3,406	16	498	3,435	14	494
Dublin	Annual mean PM10 µg/m ³	3,34	15	497	3,445	13	499
Dublin	Annual mean PM2.5 µg/m ³	3,34	11	497	3,445	8	499
Essen	Annual mean PM10 µg/m ³	3,451	25	497	3,453	22	495
Essen	Annual mean PM2.5 µg/m ³	3,451	16	497	3,453	14	495
Gdansk	Annual mean PM10 µg/m ³	3,277	20	495	3,251	23	499
Gdansk	Annual mean PM2.5 µg/m ³	3,277	13	495	3,251	14	499
Geneva	Annual mean PM10 µg/m ³	3,274	22	519	3,369	20	493
Geneva	Annual mean PM2.5 µg/m ³	3,274	16	519	3,369	15	493
Glasgow	Annual mean PM10 µg/m ³	3,372	23	494	3,413	13	496
Glasgow	Annual mean PM2.5 µg/m ³	3,372	16	494	3,413	8	496
Graz	Annual mean PM10 µg/m ³	3,514	25	500	3,635	27	499
Graz	Annual mean PM2.5 µg/m ³	3,514	19	500	3,635	19	499
Groningen	Annual mean PM10 µg/m ³	3,505	24	501	3,369	23	499
Groningen	Annual mean PM2.5 µg/m ³	3,505	13	501	3,369	11	499
Hamburg	Annual mean PM10 µg/m ³	3,42	21	498	3,408	21	498
Hamburg	Annual mean PM2.5 µg/m ³	3,42	14	498	3,408	14	498
Helsinki	Annual mean PM10 µg/m ³	3,457	21	503	3,435	23	497
Helsinki	Annual mean PM2.5 µg/m ³	3,457	8	503	3,435	6	497
Kobenhavn	Annual mean PM10 µg/m ³	3,66	27	497	3,622	25	498
Kobenhavn	Annual mean PM2.5 µg/m ³	3,66	13	497	3,622	13	498
Krakow	Annual mean PM10 µg/m ³	3,18	51	499	3,235	55	497
Krakow	Annual mean PM2.5 µg/m ³	3,18	37	499	3,235	37	497
Leipzig	Annual mean PM10 µg/m ³	3,297	25	501	3,333	24	498
Leipzig	Annual mean PM2.5 µg/m ³	3,297	16	501	3,333	14	498
Liege	Annual mean PM10 µg/m ³	3,004	22	499	3,042	18	500
Liege	Annual mean PM2.5 µg/m ³	3,004	15	499	3,042	11	500
Lille	Annual mean PM10 µg/m ³	3,138	26	499	3,212	22	495
Lille	Annual mean PM2.5 µg/m ³	3,138	19	499	3,212	15	495
Ljubljana	Annual mean PM10 µg/m ³	3,339	25	519	3,258	28	508
Ljubljana	Annual mean PM2.5 µg/m ³	3,339	20	519	3,258	23	508

London	Annual mean PM10 µg/m ³	3,301	24	498	3,374	22	494
London	Annual mean PM2.5 µg/m ³	3,301	15	498	3,374	12	494
Luxembourg	Annual mean PM10 µg/m ³	3,39	22	500	3,425	21	499
Luxembourg	Annual mean PM2.5 µg/m ³	3,39	16	500	3,425	12	499
Madrid	Annual mean PM10 µg/m ³	3,057	19	494	3,096	21	492
Madrid	Annual mean PM2.5 µg/m ³	3,057	10	494	3,096	11	492
Malmo	Annual mean PM10 µg/m ³	3,477	20	497	3,541	19	497
Malmo	Annual mean PM2.5 µg/m ³	3,477	10	497	3,541	11	497
Manchester	Annual mean PM10 µg/m ³	3,293	18	997	3,355	15	797
Manchester	Annual mean PM2.5 µg/m ³	3,293	13	997	3,355	10	797
Marseille	Annual mean PM10 µg/m ³	3,062	32	498	3,118	29	493
Marseille	Annual mean PM2.5 µg/m ³	3,062	15	498	3,118	16	493
Miskolc	Annual mean PM10 µg/m ³	2,585	35	499	2,689	33	492
Miskolc	Annual mean PM2.5 µg/m ³	2,585	24	499	2,689	23	492
Munchen	Annual mean PM10 µg/m ³	3,44	24	498	3,523	21	493
Munchen	Annual mean PM2.5 µg/m ³	3,44	16	498	3,523	13	493
Napoli	Annual mean PM10 µg/m ³	2,819	35	498	2,828	33	499
Napoli	Annual mean PM2.5 µg/m ³	2,819	20	498	2,828	18	499
Newcastle	Annual mean PM10 µg/m ³	3,39	22	497	3,481	23	497
Newcastle	Annual mean PM2.5 µg/m ³	3,39	8	497	3,481	8	497
Oslo	Annual mean PM10 µg/m ³	3,506	22	496	3,585	19	499
Oslo	Annual mean PM2.5 µg/m ³	3,506	11	496	3,585	8	499
Ostrava	Annual mean PM10 µg/m ³	3,159	41	496	3,297	34	492
Ostrava	Annual mean PM2.5 µg/m ³	3,159	32	496	3,297	27	492
Oulu	Annual mean PM10 µg/m ³	3,398	12	500	3,423	11	499
Oulu	Annual mean PM2.5 µg/m ³	3,398	7	500	3,423	7	499
Oviedo	Annual mean PM10 µg/m ³	3,174	25	494	3,202	24	496
Oviedo	Annual mean PM2.5 µg/m ³	3,174	13	494	3,202	13	496
Paris	Annual mean PM10 µg/m ³	3,094	34	993	3,041	29	799
Paris	Annual mean PM2.5 µg/m ³	3,094	20	993	3,041	17	799
Praha	Annual mean PM10 µg/m ³	3,161	27	498	3,213	23	497
Praha	Annual mean PM2.5 µg/m ³	3,161	19	498	3,213	17	497
Rennes	Annual mean PM10 µg/m ³	3,224	19	499	3,238	20	496
Rennes	Annual mean PM2.5 µg/m ³	3,224	11	499	3,238	13	496
Riga	Annual mean PM10 µg/m ³	2,924	34	502	3,089	27	495
Riga	Annual mean PM2.5 µg/m ³	2,924	17	502	3,089	16	495
Roma	Annual mean PM10 µg/m ³	2,954	28	498	2,978	30	497
Roma	Annual mean PM2.5 µg/m ³	2,954	17	498	2,978	18	497
Rostock	Annual mean PM10 µg/m ³	3,376	22	498	3,428	21	495
Rostock	Annual mean PM2.5 µg/m ³	3,376	14	498	3,428	13	495
Rotterdam	Annual mean PM10 µg/m ³	3,482	24	500	3,417	24	499
Rotterdam	Annual mean PM2.5 µg/m ³	3,482	15	500	3,417	13	499
Sofia	Annual mean PM10 µg/m ³	2,859	41	498	2,886	34	499
Sofia	Annual mean PM2.5 µg/m ³	2,859	22	498	2,886	25	499
Stockholm	Annual mean PM10 µg/m ³	3,495	26	501	3,494	18	502
Stockholm	Annual mean PM2.5 µg/m ³	3,495	6	501	3,494	5	502
Strasbourg	Annual mean PM10 µg/m ³	3,158	29	499	3,206	25	501
Strasbourg	Annual mean PM2.5 µg/m ³	3,158	18	499	3,206	17	501
Tallinn	Annual mean PM10 µg/m ³	2,978	14	494	3,169	12	490
Tallinn	Annual mean PM2.5 µg/m ³	2,978	8	494	3,169	6	490
Torino	Annual mean PM10 µg/m ³	3,032	38	496	2,919	39	494
Torino	Annual mean PM2.5 µg/m ³	3,032	29	496	2,919	27	494
Verona	Annual mean PM10 µg/m ³	3,163	36	496	3,118	33	500
Verona	Annual mean PM2.5 µg/m ³	3,163	24	496	3,118	22	500
Vilnius	Annual mean PM10 µg/m ³	3,022	27	494	3,265	27	494
Vilnius	Annual mean PM2.5 µg/m ³	3,022	23	494	3,265	23	494
Warszawa	Annual mean PM10 µg/m ³	3,207	33	498	3,217	33	497
Warszawa	Annual mean PM2.5 µg/m ³	3,207	26	498	3,217	23	497
Wien	Annual mean PM10 µg/m ³	3,556	26	500	3,491	21	499
Wien	Annual mean PM2.5 µg/m ³	3,556	18	500	3,491	15	499
Zagreb	Annual mean PM10 µg/m ³	3,05	36	503	3,109	35	497
Zagreb	Annual mean PM2.5 µg/m ³	3,05	22	503	3,109	21	497
Zurich	Annual mean PM10 µg/m ³	3,641	21	498	3,62	18	500
Zurich	Annual mean PM2.5 µg/m ³	3,641	15	498	3,62	12	500

Life satisfaction measured on a 4-point scale from not at all satisfied to very satisfied. More information about air pollution measures are available at <https://www.who.int/airpollution/data/cities/en/>

Table A19: Summary statistics and variable descriptions (Eurobarometer)

Variable	Observations
On the whole, are you very satisfied, fairly satisfied, not very satisfied or not at all satisfied with the life you lead?	
Not at all satisfied	2309
Very satisfied	6321
Fairly satisfied	35264
Very satisfied	25490
City	
Aalborg	502
Amsterdam	1003
Antwerp	1005
Athina	1803
Barcelona	1000
Belfast	997
Berlin	1004
Bialystok	1003
Bologna	1001
Bordeaux	1004
Braga	503
Bratislava	1000
Brussel	500
Bucuresti	1005
Budapest	1004
Burgas	999
Cardiff	1000
Cluj- napoc	1003
Dortmund	1003
Dublin	1000
Essen	1002
Gdansk	1000
Geneva	1024
Glasgow	1002
Graz	1002
Groningen	1002
Hamburg	1002
Helsinki	1004
Kobenhavn	1005
Kosice	501
Krakow	1002
Lefkosia	502
Leipzig	1008
Liege	1008
Lille	1001
Lisboa	797
Ljubljana	1031
London	1002
Luxembourg	1004
Madrid	1001
Malmö	1000
Manchester	1807
Marseille	1001
Miskolc	998
München	1002
Napoli	1002
Newcastle	1002
Oslo	1000
Ostrava	1000
Oulu	1001
Oviedo	1000
Palermo	502
Paris	1801
Piatra nea	503
Praha	1003
Rennes	1004
Riga	1009
Roma	1001
Rostock	1001
Rotterdam	1001
Sofia	1006

Stockholm	1005
Strasbourg	1004
Tallinn	1000
Torino	1000
Verona	1002
Vilnius	1001
Warszawa	1000
Wien	1003
Zagreb	1006
Zurich	1000
Household composition / marital status	
Single person household	16579
Married or cohabiting couple, no children (living at home)	18922
Single parent, one or more children living at home	5210
Married or cohabiting couple, 1+ children living at home	23884
Other	4957
Years living in (city)	
I live here since more than 10 years	27828
Was born here/ I've been living here for all my life	34432
I live here since 1 to 5 years	2842
I live here since between 5 to 10 years	4044
I live here since less than 1 year	601
Difficulties paying bills - last 12 months	
Almost never/never	47577
From time to time	13912
Most of the time	7158
Gender	
Female	39682
Male	30222
Occupation of respondent	
Retired	19445
Looking after the home	3192
Other employee (salesman, nurse, ...)	7227
Student (full time)	4294
Civil servant	4557
Manual worker	2849
Owner of shop, craftsman	1315
Office clerk	4355
Middle management	3906
Professional (employed doctor, lawyer, accountant, architect)	4791
Seeking a job	3864
Unskilled manual worker	710
General management, director or top management	1116
Other (Self-employed)	855
Other (Employee)	429
Professional (lawyer, medical practitioner, accountant, arch)	3031
Other (Without a professional activity)	992
Manager of a company	1988
Supervisor\ foreman (team manager, ...)	477
Refusal	330
Farmer, forester, fisherman	124
Other (Manual worker)	57
Age	
70-74	4963
50-54	6714
60-64	6136
15-19	1390
55-59	5973
25-29	4231
35-39	6015
30-34	5187
65-69	5696
40-44	6117
45-49	5830
20-24	3325
75-79	3721
85-89	1345
80-84	2691
90-94	480
95-99	83
100-104	7

Household size (aged 15+)	
1	18828
2	32676
3	10536
4	5580
5	1414
6	322
7	83
8	23
9	14
10	7
11	9
12	15
13	10
14	2
15	6
17	2
20	6
97	177
98	64
99	130
Generally speaking, please tell me if you are satisfied with each of the following issues in [city].	
Green spaces such as parks and gardens	
Not at all satisfied	4116
Rather unsatisfied	9744
Rather satisfied	31168
Very satisfied	24130
Public transport, for example the bus (tram or metro)	
Not at all satisfied	4880
Rather unsatisfied	9820
Rather satisfied	28796
Very satisfied	21225
The noise level	
Not at all satisfied	7767
Rather unsatisfied	15949
Rather satisfied	32020
Very satisfied	13331
Cleanliness	
Not at all satisfied	8832
Rather unsatisfied	17912
Rather satisfied	31575
Very satisfied	11163
Do you agree with each of the following statements?	
I am satisfied to live in [city]	
Strongly disagree	2346
Somewhat disagree	3999
Somewhat agree	22960
Strongly agree	40145
It is easy to find good housing at a reasonable price in [city]	
Strongly disagree	20367
Somewhat disagree	20483
Somewhat agree	16231
Strongly agree	5559
[City] is committed to fight against climate change	
Strongly disagree	7202
Somewhat disagree	15894
Somewhat agree	28106
Strongly agree	10830
Are you satisfied with the financial situation of your household?	
Not at all satisfied	5897
Not very satisfied	13422
Fairly satisfied	34963
Very satisfied	14694

More information about the Eurobarometer data and questionnaires is available here:
<https://dbk.gesis.org/dbksearch/SDesc2.asp?DB=E&no=6641> and here:
<https://dbk.gesis.org/dbksearch/sdesc2.asp?no=5885&db=e&doi=10.4232/1.11916>

Table A20: Life satisfaction and pollution in European cities (OLS)

Variable	(1) Life satisfaction
(Intercept)	1.265*** (0.306)
Household composition / marital status	
Single person household	-0.017 (0.011)
Married or cohabiting couple, no children (living at home)	0.078*** (0.011)
Single parent, one or more children living at home	0.008 (0.013)
Married or cohabiting couple, 1+ children living at home	0.079*** (0.01)
Years living in (city)	
I live here since more than 10 years	0.027 (0.026)
Was born here/I've been living here for all my life	0.047 (0.026)
I live here since 1 to 5 years	0.05 (0.028)
I live here since between 5 to 10 years	0.036 (0.027)
Difficulties paying bills - last 12 months	
Almost never/never	0.188*** (0.01)
From time to time	0.128*** (0.01)
Gender - Female	0.047*** (0.005)
Occupation of respondent	
Retired	0.005 (0.086)
Looking after the home	0.042 (0.087)
Other employee (salesman, nurse, ...)	0.063 (0.086)
Student (full time)	0.087 (0.087)
Civil servant	0.087 (0.086)
Manual worker	0.032 (0.086)
Owner of shop, craftsman	0.068 (0.088)
Office clerk	0.055 (0.086)
Middle management	0.093 (0.086)
Professional (employed doctor, lawyer, accountant, architect)	0.056 (0.086)
Seeking a job	-0.104 (0.086)
Unskilled manual worker	0.042 (0.089)
General management, director or top management	0.117 (0.088)
Other (Self-employed)	0.099 (0.089)
Other (Employee)	0.051 (0.092)
Professional (lawyer, medical practitioner, accountant, arch)	0.089 (0.086)
Other (Without a professional activity)	-0.092 (0.089)
Manager of a company	0.07 (0.087)
Supervisor\ foreman (team manager, ...)	0.099 (0.09)
Refusal	0.077 (0.099)
Farmer, forester, fisherman	0.22** (0.103)
Green spaces such as parks and gardens (4-point scale)	0.038*** (0.003)
Public transport, for example the bus {tram or metro} (4-point scale)	0.03*** (0.003)
The noise level (4-point scale)	0.037*** (0.003)
I am satisfied to live in [city] (4-point scale)	0.152*** (0.004)
Cleanliness (4-point scale)	0.02*** (0.003)
It is easy to find good housing at a reasonable price in [city] (4-point scale)	-0.007** (0.003)
[City] is committed to fight against climate change (4-point scale)	0.008*** (0.003)
The financial situation of your household (4-point scale)	0.326*** (0.004)
Age	
70	-0.034 (0.292)
50	-0.101 (0.292)
60	-0.082 (0.292)
15	0.05 (0.293)
55	-0.107 (0.292)
25	0.011 (0.292)

35	-0.025 (0.292)
30	-0.004 (0.292)
65	-0.063 (0.292)
40	-0.05 (0.292)
45	-0.086 (0.292)
20	0.027 (0.292)
75	-0.037 (0.292)
85	-0.057 (0.293)
80	-0.034 (0.293)
90	-0.143 (0.296)
95	0.241 (0.317)
Household size (aged 15+)	0 (0.001)
Pollution $\mu\text{g}/\text{m}^3$	-0.006*** (0)

*** $p < 0.01$, ** $p < 0.05$. Regression containing 51,054 observations with life satisfaction as the dependent variable measured on a 4-point scale. R-squared = 0.34. Clustered robust standard errors are reported in parentheses. Sample includes adults over the age of 15 in European cities. Pollution created from the average of annual concentration of PM (10) and PM (2.5) ($\mu\text{g}/\text{m}^3$). Estimates obtained using the following OLS regression equation:

$$\text{Life satisfaction}_i = \beta_0 + \beta_1 \text{Pollution}_i + \beta_2 X_i + \varepsilon_i$$

where β_1 represents life satisfaction increase for each 1 $\mu\text{g}/\text{m}^3$ increase in pollutant. X_i represents a vector of categorical dummy control variables, with β_2 as their respective coefficients. β_0 represents the constant, while ε_i accounts for unexplained variation.