

Some technical notes on the modeling results:

- happiness is hard to measure with a single variable (or indeed any set of variables).
- multilevel modelling is a way to take into account people and places in the same analysis.
- the places in this analysis are districts in Britain, as defined for the release of the 1991 Census 2% individual Samples of Anonymised Records (SARs). These are individual 1991 local authority districts or amalgamations of districts so that no area has a population of less than 120,000 (Marsh and Teague, 1992).
- Each of these districts is not a miniature version of Britain. Each district has its own socio-demographic characteristics, and two people from any one district are more likely to be similar than two people taken from anywhere in Britain. e.g. Blackpool contains a higher percentage of older people than Britain as a whole – Blackpool is a retirement area.
- the way in which the data were collected – sample design - needs to be borne in mind. BHPS data clustered within areas (districts).

2003 results:

- First of all we conducted a multilevel analysis that does not take into account the socio-demographic characteristics of people. The purpose of this analysis to see 'where we start off from' in terms of the extent of variation. i.e. to find out Is it mostly between people or mostly between areas (districts)?
- We find most of the variation is between people rather than areas (but we also are aware that the definition of *area* here is district and that the results would probably be different for finer geographical scales e.g. wards if the data were available).

However there is a little bit of geographical variation at the district scale and one or two places that appear to be significantly less 'happy' than the rest of Britain; these are the area of "Cynon Valley; Rhondda" and "Merthyr Tydfil; Rhymney Valley; Taff-Ely" in Wales.

However because happiness mostly varies by people we need to take into account the socio-demographic variations of people in the areas to see if this explains the significant differences. This is one of the advantages of a multilevel approach used here.

We find it that socio demographic variations from district to district do explain the differences, in the sense that all places are essentially similar with respect to happiness when we take into account the differences their socio-demographic composition.

The ranks provide a guide of the order of the differences by area before and after accounting for socio-demographic composition and do not directly imply better or worse places to live in terms of this particular happiness measure. Note that the residuals underlying the ranks for the model that takes into account socio-demographic characteristics are not statistically significant from each other. Two of the residuals (the areas in Wales mentioned above) have statistically lower (worse) levels of well-being than the rest of Britain but these differences are explained by socio-demographic differences – compositional differences – in these areas.

Certain characteristics of people are more/less associated with happiness. The multilevel model coefficient estimates will tell us which characteristics are associated with more/less happiness (for more details on the method and an application on earlier BHPS data see: <http://arxiv1.library.cornell.edu/ftp/arxiv/papers/0808/0808.1001.pdf>)

Information on the “subjective well-being” variable that was used:

This study used a measure of subjective well-being based on the responses to 12 questions that make up the General Health Questionnaire (GHQ), which was originally developed as a

screening instrument for psychiatric illness, but are also commonly used as an indicator of subjective well-being (Cox *et al.*, 1987). The way these questions were asked and recorded in the BHPS is described below:

The GHQ set of questions as they appear on the BHPS questionnaire: Here are some questions regarding the way you have been feeling over the last few weeks. For each question please ring the number next to the answer that best suits the way you have felt. Have you recently:

GHQ questions / responses	1	2	3	4
1. Been able to concentrate on whatever you are doing?	Better than usual	Same as usual	Less than usual	Much less than usual
2. Lost much sleep over worry?	Not at all	No more than usual	Rather more than usual	Much more than usual
3. Felt that you are playing a useful part in things?	More than usual	Same as usual	Less so than usual	Much less than usual
4. Felt capable of making decisions about things?	More so than usual	Same as usual	Less so than usual	Much less capable
5. Felt constantly under strain?	Not at all	No more than usual	Rather more than usual	Much more than usual
6. Felt you could not overcome your difficulties?	Not at all	No more than usual	Rather more than usual	Much more than usual
7. Been able to enjoy your normal day-to-day activities?	Much more than usual	Same as usual	Less so than usual	Much less than usual
8. Been able to face up to your problems?	More so than usual	Same as usual	Less able than usual	Much less able
9. Been feeling unhappy and depressed?	Not at all	No more than usual	Rather more than usual	Much more than usual
10. Been losing confidence in yourself?	Not at all	Not more than usual	Rather more than usual	Much more than usual
11. Been thinking of yourself as a worthless person?	Not at all	No more than usual	Rather more than usual	Much more than usual
12. Been feeling reasonably happy all things considered?	More so than usual	About same as usual	less so than usual	Much less than usual

Responses are made on a four-point frequency scale of feeling in relation to a person's usual state (Taylor *et al.*, 2001). In the study presented here we used the responses to the 12th question (known as "GHQL: General Happiness"). We also used the HLGHQ1 measure of subjective well-being which amalgamates the answers to the above questions to a single scale by recoding so that the scale for individual variables runs from 0 to 3 instead of 1 to 4 and then summing, giving a scale running from 0 (the least distressed) to 36 (the most distressed).

References:

Cox, B et al. (1987), *The Health and Lifestyle Survey*, London: Health Promotion Research Trust.
 Marsh, C., Teague, A. (1992), Samples of anonymised records from the 1991 Census, *Population Trends*, 69, 17-26.
 Taylor, M F, Brice J., Buck, N., Prentice-Lane, E (2001) *British Household Panel Survey User Manual Volume A: Introduction, Technical Report and Appendices*. Colchester: University of Essex.

Appendix: Districts with BHPS sample respondents in 2003, ranked by estimated "subjective well-being" residuals (after Ballas and Tranmer, 2008; see text above for an explanation) according to different models

LABEL	Model 1 (no explanatory variables)	Model 2
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Powys (Brecknock, Montgomeryshire & Radnorshire)	273	273
Manchester	272	272
West Lothian	270	271
Cumbernauld & Kilsyth; Monklands	253	270
Macclesfield	264	269
Cunninghame	269	268
Sutton	260	267
Falkirk	247	266
Cleethorpes; Great Grimsby	263	265
Nottingham	246	264
East Staffordshire; Staffordshire Moorlands	271	263
East Northamptonshire; Wellingborough	261	262
Berwickshire, East Lothian etc	254	261
St Helens	257	260
Clackmannan; Stirling	266	259
Colchester	265	258
Congleton; Crewe & Nantwich; Vale Royal	238	257
Badenoch & Strathspey etc	267	256
Argyll & Bute; Dumbarton; Inverclyde	259	255
Chelmsford	268	254
Forest of Dean; Stroud	258	253
Stoke-on-Trent	233	252
Birmingham	177	251
East Lindsey; West Lindsey; Lincoln	249	250
Vale of Glamorgan	224	249
Barrow in Furness; Copeland	255	248
Ogwr	252	247
Allerdale; Carlisle	220	246
North Hertfordshire; Stevenage	262	245
Lliw Valley; Neath; Port Talbot	91	244
Dumfries & Galloway	256	243
Woodspring	248	242
Ashfield; Mansfield	202	241
Colwyn; Glyndwr; Rhuddlan	127	240
Newcastle under Lyme; Stafford	243	239
Newcastle upon Tyne	172	238
Dudley	146	237
Islington	228	236
Kerrier; Penwith; Isles of Scilly	222	235
Barnet	229	234
Stratford on Avon; Warwick	241	233
Sevenoaks; Tonbridge & Malling	245	232
East Cambridgeshire; Fenland	215	231
Carrick; Restormel	219	230
Cherwell	237	229
Wirral	227	228
Trafford	221	227
Gillingham; Swale	230	226
Eastwood; Kilmarnock & Loudan	95	225
Brighton	226	224
Northampton	212	223
Babergh; Ipswich	251	222
Bassetlaw; Newark & Sherwood	196	221
Bury	223	220

Blackpool	183	219
Forest Heath; Mid-Suffolk; St Edmundsbury	216	218
Erewash; South Derbyshire	100	217
Fylde; Wyre	123	216
Corby; Kettering	236	215
Angus; Perth & Kinross	203	214
Lichfield; Tamworth	217	213
Redditch; Wychavon	157	212
Dunfermline	176	211
Three Rivers; Watford	197	210
Crawley; M Sussex	205	209
Waltham Forest	210	208
Bearsden & Milngavie; Clydebank; Strathkelvin	192	207
Tameside	179	206
Sefton	235	205
Bournemouth	122	204
Newport	201	203
Halton	206	202
Motherwell	160	201
North Kesteven; South Kesteven	209	200
Carmarthen; Dinefwr; Llanelli	47	199
Alyn & Deeside; Delyn; Wrexham Maelor	135	198
Hammersmith & Fulham	182	197
Plymouth	234	196
Newbury	242	195
Luton	214	194
Kirkcaldy; North East Fife	76	193
Sunderland	113	192
Purbeck; West Dorset; Weymouth & Portland	225	191
Huntingdonshire	218	190
Solihull	198	189
Beverley; Boothferry	231	188
Test Valley; Winchester	232	187
North Tyneside	207	186
Suffolk Coastal; Waveney	170	185
Aberdeen City	68	184
Alnwick; Berwick upon Tweed; Castle Morpeth; Ty	195	183
North Shropshire; South Shropshire; Oswestry	131	182
Hillingdon	199	181
Rotherham	204	180
Gordon; Kincardine & Deeside	250	179
Portsmouth	211	178
Hackney	169	177
Knowsley	178	176
Lancaster	193	175
Lambeth	140	174
Wycombe	174	173
North Warwickshire; Nuneaton & Bedworth; Rugby	190	172
Hertsmere; Welyn Hatfield	171	171
East Yorkshire; Holderness	200	170
Calderdale	162	169
Aylesbury Vale	187	168
Rochdale	163	167
Wokingham	189	166

Darlington; Teesdale	173	165
Gateshead	29	164
Glasgow City	6	163
Cambridge; South Cambridgeshire	156	162
New Forest	181	161
Hastings; Rother	152	160
St Albans	188	159
Kensington & Chelsea	147	158
Oldham	134	157
Dacorum	149	156
Castle Point; Maldon; Rochford	125	155
Isle of Wight	159	154
Mole Valley; Waverley	142	153
Exeter; Teignbridge	168	152
Bexley	108	151
Chichester; Horsham	240	150
City of London City of Westminster ;	175	149
Rochester upon Medway	67	148
Merton	208	147
Cannock Chase; South Staffordshire	136	146
Thanet	154	145
The Wrekin	129	144
North Bedfordshire	150	143
Hinckley & Bosworth; North West Leicestershire	133	142
Caradon; North Cornwall	148	141
Tower Hamlets	158	140
Preston	167	139
Runnymede; Spelthorne	153	138
Walsall	111	137
Reigate & Banstead; Tandridge	194	136
Bolton	151	135
East Kilbride; Hamilton	165	134
Dartford; Gravesham	116	133
Camden	138	132
Southwark	124	131
Cheltenham; Cotswold	110	130
Eden; South Lakeland	114	129
North Devon; Torridge	143	128
Kingston upon Hull	118	127
Northavon	93	126
High Peak; Derbyshire Dales	112	125
Eastbourne; Hove; Lewes	105	124
Chiltern; South Bucks	119	123
South Hams; West Devon	184	122
Brentwood; Epping Forest; Harlow	164	121
Braintree; Uttlesford	239	120
Blyth Valley; Wansbeck	85	119
Charnwood	121	118
Brent	120	117
Peterborough	102	116
Bristol	137	115
Adur; Worthing	107	114
Hounslow	103	113
Bradford	244	112

Hartlepool; Stockton on Tees	166	111
South Somerset	139	110
Malvern Hills; Worcester	130	109
Salford	132	108
Mendip; Sedgemoor	115	107
Lewisham	99	106
Craven; Hambleton; Richmondshire	145	105
Kingston upon Thames	144	104
Hyndburn; Rossendale	89	103
Wandsworth	126	102
Wakefield	35	101
Harborough; Melton; Rutland	104	100
Torbay	84	99
Selby; York	96	98
North Wilts; West Wilts	155	97
Tendring	98	96
Ealing	92	95
Wealdon	117	94
Bracknell Forest; Slough	65	93
Banff & Buchan; Moray	185	92
Windsor & Maidenhead	70	91
Redbridge	161	90
Boston; South Holland	78	89
Easington; Sedgefield	57	88
Breckland; South Norfolk	191	87
Stockport	83	86
Newham	62	85
Milton Keynes	213	84
Broxtowe; Gedling; Rushcliffe	101	83
Basildon	109	82
Middlesborough	90	81
Canterbury	77	80
Richmond upon Thames	73	79
Harrogate	61	78
Enfield	81	77
Langbaugh-on-Tees	88	76
Kennet; Salisbury	180	75
Taunton Deane; West Somerset	87	74
East Hampshire; Havant	106	73
Great Yarmouth; North Norfolk	46	72
Glanford; Scunthorpe	49	71
Hereford; Leominster; South Herefordshire	80	70
Warrington	52	69
Bromley	86	68
Elmbridge; Epsom & Ewell	75	67
Kings Lynn; West Norfolk	60	66
Wolverhampton	41	65
Chorley; West Lancashire	66	64
Chester; Ellesmere Port & Neston	50	63
Bridgnorth; Shrewsbury; Atcham	38	62
Barnsley	69	61
Surrey Heath; Woking	82	60
Derby	71	59
Greenwich	16	58

Burnley; Pendle	141	57
Wigan	59	56
Guildford	72	55
Coventry	39	54
Hart; Rushmoor	63	53
Derwentside; Wear Valley	21	52
Ribble Valley; South Ribble	51	51
Basingstoke & Deane	45	50
Broadland; Norwich	128	49
Maidstone	58	48
Bath; Kingswood; Wansdyke	56	47
Chester-le-Street; Durham	54	46
Broxbourne; East Hertfordshire	64	45
Haringey	55	44
Leicester	36	43
Caithness, Sutherland etc	43	42
Kirklees	37	41
East Devon; Mid Devon	53	40
Monmouth; Torfaen	14	39
Thamesdown	94	38
Liverpool	44	37
Dundee City	11	36
South Oxfordshire	74	35
Oxford; Vale of White Horse; West Oxfordshire	79	34
Croydon	24	33
Arun	97	32
Barking; Dagenham	30	31
Havering	28	30
Cardiff	18	29
Sheffield	33	28
Reading	42	27
Southampton	26	26
Leeds	34	25
Mid Bedfordshire; South Bedfordshire	48	24
Gwynedd	186	23
Daventry; South Northhamptonshire	23	22
Harrow	22	21
Ryedale; Scarborough	40	20
Blaenau Gwent; Islwyn	15	19
Merthyr Tydfil; Rhymney Valley; Taff-Ely	2	18
Poole	13	17
Renfrew	19	16
Bolsover; Chesterfield	9	15
Bromsgrove; Wyre Forest	27	14
Ashford; Tunbridge Wells	17	13
Blackburn	4	12
Eastleigh; Fareham; Gosport	25	11
Ceredigion; South & Preseli Pembrokeshire	31	10
Sandwell	7	9
Christchurch; North Dorset; East Dorset	20	8
Doncaster	3	7
Gloucester; Tewkesbury	32	6
Swansea	5	5
Clydesdale, Cumnock & Doon Valley; Kyle & Carri	10	4

Amber Valley; North East Derbyshire	8	3
Cynon Valley; Rhondda	1	2
Edinburgh City	12	1