

A quantitative approach to the intersectional study of mental health inequalities during the COVID-19 pandemic in UK young adults

Supplementary Material

Table of Contents

Appendix S1. Assessment of mismatch/bias between Bayesian Markov Chain Monte Carlo (MCMC) and maximum likelihood (ML) MAIHDA models.....	3
Appendix S2. Additional details on sensitivity checks and comparison with fixed-effects approach.....	9
Table S1. Distribution of variables adopted to define the intersectional strata in the overall sample and by cohort.....	10
Table S2. Number of strata with at least one observation and missing strata under the different stratifications.....	11
Table S3. Number of observations by intersectional strata.....	12
Table S4. Fixed- and random-effects from the main models. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	15
Table S5. Fixed- and random-effects from the main models. Maximum likelihood estimation, weighted (survey design and non-response) results.....	18
Table S6. Results from the fixed-effects multiple regression approach using stratification 40 (cohort * birth sex * ethnic group * sexual orientation).....	21
Table S7. Results from the fixed-effects multiple regression approach using stratification 80a (cohort * birth sex * ethnic group * sexual orientation * residential Index of Multiple Deprivation rank).....	24
Table S8. Results from the fixed-effects multiple regression approach using stratification 80b (cohort * birth sex * ethnic group * sexual orientation * housing tenure).....	29
Table S9. Results from the fixed-effects multiple regression approach using stratification 80c (cohort * birth sex * ethnic group * sexual orientation * childhood social class).....	34
Figure S1. Stratum-specific residual values and 95% credible intervals for each outcome using 40 strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	39
Figure S2. Stratum-specific predicted values and 95% credible intervals for each outcome using 40 strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	40
Figure S3. Stratum-specific residual values for each outcome using 40 strata. Maximum likelihood estimation, weighted (survey design and non-response) results.....	41
Figure S4. Stratum-specific predicted values for each outcome using 40 strata. Maximum likelihood estimation, weighted (survey design and non-response) results.....	42
Figure S5. Anxiety and depressive symptomatology predicted values of each intersectional strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	43
Figure S6. Loneliness and life satisfaction predicted values of each intersectional strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	44
Figure S7. Anxiety and depressive symptomatology predicted values of each intersectional strata. Maximum likelihood estimation, weighted (survey design and non-response) results.....	45
Figure S8. Loneliness and life satisfaction predicted values of each intersectional strata. Maximum likelihood estimation, weighted (survey design and non-response) results.....	46
Figure S9. Anxiety and depressive symptomatology residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using housing tenure as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	47
Figure S10. Loneliness and life satisfaction residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using housing tenure as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	48
Figure S11. Anxiety and depressive symptomatology residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using parental social class during childhood as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	49
Figure S12. Loneliness and life satisfaction residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using parental social class during childhood as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.....	50

Figure S13. Anxiety and depressive symptomatology residual values (intersectional effects) using residential Index of Multiple Deprivation (IMD) rank as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	51
Figure S14. Loneliness and life satisfaction residual values (intersectional effects) using residential Index of Multiple Deprivation (IMD) rank as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	52
Figure S15. Anxiety and depressive symptomatology residual values (intersectional effects) using housing tenure as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	53
Figure S16. Loneliness and life satisfaction residual values (intersectional effects) using housing tenure as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	54
Figure S17. Anxiety and depressive symptomatology residual values (intersectional effects) using parental social class during childhood as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	55
Figure S18. Loneliness and life satisfaction residual values (intersectional effects) using parental social class during childhood as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.	56
Supplementary references	57

Appendix S1. Assessment of mismatch/bias between Bayesian Markov Chain Monte Carlo (MCMC) and maximum likelihood (ML) MAIHDA models

Due to the complexity of the designs of Next Steps and Millennium Cohort Study, and the differential non-response to the COVID-19 Survey used in this study [1], we aimed to conduct the analyses using the corresponding survey and non-response weights. Non-response weights were derived for all participants in the COVID-19 Survey following the Centre for Longitudinal Studies (CLS) Missing Data Strategy [2], and have been found to be effective at restoring sample representativeness [1,3].

However, the use of weights under the 'standard' analytical approach to estimating MAIHDA models (i.e., Bayesian Markov Chain Monte Carlo (MCMC) estimation, see [4-7]) has not yet been implemented. Therefore, in order to understand the extent of potential bias to which not accounting for the survey design and survey non-response may lead, we conducted an additional set of MAIHDA models using Maximum Likelihood (ML) estimation, which in turn does not provide (an approximation to) significance testing for the intersectional effects.

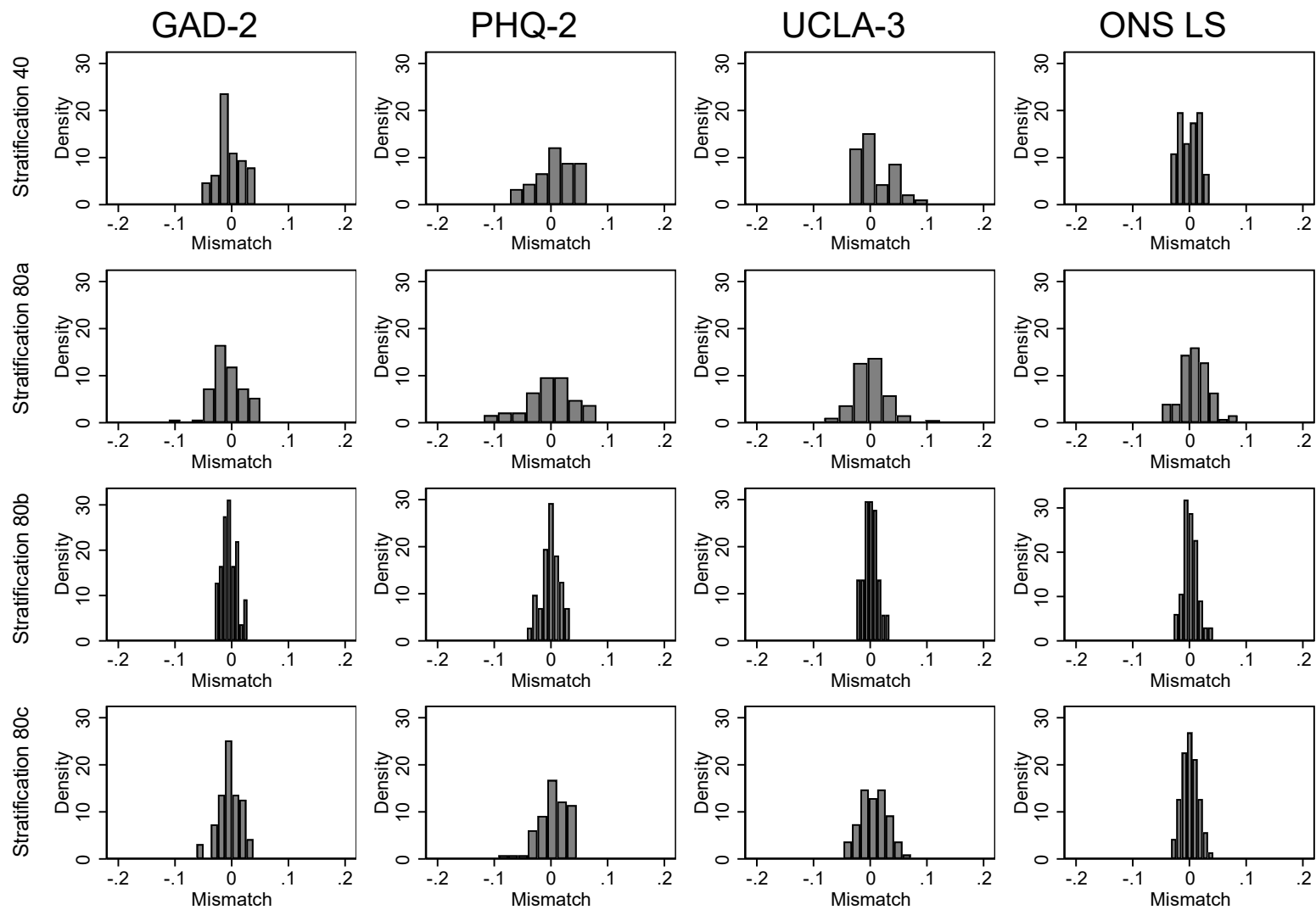
We first explored the degree of mismatch across the levels predicted at each intersectional stratum between unweighted MCMC and ML MAIHDA approaches across stratifications (40, 80a, 80b, 80c) and outcomes (anxiety symptomatology, depressive symptomatology, loneliness, and life satisfaction). The degree of mismatch across these two approaches was negligible, as shown evidenced in **Appendix S1.1** (note the narrow X-axis, with most cases being very close to zero, which signifies no difference across approaches).

We then explored the degree of mismatch across ML MAIHDA approaches using no weights, using survey weights, and using survey and non-response weights combined. Plots showing the mismatch across the different stratifications are available in **Appendix S1.2** (stratification 40), **Appendix S1.3** (stratification 80a), **Appendix S1.4** (stratification 80b), and **Appendix S1.5** (stratification 80c). Note that the X-axes in these graphs have been expanded (further under stratification 80c) to account for the larger differences/mismatch in some cases.

The exploration suggested that survey non-response was introducing bias in the estimation, thus hindering generalisability beyond the survey respondents of the results from models not accounting for differential non-response.

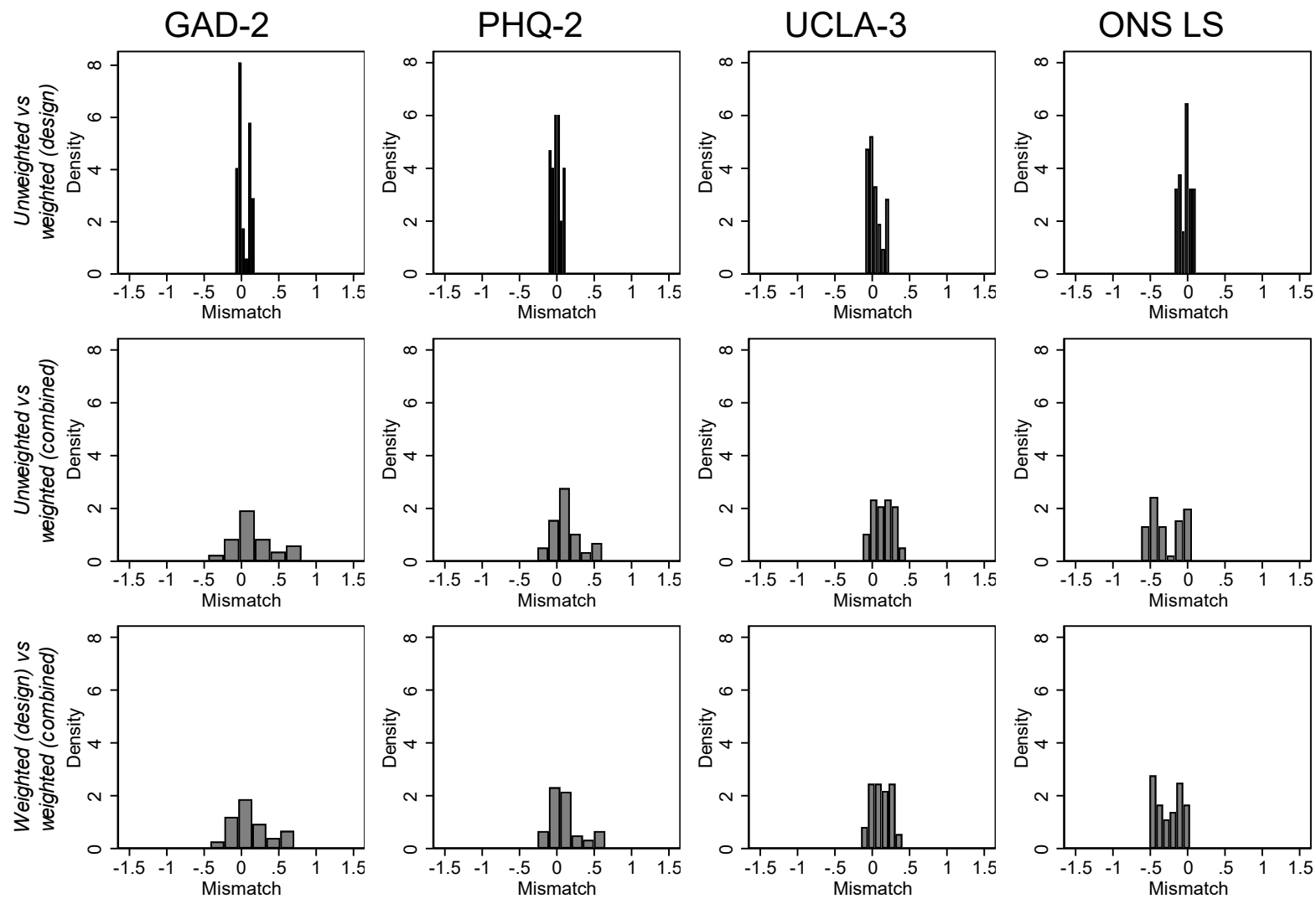
Appendix S1.1. Mismatch in stratum-specific predicted levels across unweighted Markov Chain Monte Carlo (MCMC) and Maximum Likelihood (ML) estimations.

GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics life satisfaction question; PHQ-2: 2-item Patient Health Questionnaire depression questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.



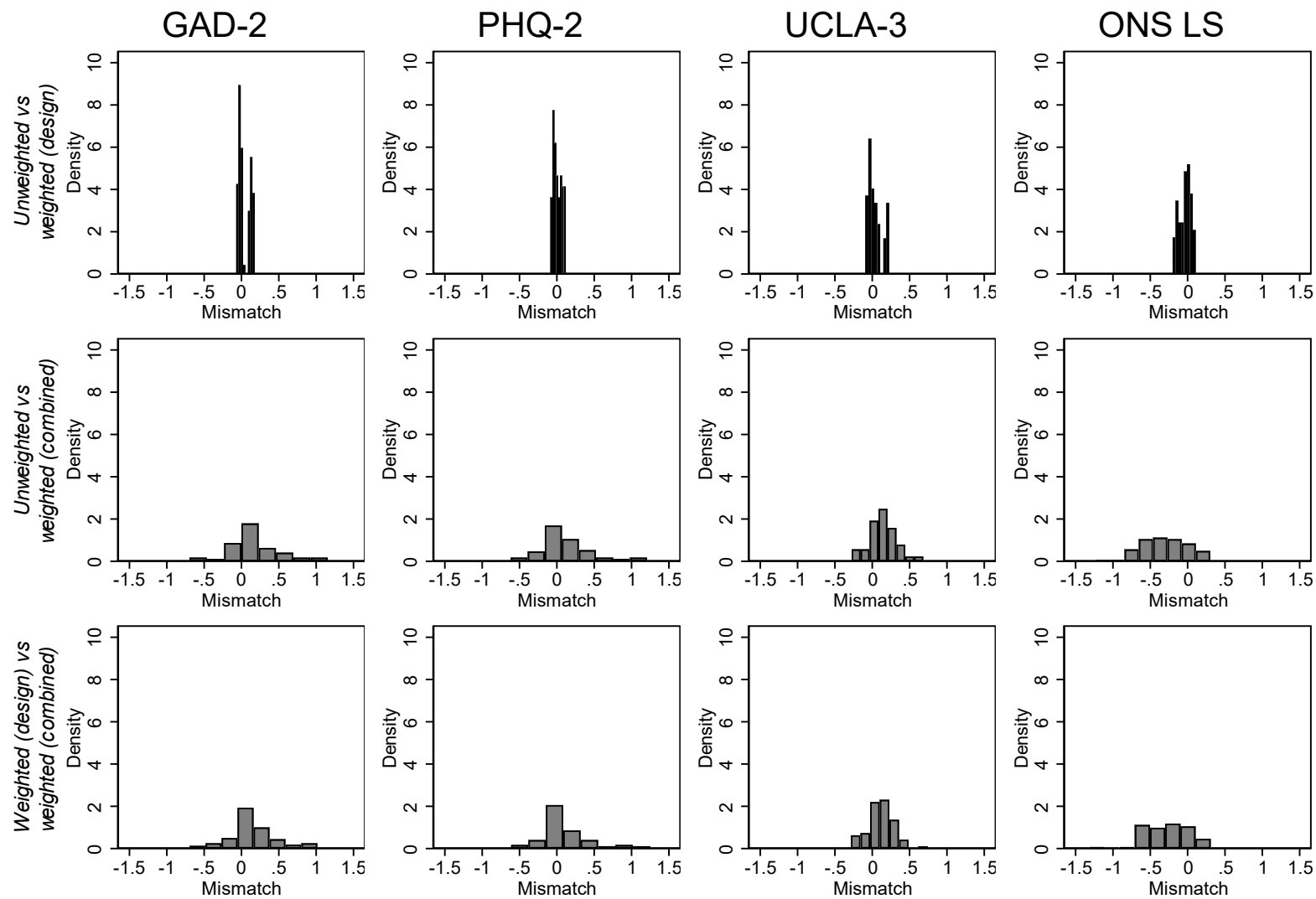
Appendix S1.2. Mismatch in stratum-specific predicted levels across Maximum Likelihood (ML) estimation approaches using stratification 40.

GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics life satisfaction question; PHQ-2: 2-item Patient Health Questionnaire depression questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.



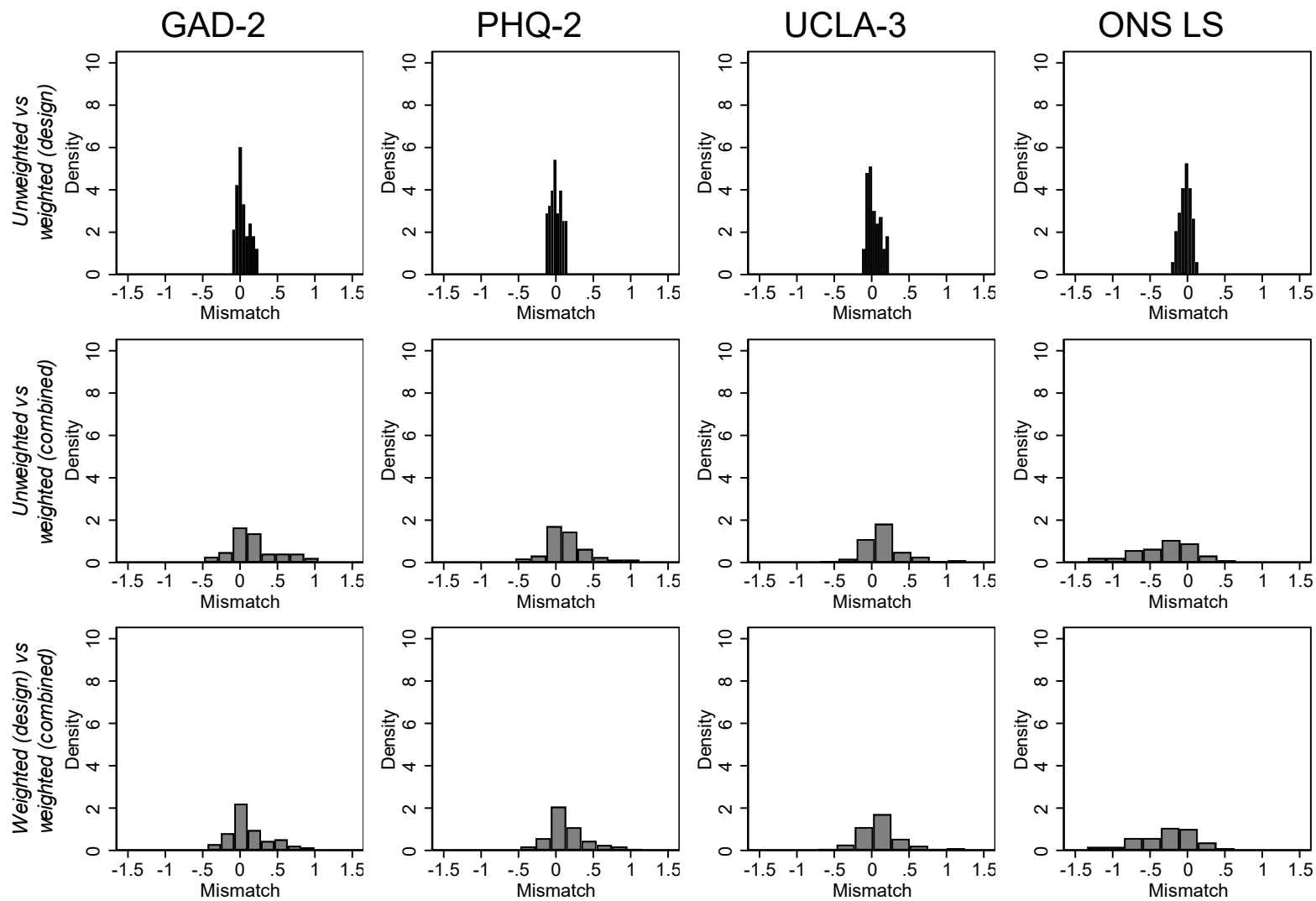
Appendix S1.3. Mismatch in stratum-specific predicted levels across Maximum Likelihood (ML) estimation approaches using stratification 80a.

GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics life satisfaction question; PHQ-2: 2-item Patient Health Questionnaire depression questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.



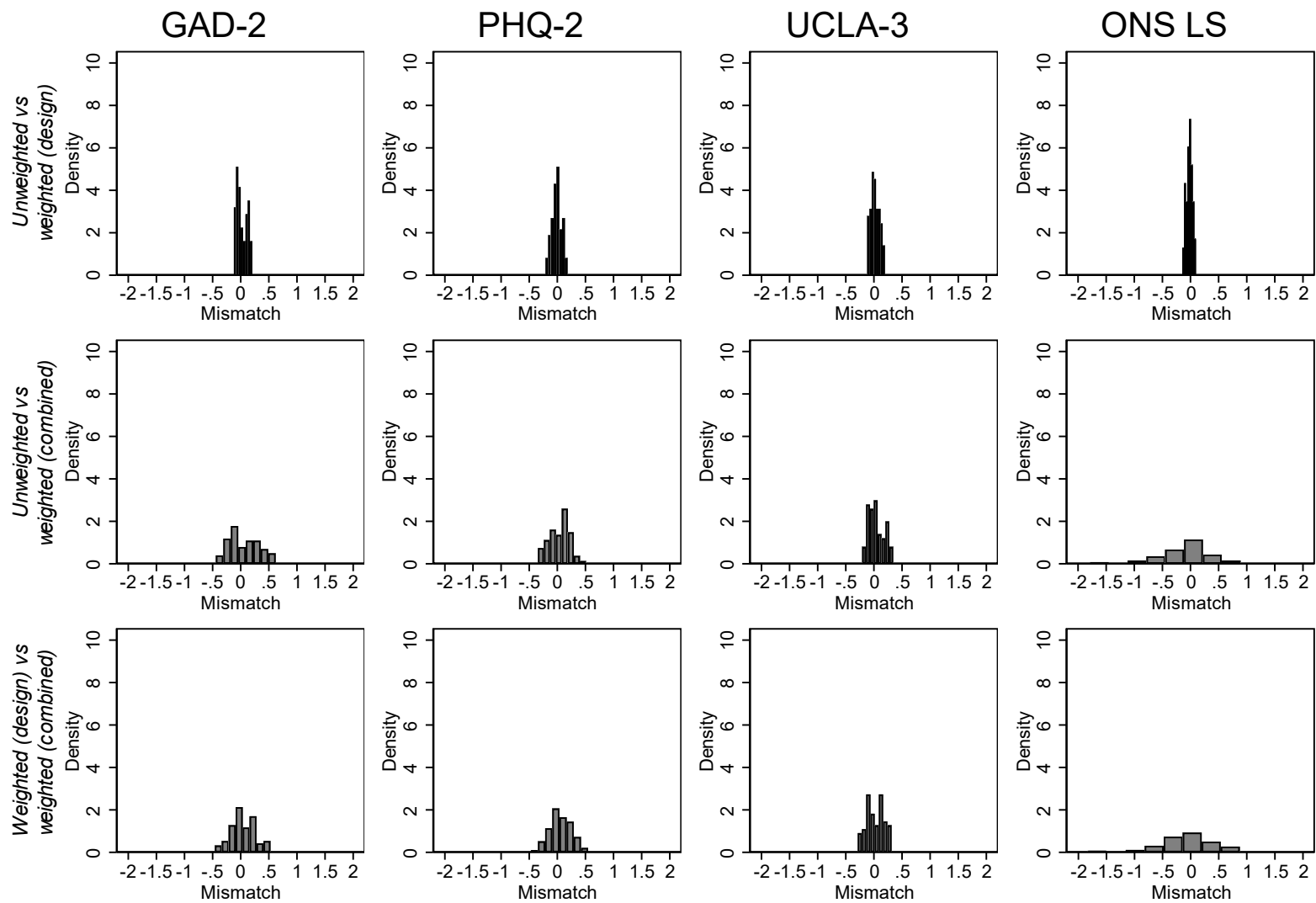
Appendix S1.4. Mismatch in stratum-specific predicted levels across Maximum Likelihood (ML) estimation approaches using stratification 80b.

GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics life satisfaction question; PHQ-2: 2-item Patient Health Questionnaire depression questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.



Appendix S1.5. Mismatch in stratum-specific predicted levels across Maximum Likelihood (ML) estimation approaches using stratification 80c.

GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics life satisfaction question; PHQ-2: 2-item Patient Health Questionnaire depression questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.



Appendix S2. Additional details on sensitivity checks and comparison with fixed-effects approach.

We used a fixed-effects multiple regression approach including interaction effects across all the variables adopted to define the intersections. This approach has several limitations compared to MAIHDA models when it comes to studying inequalities from an intersectional perspective, including the necessary use of reference categories and scalability and interpretability issues when multiple intersecting social identities/positions are included [4,8]. However, it remains a very widely used approach [9], so we performed this additional set of analysis for comparison purposes.

Table S1. Distribution of variables adopted to define the intersectional strata in the overall sample and by cohort.

	Next Steps (1990) N=4,167	MCS (2000/2002) N=4,421	Total N=8,588
Birth sex			
Female	2,599 (62.4%)	2,674 (60.5%)	5,273 (61.4%)
Male	1,568 (37.6%)	1,747 (39.5%)	3,315 (38.6%)
Ethnicity			
White (all)	3,062 (73.5%)	3,588 (81.2%)	6,650 (77.4%)
Mixed	183 (4.4%)	200 (4.5%)	383 (4.5%)
South Asian (Bangladeshi / Indian / Pakistani)	640 (15.4%)	413 (9.3%)	1,053 (12.3%)
Black African / Black Caribbean / Black British	178 (4.3%)	115 (2.6%)	293 (3.4%)
Other	104 (2.5%)	101 (2.3%)	205 (2.4%)
<i>Missing</i>	0 (0.0%)	4 (0.1%)	4 (0.0%)
Sexual orientation			
Heterosexual	3,774 (90.6%)	3,691 (83.5%)	7,465 (86.9%)
Sexual minority (homosexual, bisexual, other)	263 (6.3%)	559 (12.6%)	822 (9.6%)
<i>Missing</i>	130 (3.1%)	171 (3.9%)	301 (3.5%)
Residential IMD rank			
Higher 50% within-country IMD rank (more deprived)	2,164 (51.9%)	2,069 (46.8%)	4,233 (49.3%)
Lower 50% within-country IMD rank (less deprived)	1,948 (46.7%)	2,332 (52.7%)	4,280 (49.8%)
<i>Missing</i>	55 (1.3%)	20 (0.5%)	75 (0.9%)
Housing tenure			
Not homeowner/part owner	1,758 (42.2%)	2,293 (51.9%)	4,051 (47.2%)
Homeowner/part owner	2,182 (52.4%)	1,578 (35.7%)	3,760 (43.8%)
<i>Missing</i>	227 (5.4%)	550 (12.4%)	777 (9.0%)
Parental social class during childhood (age 11/14)			
Disadvantaged parental social class	1,396 (33.5%)	788 (17.8%)	2,184 (25.4%)
Advantaged parental social class	2,473 (59.3%)	2,915 (65.9%)	5,388 (62.7%)
<i>Missing</i>	298 (7.2%)	718 (16.2%)	1,016 (11.8%)

Note. Unweighted results. IMD: within-country Index of Multiple Deprivation; MCS: Millennium Cohort Study. "Other" ethnicity corresponds to all reported ethnicities not included in the other categories.

Table S2. Number of strata with at least one observation and missing strata under the different stratifications.

Outcome	Stratification	Valid strata	Missing strata
GAD-2 (anxiety symptomatology)	40	40	None
	80a	75	10211, 10410, 11311, 20510, 21411
	80b	76	11511, 20411, 20510, 21411
	80c	76	10210, 20411, 20510, 21410
PHQ-2 (depressive symptomatology)	40	40	None
	80a	75	10211, 10410, 11311, 20510, 21411
	80b	76	11511, 20411, 20510, 21411
	80c	76	10210, 20411, 20510, 21410
UCLA-3 (feelings of loneliness)	40	40	None
	80a	74	10211, 10410, 11311, <i>20410</i> , 20510, 21411
	80b	74	<i>10410</i> , 11511, <i>20410</i> , 20411, 20510, 21411
	80c	73	10210, <i>10410</i> , <i>11310</i> , <i>20410</i> , 20411, 20510, 21410
ONS life satisfaction question	40	40	None
	80a	75	10211, 10410, 11311, 20510, 21411
	80b	76	11511, 20411, 20510, 21411
	80c	76	10210, 20411, 20510, 21410

Note. GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale. Stratification 40 is defined by cohort * birth sex * racial/ethnic group * sexual orientation; strata 80a include stratification 40 * within-country index of multiple deprivation rank of the residential area; strata 80b include stratification 40 * housing tenure; strata 80c include stratification 40 * parental social class during childhood (age 11/14). Missing strata in each stratification are common across all outcomes except for loneliness (UCLA-3), which has additional missing strata that have been highlighted in italics.

Intersectional strata are defined by generation/cohort (first digit: 1 Next Steps / 1990, 2 Millennium Cohort Study / 2000-2002), birth sex (second digit: 0 Male, 1 Female), racial/ethnic group (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority). The fifth digit corresponds to within-country Index of Multiple Deprivation rank in the stratification 80a (0 Below the median/more deprived area, 1 Above the median/less deprived area); housing tenure in stratification 80b (0 Not homeowner, 1 Homeowner / part owner); and parental social class during childhood in stratification 80c (0 Disadvantaged, 1 Advantaged).

Table S3. Number of observations by intersectional strata.

	Strata 40				Strata 80a				Strata 80b				Strata 80c			
	GAD-2	PHQ-2	UCLA-3	ONS LS	GAD-2	PHQ-2	UCLA-3	ONS LS	GAD-2	PHQ-2	UCLA-3	ONS LS	GAD-2	PHQ-2	UCLA-3	ONS LS
10100					467	468	466	469	417	417	416	418	307	308	308	308
10101	1,026	1,027	1,024	1,030	539	539	538	541	556	557	554	558	687	687	685	690
10110					53	53	53	53	49	49	49	49	28	28	28	28
10111	94	94	94	94	36	36	36	36	42	42	42	42	63	63	63	63
10200					26	26	26	26	24	25	25	25	16	16	16	16
10201	50	51	51	51	24	25	25	25	23	23	23	23	31	32	32	32
10210					2	2	2	2	1	1	1	1	0	0	0	0
10211	2	2	2	2	0	0	0	0	1	1	1	1	2	2	2	2
10300					158	157	160	160	76	77	77	78	116	115	116	117
10301	219	218	220	222	61	61	60	62	133	131	133	135	75	75	75	76
10310					7	7	7	7	6	6	6	6	9	9	9	9
10311	14	14	14	14	6	6	6	6	8	8	8	8	3	3	3	3
10400					33	33	32	33	25	25	24	25	12	12	11	12
10401	46	46	44	46	12	12	11	12	20	20	19	20	27	27	27	27
10410					0	0	0	0	1	1	0	1	1	1	0	1
10411	2	2	1	2	2	2	1	2	1	1	1	1	1	1	1	1
10500					13	13	13	13	12	12	12	12	11	11	11	11
10501	24	24	24	24	11	11	11	11	11	11	11	11	8	8	8	8
10510					3	3	3	3	4	4	4	4	2	2	2	2
10511	6	6	6	6	3	3	3	3	2	2	2	2	4	4	4	4
11100					751	751	753	755	638	637	639	640	497	497	497	497
11101	1,664	1,664	1,667	1,669	897	897	898	898	949	950	949	951	1,120	1,120	1,121	1,124
11110					53	53	53	53	66	66	66	66	45	45	45	45
11111	118	118	118	118	63	63	63	63	47	47	47	47	69	69	69	69
11200					66	66	66	67	64	64	64	64	34	34	34	34
11201	114	114	114	115	47	47	47	47	46	46	46	47	69	69	69	69
11210					6	6	6	6	4	4	4	4	1	1	1	1
11211	9	9	9	9	3	3	3	3	4	4	4	4	7	7	7	7
11300					244	244	244	245	151	152	151	151	158	156	157	158
11301	346	345	346	348	100	99	100	101	182	180	182	183	91	92	91	92
11310					6	7	6	7	3	4	3	4	1	1	0	1
11311	6	7	6	7	0	0	0	0	3	3	3	3	1	1	1	1
11400					79	79	79	80	54	54	54	54	30	30	30	30
11401	102	102	102	103	22	22	22	22	40	40	40	40	59	59	59	60
11410					4	4	4	4	4	4	4	4	1	1	1	1
11411	5	5	5	5	1	1	1	1	1	1	1	1	2	2	2	2
11500					39	39	39	39	37	37	37	37	24	24	24	24
11501	63	63	63	63	24	24	24	24	22	22	22	22	29	29	29	29

11510					3	3	3	3	4	4	4	4	1	1	1	1
11511	4	4	4	4	1	1	1	1	0	0	0	0	2	2	2	2
20100					459	460	457	465	609	608	608	613	178	179	180	181
20101	1,185	1,186	1,185	1,197	722	722	724	728	460	461	463	467	868	866	866	874
20110					55	55	55	55	80	80	80	80	17	17	17	17
20111	121	121	122	123	66	66	67	68	34	34	35	36	82	82	83	84
20200					36	36	36	36	26	26	27	27	6	6	6	6
20201	61	61	62	62	25	25	26	26	26	26	26	26	45	45	46	46
20210					3	3	3	3	3	3	3	3	1	1	1	1
20211	6	6	6	6	3	3	3	3	3	3	3	3	5	5	5	5
20300					109	109	108	111	53	53	55	55	40	40	38	40
20301	144	144	144	147	35	35	36	36	66	66	65	66	69	69	70	72
20310					1	1	1	1	2	2	2	2	2	2	2	2
20311	5	5	5	5	4	4	4	4	3	3	3	3	3	3	3	3
20400					34	34	34	34	27	27	27	27	8	8	8	8
20401	43	43	43	43	9	9	9	9	12	12	12	12	18	18	18	18
20410					1	1	0	1	1	1	0	1	1	1	0	1
20411	2	2	1	2	1	1	1	1	0	0	0	0	0	0	0	0
20500					20	20	18	20	11	11	10	11	7	7	7	7
20501	31	31	29	31	11	11	11	11	11	11	10	11	15	15	14	15
20510					0	0	0	0	0	0	0	0	0	0	0	0
20511	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
21100					678	674	672	680	868	866	857	868	269	267	264	269
21101	1,647	1,643	1,637	1,650	959	959	955	960	601	599	603	603	1,187	1,185	1,184	1,189
21110					166	166	166	165	219	219	219	218	54	54	54	54
21111	349	349	350	349	179	179	180	180	101	101	102	102	229	229	229	229
21200					52	52	52	52	55	56	56	56	21	21	21	21
21201	90	91	91	91	38	39	39	39	21	21	21	21	47	48	48	48
21210					12	12	12	12	11	11	11	11	3	3	3	3
21211	21	21	21	21	9	9	9	9	9	9	9	9	11	11	11	11
21300					149	149	143	150	76	76	74	76	62	62	62	63
21301	200	201	195	202	51	52	52	52	86	86	83	86	82	82	81	82
21310					11	11	11	11	8	8	8	8	5	5	5	5
21311	19	19	19	19	8	8	8	8	9	9	9	9	9	9	9	9
21400					42	41	42	42	44	43	44	44	10	10	10	10
21401	57	56	57	57	15	15	15	15	4	4	4	4	22	22	22	22
21410					2	2	2	2	2	2	2	2	0	0	0	0
21411	2	2	2	2	0	0	0	0	0	0	0	0	1	1	1	1
21500					37	37	37	37	30	30	30	30	17	17	17	17
21501	57	57	57	57	20	20	20	20	15	15	15	15	22	22	22	22
21510					5	5	5	5	5	5	5	5	2	2	2	2
21511	7	7	7	7	2	2	2	2	1	1	1	1	2	2	2	2

Note. GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS LS: Office for National Statistics' question on life satisfaction; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles Loneliness scale. Stratification 40 is defined by cohort * birth sex * racial/ethnic group * sexual orientation; strata 80a include stratification 40 * within-country index of multiple deprivation rank of the residential area; strata 80b include stratification 40 * housing tenure; strata 80c include stratification 40 * parental social class during childhood (age 11/14).

Intersectional strata are defined by generation/cohort (first digit: 1 Next Steps / 1990, 2 Millennium Cohort Study / 2000-2002), birth sex (second digit: 0 Male, 1 Female), racial/ethnic group (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority). The fifth digit corresponds to within-country Index of Multiple Deprivation rank in the stratification 80a (0 Below the median/more deprived area, 1 Above the median/less deprived area); housing tenure in stratification 80b (0 Not homeowner, 1 Homeowner / part owner); and parental social class during childhood in stratification 80c (0 Disadvantaged, 1 Advantaged). This fifth digit does not apply to stratification 40, and therefore cells of strata differing only in that last digit are merged under that stratification.

Table S4. Fixed- and random-effects from the main models. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.

Stratification 40	Anxiety symptomatology (GAD-2)		Depressive symptomatology (PHQ-2)		Loneliness (UCLA-3)		Life satisfaction (ONS question)	
	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>
Fixed effects								
Intercept	0.69 (0.43, 0.91)	<0.001	0.64 (0.37, 0.87)	<0.001	4.26 (4.04, 4.51)	<0.001	7.30 (7.06, 7.51)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.46 (0.32, 0.60)	<0.001	0.52 (0.38, 0.68)	<0.001	0.37 (0.23, 0.49)	<0.001	-0.55 (-0.67, -0.40)	<0.001
Birth sex (ref. Male)								
Female	0.77 (0.60, 0.90)	<0.001	0.44 (0.29, 0.57)	<0.001	0.28 (0.14, 0.40)	<0.001	-0.22 (-0.34, -0.09)	0.003
Racial/ethnic group (ref. White)								
Mixed	-0.08 (-0.29, 0.16)	0.247	0.06 (-0.17, 0.29)	0.294	0.10 (-0.11, 0.32)	0.179	-0.20 (-0.43, 0.06)	0.052
South Asian	-0.21 (-0.39, -0.05)	0.008	-0.13 (-0.33, 0.04)	0.064	-0.06 (-0.23, 0.09)	0.223	-0.06 (-0.25, 0.11)	0.210
Black	-0.43 (-0.70, -0.16)	<0.001	-0.17 (-0.43, 0.10)	0.096	-0.11 (-0.36, 0.15)	0.194	-0.05 (-0.33, 0.23)	0.357
Other	-0.21 (-0.49, 0.06)	0.066	0.06 (-0.22, 0.33)	0.340	0.13 (-0.15, 0.41)	0.172	-0.43 (-0.75, -0.12)	0.005
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.71 (0.53, 0.89)	<0.001	0.71 (0.52, 0.88)	<0.001	0.80 (0.62, 0.96)	<0.001	-0.84 (-1.03, -0.67)	<0.001
Random effects								
Between-stratum variance	0.01 (0.00, 0.04)		0.01 (0.00, 0.04)		0.01 (0.00, 0.03)		0.01 (0.00, 0.02)	
Within-stratum variance	3.04 (2.95, 3.14)		2.77 (2.69, 2.86)		3.01 (2.92, 3.11)		4.60 (4.45, 4.74)	
Stratification 80a	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>
Fixed effects								
Intercept	0.75 (0.54, 0.95)	<0.001	0.74 (0.51, 0.95)	<0.001	4.31 (4.11, 4.52)	<0.001	7.21 (6.96, 7.45)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.44 (0.33, 0.56)	<0.001	0.50 (0.38, 0.63)	<0.001	0.38 (0.25, 0.49)	<0.001	-0.54 (-0.68, -0.41)	<0.001
Birth sex (ref. Male)								
Female	0.77 (0.65, 0.88)	<0.001	0.44 (0.32, 0.55)	<0.001	0.27 (0.16, 0.39)	<0.001	-0.21 (-0.32, -0.08)	0.004

Racial/ethnic group (ref. White)								
Mixed	-0.09 (-0.30, 0.13)	0.210	0.05 (-0.16, 0.26)	0.319	0.10 (-0.11, 0.29)	0.185	-0.18 (-0.43, 0.06)	0.065
South Asian	-0.22 (-0.36, -0.06)	0.003	-0.14 (-0.30, 0.01)	0.033	-0.07 (-0.22, 0.09)	0.163	-0.03 (-0.20, 0.14)	0.353
Black	-0.47 (-0.71, -0.22)	0.001	-0.21 (-0.45, 0.05)	0.043	-0.13 (-0.38, 0.10)	0.128	-0.01 (-0.32, 0.29)	0.492
Other	-0.23 (-0.49, 0.04)	0.048	0.04 (-0.22, 0.30)	0.364	0.12 (-0.16, 0.41)	0.199	-0.41 (-0.71, -0.10)	0.002
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.71 (0.55, 0.87)	<0.001	0.72 (0.56, 0.88)	<0.001	0.80 (0.63, 0.96)	<0.001	-0.84 (-1.03, -0.66)	<0.001
Residential IMD rank (ref. More deprived)								
Less deprived	-0.06 (-0.18, 0.07)	0.155	-0.12 (-0.24, 0.00)	0.031	-0.09 (-0.20, 0.03)	0.071	0.12 (-0.01, 0.24)	0.033
Random effects								
Between-stratum variance	0.01 (0.00, 0.03)		0.01 (0.00, 0.04)		0.01 (0.00, 0.03)		0.01 (0.00, 0.03)	
Within-stratum variance	3.04 (2.95, 3.13)		2.77 (2.68, 2.86)		3.00 (2.91, 3.09)		4.60 (4.45, 4.75)	
Stratification 80b	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Fixed effects								
Intercept	0.84 (0.59, 1.05)	<0.001	0.81 (0.54, 1.03)	<0.001	4.39 (4.16, 4.65)	<0.001	7.18 (6.87, 7.45)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.44 (0.32, 0.57)	<0.001	0.48 (0.36, 0.63)	<0.001	0.38 (0.25, 0.50)	<0.001	-0.56 (-0.70, -0.40)	<0.001
Birth sex (ref. Male)								
Female	0.75 (0.62, 0.87)	<0.001	0.43 (0.29, 0.55)	<0.001	0.28 (0.14, 0.42)	<0.001	-0.20 (-0.36, -0.05)	0.006
Racial/ethnic group (ref. White)								
Mixed	-0.05 (-0.28, 0.18)	0.347	0.12 (-0.11, 0.35)	0.124	0.10 (-0.13, 0.33)	0.209	-0.21 (-0.49, 0.07)	0.070
South Asian	-0.17 (-0.32, -0.01)	0.021	-0.09 (-0.25, 0.07)	0.135	-0.03 (-0.21, 0.14)	0.347	-0.14 (-0.33, 0.05)	0.073
Black	-0.48 (-0.74, -0.23)	<0.001	-0.25 (-0.51, -0.01)	0.023	-0.15 (-0.41, 0.11)	0.138	-0.06 (-0.38, 0.25)	0.346
Other	-0.23 (-0.51, 0.04)	0.056	0.02 (-0.25, 0.28)	0.447	0.20 (-0.09, 0.50)	0.095	-0.54 (-0.88, -0.21)	0.001
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.68 (0.54, 0.83)	<0.001	0.71 (0.57, 0.87)	<0.001	0.77 (0.59, 0.94)	<0.001	-0.81 (-0.99, -0.62)	<0.001
Housing tenure (ref. Not homeowner)								

Homeowner / part owner	-0.22 (-0.33, -0.10)	0.001	-0.23 (-0.35, -0.10)	0.001	-0.24 (-0.38, -0.10)	0.001	0.25 (0.10, 0.39)	0.001
Random effects								
Between-stratum variance	0.01 (0.00, 0.03)		0.01 (0.00, 0.04)		0.02 (0.01, 0.04)		0.02 (0.00, 0.05)	
Within-stratum variance	2.99 (2.89, 3.08)		2.71 (2.62, 2.80)		2.96 (2.86, 3.06)		4.51 (4.36, 4.65)	
Stratification 80c	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Fixed effects								
Intercept	0.75 (0.50, 0.97)	<0.001	0.80 (0.54, 1.03)	<0.001	4.36 (4.16, 4.58)	<0.001	7.26 (7.02, 7.47)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.45 (0.33, 0.60)	<0.001	0.48 (0.35, 0.64)	<0.001	0.40 (0.27, 0.51)	<0.001	-0.58 (-0.70, -0.44)	<0.001
Birth sex (ref. Male)								
Female	0.77 (0.63, 0.90)	<0.001	0.43 (0.29, 0.58)	<0.001	0.26 (0.13, 0.39)	0.001	-0.21 (-0.34, -0.09)	<0.001
Racial/ethnic group (ref. White)								
Mixed	-0.12 (-0.33, 0.12)	0.169	-0.02 (-0.24, 0.22)	0.488	0.05 (-0.17, 0.26)	0.331	-0.17 (-0.41, 0.10)	0.120
South Asian	-0.23 (-0.40, -0.06)	0.004	-0.18 (-0.36, 0.00)	0.024	-0.14 (-0.30, 0.02)	0.056	0.03 (-0.15, 0.22)	0.384
Black	-0.45 (-0.74, -0.18)	0.001	-0.31 (-0.60, -0.04)	0.013	-0.20 (-0.46, 0.08)	0.062	0.01 (-0.32, 0.32)	0.500
Other	-0.23 (-0.52, 0.06)	0.074	0.04 (-0.24, 0.33)	0.380	0.17 (-0.13, 0.47)	0.110	-0.60 (-0.94, -0.25)	<0.001
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.68 (0.52, 0.85)	<0.001	0.69 (0.53, 0.86)	<0.001	0.73 (0.55, 0.91)	<0.001	-0.83 (-1.01, -0.65)	<0.001
Childhood social class (ref. Disadvantaged)								
Advantaged	-0.06 (-0.18, 0.05)	0.172	-0.14 (-0.26, -0.01)	0.023	-0.17 (-0.29, -0.03)	0.009	0.13 (0.01, 0.25)	0.022
Random effects								
Between-stratum variance	0.01 (0.00, 0.04)		0.02 (0.00, 0.05)		0.01 (0.00, 0.03)		0.01 (0.00, 0.03)	
Within-stratum variance	3.00 (2.90, 3.09)		2.72 (2.62, 2.80)		2.95 (2.85, 3.05)		4.48 (4.33, 4.62)	

Note. CI: credible interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS: Office for National Statistics; *p*: one-sided Bayesian *p*-value (proportion of the Monte Carlo Markov Chain that is of the opposite sign to the point estimate); PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles Loneliness scale.

Stratification 40 is defined by cohort * birth sex * racial/ethnic group * sexual orientation; strata 80a include stratification 40 * within-country index of multiple deprivation rank of the residential area; strata 80b include stratification 40 * housing tenure; strata 80c include stratification 40 * parental social class during childhood (age 11/14).

White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Table S5. Fixed- and random-effects from the main models. Maximum likelihood estimation, weighted (survey design and non-response) results.

Stratification 40	Anxiety symptomatology (GAD-2)		Depressive symptomatology (PHQ-2)		Loneliness (UCLA-3)		Life satisfaction (ONS question)	
	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>
Fixed effects								
Intercept	0.52 (0.20, 0.84)	0.001	0.59 (0.19, 0.98)	0.004	4.27 (3.99, 4.55)	<0.001	7.38 (7.21, 7.54)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.50 (0.32, 0.68)	<0.001	0.54 (0.32, 0.76)	<0.001	0.36 (0.18, 0.53)	<0.001	-0.63 (-0.72, -0.54)	<0.001
Birth sex (ref. Male)								
Female	0.81 (0.64, 0.99)	<0.001	0.43 (0.22, 0.64)	<0.001	0.28 (0.13, 0.43)	<0.001	-0.14 (-0.23, -0.06)	0.001
Racial/ethnic group (ref. White)								
Mixed	0.21 (-0.01, 0.42)	0.062	0.44 (0.08, 0.80)	0.016	0.38 (0.21, 0.55)	<0.001	-0.60 (-0.80, -0.41)	<0.001
South Asian	-0.05 (-0.30, 0.21)	0.727	-0.03 (-0.35, 0.30)	0.868	0.12 (-0.15, 0.39)	0.381	-0.07 (-0.31, 0.18)	0.584
Black	-0.19 (-0.44, 0.06)	0.141	0.01 (-0.20, 0.21)	0.942	0.08 (-0.22, 0.37)	0.614	-0.54 (-0.96, -0.13)	0.010
Other	0.59 (0.14, 1.05)	0.011	0.37 (-0.18, 0.91)	0.184	0.52 (0.07, 0.97)	0.024	-0.78 (-1.25, -0.30)	0.001
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.56 (0.28, 0.84)	<0.001	0.64 (0.34, 0.93)	<0.001	0.74 (0.58, 0.90)	<0.001	-0.88 (-1.08, -0.69)	<0.001
Random effects								
Between-stratum variance	0.02 (0.00, 0.17)		0.05 (0.01, 0.32)		0.01 (0.00, 8.52)		0.00 (0.00, 0.00)	
Within-stratum variance	2.97 (2.66, 3.33)		2.75 (2.57, 2.94)		3.18 (2.97, 3.41)		4.94 (4.67, 5.22)	
Stratification 80a	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>	Coefficient (95% CI)	<i>p</i>
Fixed effects								
Intercept	0.49 (0.11, 0.88)	0.011	0.63 (0.12, 1.14)	0.016	4.32 (4.02, 4.62)	<0.001	7.21 (6.77, 7.65)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.51 (0.29, 0.73)	<0.001	0.54 (0.28, 0.80)	<0.001	0.36 (0.16, 0.55)	<0.001	-0.56 (-0.81, -0.30)	<0.001
Birth sex (ref. Male)								
Female	0.78 (0.57, 1.00)	<0.001	0.43 (0.17, 0.68)	0.001	0.28 (0.10, 0.46)	0.002	0.00 (-0.26, 0.26)	0.994

Racial/ethnic group (ref. White)								
Mixed	0.21 (-0.03, 0.46)	0.084	0.40 (0.04, 0.76)	0.028	0.36 (0.10, 0.62)	0.007	-0.62 (-0.95, -0.29)	<0.001
South Asian	0.01 (-0.27, 0.29)	0.943	-0.02 (-0.36, 0.32)	0.903	0.12 (-0.16, 0.39)	0.407	-0.22 (-0.66, 0.22)	0.323
Black	-0.18 (-0.42, 0.07)	0.161	0.06 (-0.33, 0.45)	0.768	0.04 (-0.30, 0.37)	0.829	-0.46 (-0.95, 0.04)	0.071
Other	0.55 (-0.06, 1.16)	0.078	0.25 (-0.36, 0.86)	0.423	0.48 (0.05, 0.91)	0.027	-0.75 (-1.34, -0.15)	0.014
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.60 (0.30, 0.89)	<0.001	0.63 (0.31, 0.95)	<0.001	0.74 (0.55, 0.93)	<0.001	-0.94 (-1.29, -0.58)	<0.001
Residential IMD rank (ref. More deprived)								
Less deprived	0.04 (-0.18, 0.25)	0.746	-0.06 (-0.33, 0.20)	0.629	-0.12 (-0.30, 0.06)	0.177	0.01 (-0.25, 0.27)	0.935
Random effects								
Between-stratum variance	0.09 (0.03, 0.30)		0.17 (0.06, 0.51)		0.05 (0.01, 0.23)		0.12 (0.02, 0.62)	
Within-stratum variance	2.96 (2.71, 3.23)		2.71 (2.54, 2.89)		3.16 (2.96, 3.37)		4.89 (4.54, 5.26)	
Stratification 80b	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Fixed effects								
Intercept	0.62 (0.28, 0.96)	<0.001	0.67 (0.13, 1.22)	0.015	4.39 (3.84, 4.94)	<0.001	7.09 (6.47, 7.70)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.50 (0.32, 0.68)	<0.001	0.51 (0.26, 0.77)	<0.001	0.36 (0.08, 0.64)	0.010	-0.63 (-0.96, -0.29)	<0.001
Birth sex (ref. Male)								
Female	0.78 (0.60, 0.96)	<0.001	0.41 (0.16, 0.65)	0.001	0.24 (-0.03, 0.51)	0.081	0.09 (-0.24, 0.42)	0.591
Racial/ethnic group (ref. White)								
Mixed	0.26 (0.06, 0.46)	0.010	0.53 (0.15, 0.92)	0.007	0.41 (0.05, 0.78)	0.026	-0.68 (-1.08, -0.29)	0.001
South Asian	0.00 (-0.24, 0.24)	0.989	0.00 (-0.35, 0.36)	0.986	0.18 (-0.16, 0.53)	0.292	-0.38 (-0.87, 0.12)	0.137
Black	-0.12 (-0.45, 0.21)	0.470	0.05 (-0.27, 0.37)	0.773	0.09 (-0.28, 0.45)	0.633	-0.60 (-1.15, -0.05)	0.033
Other	0.63 (0.11, 1.16)	0.018	0.41 (-0.07, 0.88)	0.092	0.53 (-0.08, 1.13)	0.090	-0.84 (-1.49, -0.19)	0.011
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.54 (0.29, 0.79)	<0.001	0.63 (0.32, 0.95)	<0.001	0.69 (0.39, 0.99)	<0.001	-0.85 (-1.27, -0.43)	<0.001
Housing tenure (ref. Not homeowner)								

Homeowner / part owner	-0.18 (-0.37, 0.00)	0.048	-0.11 (-0.36, 0.14)	0.391	-0.19 (-0.47, 0.09)	0.183	0.39 (0.07, 0.71)	0.017
Random effects								
Between-stratum variance	0.05 (0.01, 0.22)		0.14 (0.06, 0.34)		0.18 (0.08, 0.40)		0.24 (0.11, 0.53)	
Within-stratum variance	2.94 (2.67, 3.23)		2.67 (2.44, 2.93)		3.11 (2.86, 3.38)		4.81 (4.55, 5.09)	
Stratification 80c	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Fixed effects								
Intercept	0.60 (0.37, 0.83)	<0.001	0.80 (0.55, 1.06)	<0.001	4.42 (4.22, 4.62)	<0.001	7.01 (6.34, 7.67)	<0.001
Cohort/generation (ref. Next Steps / 1990)								
Millennium Cohort Study / 2000-2002	0.46 (0.32, 0.60)	<0.001	0.41 (0.27, 0.56)	<0.001	0.39 (0.26, 0.52)	<0.001	-0.39 (-0.74, -0.04)	0.028
Birth sex (ref. Male)								
Female	0.81 (0.68, 0.94)	<0.001	0.40 (0.25, 0.54)	<0.001	0.21 (0.07, 0.34)	0.002	-0.07 (-0.44, 0.30)	0.717
Racial/ethnic group (ref. White)								
Mixed	0.09 (-0.11, 0.28)	0.380	0.28 (-0.15, 0.71)	0.203	0.29 (0.18, 0.40)	<0.001	-0.52 (-0.96, -0.08)	0.019
South Asian	-0.16 (-0.37, 0.04)	0.110	-0.19 (-0.34, -0.04)	0.013	-0.12 (-0.25, 0.01)	0.063	-0.16 (-0.78, 0.45)	0.601
Black	-0.04 (-0.22, 0.15)	0.704	0.00 (-0.21, 0.20)	0.984	0.08 (-0.24, 0.40)	0.639	-0.35 (-1.06, 0.36)	0.330
Other	0.40 (0.00, 0.79)	0.047	0.31 (-0.09, 0.71)	0.126	0.21 (-0.24, 0.66)	0.361	-0.59 (-1.32, 0.14)	0.112
Sexual orientation (ref. Heterosexual)								
Sexual minority	0.46 (0.21, 0.71)	<0.001	0.58 (0.41, 0.75)	<0.001	0.63 (0.36, 0.91)	<0.001	-0.84 (-1.43, -0.25)	0.005
Childhood social class (ref. Disadvantaged)								
Advantaged	-0.01 (-0.16, 0.14)	0.906	-0.03 (-0.16, 0.11)	0.690	-0.22 (-0.34, -0.10)	<0.001	0.07 (-0.32, 0.46)	0.715
Random effects								
Between-stratum variance	0.01 (0.00, 0.10)		0.02 (0.00, 0.12)		0.01 (0.00, 0.20)		0.35 (0.10, 1.17)	
Within-stratum variance	2.88 (2.62, 3.16)		2.67 (2.54, 2.81)		3.05 (2.88, 3.22)		4.66 (4.36, 4.98)	

Note. CI: confidence interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles Loneliness scale. Stratification 40 is defined by cohort * birth sex * racial/ethnic group * sexual orientation; strata 80a include stratification 40 * within-country index of multiple deprivation rank of the residential area; strata 80b include stratification 40 * housing tenure; strata 80c include stratification 40 * parental social class during childhood (age 11/14). White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Table S6. Results from the fixed-effects multiple regression approach using stratification 40 (cohort * birth sex * ethnic group * sexual orientation).

	GAD-2				PHQ-2			
	Unweighted		Weighted		Unweighted		Weighted	
	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Cohort (MCS)	0.27 (0.13, 0.42)	<0.001	0.26 (0.00, 0.51)	0.046	0.29 (0.15, 0.43)	<0.001	0.28 (0.04, 0.51)	0.023
Birth sex (female)	0.70 (0.56, 0.83)	<0.001	0.74 (0.50, 0.98)	<0.001	0.30 (0.17, 0.43)	<0.001	0.40 (0.20, 0.61)	<0.001
Ethnic group								
Mixed	-0.05 (-0.55, 0.44)	0.835	-0.27 (-0.85, 0.30)	0.351	0.02 (-0.45, 0.48)	0.948	0.00 (-0.55, 0.54)	0.989
South Asian	-0.03 (-0.29, 0.22)	0.791	-0.01 (-0.42, 0.41)	0.972	-0.12 (-0.36, 0.13)	0.342	-0.28 (-0.60, 0.03)	0.079
Black	-0.65 (-1.16, -0.13)	0.014	-0.26 (-0.99, 0.48)	0.492	-0.32 (-0.81, 0.17)	0.199	-0.01 (-0.61, 0.59)	0.977
Other	-0.30 (-1.00, 0.41)	0.411	0.76 (-0.55, 2.07)	0.254	0.01 (-0.66, 0.69)	0.969	1.11 (-0.22, 2.43)	0.102
Sexual orientation (sexual minority)	0.56 (0.20, 0.93)	0.003	-0.04 (-0.59, 0.51)	0.879	0.48 (0.13, 0.83)	0.008	0.43 (-0.19, 1.06)	0.172
Cohort * birth sex								
MCS * female	0.26 (0.07, 0.45)	0.007	0.23 (-0.09, 0.56)	0.159	0.22 (0.05, 0.40)	0.014	0.12 (-0.20, 0.44)	0.468
Cohort * ethnic group								
MCS * Mixed	-0.04 (-0.71, 0.63)	0.904	0.48 (-0.30, 1.27)	0.228	0.12 (-0.51, 0.75)	0.711	1.00 (-0.04, 2.04)	0.060
MCS * South Asian	-0.31 (-0.70, 0.09)	0.128	-0.36 (-0.88, 0.16)	0.179	-0.12 (-0.49, 0.26)	0.540	0.15 (-0.43, 0.73)	0.615
MCS * Black	0.46 (-0.28, 1.20)	0.220	-0.31 (-1.19, 0.57)	0.494	0.45 (-0.26, 1.16)	0.211	0.13 (-0.88, 1.15)	0.799
MCS * Other	0.23 (-0.71, 1.17)	0.634	0.16 (-1.64, 1.97)	0.861	-0.10 (-1.00, 0.80)	0.830	-1.24 (-2.67, 0.19)	0.090
Birth sex * ethnic group								
Female * Mixed	-0.04 (-0.64, 0.55)	0.894	0.43 (-0.58, 1.44)	0.404	0.09 (-0.48, 0.65)	0.757	0.28 (-0.72, 1.28)	0.584
Female * South Asian	-0.21 (-0.54, 0.11)	0.200	-0.20 (-0.72, 0.31)	0.432	0.00 (-0.31, 0.31)	0.983	0.01 (-0.38, 0.41)	0.957
Female * Black	-0.04 (-0.66, 0.59)	0.910	0.18 (-0.86, 1.21)	0.734	-0.06 (-0.66, 0.53)	0.840	-0.04 (-0.98, 0.90)	0.936
Female * Other	-0.09 (-0.92, 0.74)	0.834	-0.74 (-2.20, 0.71)	0.317	-0.12 (-0.91, 0.68)	0.774	-1.04 (-2.44, 0.36)	0.145
Cohort * birth sex * ethnic group								
MCS * Female * Mixed	0.02 (-0.81, 0.86)	0.955	-0.49 (-1.78, 0.81)	0.461	-0.22 (-1.01, 0.57)	0.584	-0.95 (-2.44, 0.55)	0.213
MCS * Female * South Asian	0.40 (-0.12, 0.91)	0.130	0.76 (-0.17, 1.69)	0.110	0.37 (-0.12, 0.86)	0.140	0.80 (-0.73, 2.32)	0.304
MCS * Female * Black	0.04 (-0.90, 0.98)	0.933	0.19 (-1.22, 1.61)	0.787	0.00 (-0.90, 0.90)	0.997	-0.32 (-1.84, 1.21)	0.684
MCS * Female * Other	-0.16 (-1.30, 0.97)	0.777	0.15 (-1.97, 2.28)	0.888	0.65 (-0.43, 1.73)	0.240	1.79 (0.10, 3.48)	0.038
Cohort * sexual orientation								
MCS * sexual minority	0.33 (-0.16, 0.82)	0.190	0.93 (0.12, 1.73)	0.025	0.51 (0.04, 0.98)	0.034	0.40 (-0.36, 1.17)	0.304
Birth sex * sexual orientation								
Female * sexual minority	0.10 (-0.39, 0.59)	0.680	0.33 (-0.63, 1.29)	0.504	0.33 (-0.14, 0.80)	0.164	0.20 (-0.66, 1.05)	0.652
Cohort * birth sex * sexual orientation								
MCS * Female * sexual minority	-0.36 (-0.98, 0.26)	0.258	-0.72 (-1.95, 0.50)	0.248	-0.57 (-1.17, 0.02)	0.060	-0.41 (-1.48, 0.66)	0.450
Ethnic group * sexual orientation								
Mixed * sexual minority	-0.22 (-2.72, 2.27)	0.860	0.34 (-0.54, 1.21)	0.451	0.23 (-2.15, 2.61)	0.850	-0.31 (-1.47, 0.85)	0.603
South Asian * sexual minority	-0.10 (-1.11, 0.91)	0.847	0.84 (-0.14, 1.82)	0.092	-0.21 (-1.17, 0.76)	0.672	0.43 (-0.41, 1.26)	0.314
Black * sexual minority	-0.13 (-2.62, 2.37)	0.919	0.13 (-0.76, 1.03)	0.771	2.07 (-0.32, 4.45)	0.089	1.58 (0.59, 2.58)	0.002
Other * sexual minority	2.19 (0.58, 3.79)	0.008	3.04 (1.37, 4.70)	<0.001	1.40 (-0.13, 2.93)	0.073	0.96 (-1.56, 3.48)	0.456
Cohort * ethnic group * sexual orientation								
MCS * Mixed * sexual minority	0.77 (-2.14, 3.68)	0.603	0.52 (-1.19, 2.24)	0.549	-0.59 (-3.36, 2.19)	0.679	-1.10 (-2.90, 0.70)	0.232
MCS * South Asian * sexual minority	0.06 (-1.82, 1.94)	0.950	-0.24 (-1.61, 1.13)	0.732	-0.51 (-2.31, 1.29)	0.579	0.46 (-2.00, 2.92)	0.715

MCS * Black * sexual minority	-0.07 (-3.59, 3.46)	0.971	0.12 (-1.03, 1.28)	0.833	-3.25 (-6.62, 0.12)	0.059	-3.22 (-5.51, -0.92)	0.006
MCS * Other * sexual minority	-3.00 (-5.98, -0.02)	0.049	-6.13 (-8.27, -4.00)	<0.001	-2.87 (-5.71, -0.02)	0.048	-3.10 (-5.71, -0.49)	0.020
Birth sex * ethnic group * sexual orientation								
Female * Mixed * sexual minority	-0.26 (-3.04, 2.52)	0.855	-0.71 (-2.22, 0.80)	0.359	-1.28 (-3.93, 1.37)	0.344	-1.31 (-3.15, 0.52)	0.161
Female * South Asian * sexual minority	-0.06 (-1.83, 1.70)	0.944	-2.13 (-3.72, -0.53)	0.009	-0.77 (-2.38, 0.83)	0.345	-1.71 (-2.87, -0.56)	0.004
Female * Black * sexual minority	1.24 (-1.73, 4.20)	0.414	0.26 (-1.57, 2.08)	0.781	-1.67 (-4.50, 1.16)	0.247	-1.68 (-3.35, 0.00)	0.049
Female * Other * sexual minority	-2.88 (-5.28, -0.47)	0.019	-4.05 (-6.46, -1.63)	0.001	-1.93 (-4.23, 0.36)	0.099	-2.14 (-5.08, 0.80)	0.154
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	-0.02 (-3.29, 3.25)	0.991	0.82 (-1.80, 3.45)	0.539	2.31 (-0.81, 5.43)	0.146	4.06 (1.40, 6.72)	0.003
MCS * Female * South Asian * sexual minority	-0.61 (-3.13, 1.91)	0.636	1.41 (-1.13, 3.95)	0.277	0.99 (-1.36, 3.35)	0.407	0.64 (-2.53, 3.81)	0.693
MCS * Female * Black * sexual minority	-0.44 (-5.03, 4.15)	0.851	0.45 (-1.73, 2.64)	0.683	2.45 (-1.94, 6.83)	0.274	3.47 (0.46, 6.48)	0.024
MCS * Female * Other * sexual minority	4.36 (0.62, 8.10)	0.022	7.25 (4.13, 10.38)	<0.001	2.54 (-1.03, 6.12)	0.164	2.92 (-0.35, 6.19)	0.080
Intercept	1.21 (1.11, 1.32)	<0.001	1.17 (0.97, 1.36)	<0.001	1.28 (1.18, 1.38)	<0.001	1.25 (1.08, 1.41)	<0.001

	UCLA-3				ONS life satisfaction			
	Unweighted		Weighted		Unweighted		Weighted	
	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Cohort (MCS)	0.55 (0.41, 0.70)	<0.001	0.48 (0.22, 0.74)	<0.001	-0.61 (-0.78, -0.43)	<0.001	-0.64 (-0.97, -0.30)	<0.001
Birth sex (female)	0.33 (0.20, 0.47)	<0.001	0.36 (0.13, 0.59)	0.002	-0.22 (-0.38, -0.05)	0.011	-0.21 (-0.50, 0.09)	0.165
Ethnic group								
Mixed	0.40 (-0.09, 0.89)	0.108	0.38 (-0.15, 0.91)	0.156	-0.57 (-1.17, 0.03)	0.064	-0.76 (-1.77, 0.25)	0.141
South Asian	0.12 (-0.13, 0.37)	0.360	0.14 (-0.45, 0.73)	0.641	-0.05 (-0.36, 0.26)	0.764	0.13 (-0.38, 0.64)	0.621
Black	0.14 (-0.38, 0.66)	0.598	0.46 (-0.46, 1.38)	0.325	0.17 (-0.46, 0.80)	0.599	-0.97 (-2.63, 0.70)	0.254
Other	0.50 (-0.20, 1.20)	0.162	1.04 (-0.61, 2.70)	0.216	-1.04 (-1.90, -0.17)	0.019	-1.53 (-2.79, -0.28)	0.017
Sexual orientation (sexual minority)	0.93 (0.56, 1.29)	<0.001	0.49 (-0.21, 1.19)	0.170	-1.15 (-1.60, -0.70)	<0.001	-0.78 (-1.88, 0.31)	0.161
Cohort * birth sex								
MCS * female	-0.15 (-0.34, 0.04)	0.120	-0.22 (-0.56, 0.11)	0.193	-0.01 (-0.24, 0.22)	0.927	0.03 (-0.41, 0.46)	0.900
Cohort * ethnic group								
MCS * Mixed	-0.65 (-1.31, 0.00)	0.052	-0.04 (-0.98, 0.90)	0.933	0.58 (-0.23, 1.40)	0.161	0.28 (-1.12, 1.69)	0.691
MCS * South Asian	-0.58 (-0.97, -0.19)	0.004	-0.51 (-1.21, 0.20)	0.157	0.15 (-0.33, 0.63)	0.536	-0.17 (-0.94, 0.60)	0.667
MCS * Black	-0.61 (-1.35, 0.14)	0.110	-0.98 (-2.21, 0.26)	0.120	-0.42 (-1.33, 0.49)	0.364	0.22 (-1.80, 2.24)	0.833
MCS * Other	-0.42 (-1.37, 0.53)	0.385	0.07 (-1.91, 2.05)	0.944	1.05 (-0.11, 2.21)	0.076	0.66 (-1.53, 2.85)	0.553
Birth sex * ethnic group								
Female * Mixed	-0.26 (-0.85, 0.32)	0.380	-0.11 (-1.06, 0.85)	0.828	0.47 (-0.26, 1.20)	0.205	0.37 (-1.01, 1.75)	0.600
Female * South Asian	-0.09 (-0.42, 0.23)	0.567	-0.16 (-0.85, 0.54)	0.661	-0.07 (-0.47, 0.33)	0.722	-0.03 (-0.61, 0.56)	0.928
Female * Black	-0.26 (-0.89, 0.37)	0.420	-0.29 (-1.50, 0.92)	0.640	-0.43 (-1.19, 0.33)	0.269	0.38 (-1.36, 2.11)	0.670
Female * Other	-0.20 (-1.02, 0.63)	0.638	-0.90 (-2.82, 1.01)	0.354	0.78 (-0.24, 1.80)	0.133	1.45 (-0.04, 2.93)	0.056
Cohort * birth sex * ethnic group								
MCS * Female * Mixed	0.69 (-0.13, 1.52)	0.099	0.06 (-1.30, 1.41)	0.936	-0.78 (-1.79, 0.24)	0.134	-0.74 (-2.56, 1.08)	0.424
MCS * Female * South Asian	0.57 (0.06, 1.08)	0.028	1.26 (-0.35, 2.87)	0.126	-0.12 (-0.75, 0.50)	0.704	-0.43 (-1.92, 1.06)	0.574
MCS * Female * Black	0.89 (-0.05, 1.83)	0.064	0.74 (-0.93, 2.41)	0.387	0.90 (-0.25, 2.05)	0.125	0.96 (-1.24, 3.16)	0.393
MCS * Female * Other	0.14 (-1.00, 1.28)	0.808	-0.03 (-2.29, 2.23)	0.981	-1.66 (-3.06, -0.27)	0.020	-1.53 (-4.03, 0.98)	0.232
Cohort * sexual orientation								
MCS * sexual minority	-0.03 (-0.52, 0.46)	0.910	0.28 (-0.70, 1.25)	0.576	0.38 (-0.22, 0.98)	0.215	-0.21 (-1.44, 1.01)	0.735

Birth sex * sexual orientation								
Female * sexual minority	-0.19 (-0.68, 0.30)	0.448	0.29 (-0.67, 1.24)	0.554	0.26 (-0.34, 0.87)	0.393	-0.05 (-1.44, 1.33)	0.939
Cohort * birth sex * sexual orientation								
MCS * Female * sexual minority	0.09 (-0.52, 0.71)	0.765	-0.23 (-1.50, 1.03)	0.719	-0.26 (-1.03, 0.50)	0.500	0.31 (-1.23, 1.85)	0.693
Ethnic group * sexual orientation								
Mixed * sexual minority	1.13 (-1.35, 3.61)	0.371	2.18 (0.99, 3.37)	<0.001	0.93 (-2.13, 4.00)	0.551	0.77 (-0.69, 2.24)	0.300
South Asian * sexual minority	-0.01 (-1.02, 0.99)	0.977	0.44 (-0.95, 1.83)	0.534	-0.30 (-1.55, 0.94)	0.631	-2.53 (-4.78, -0.28)	0.028
Black * sexual minority	-0.61 (-4.07, 2.85)	0.730	-0.53 (-1.67, 0.61)	0.361	-1.31 (-4.38, 1.76)	0.403	-0.27 (-2.32, 1.78)	0.794
Other * sexual minority	-0.14 (-1.73, 1.46)	0.868	0.08 (-2.98, 3.15)	0.957	0.40 (-1.57, 2.37)	0.692	-0.32 (-3.99, 3.35)	0.865
Cohort * ethnic group * sexual orientation								
MCS * Mixed * sexual minority	-1.87 (-4.76, 1.02)	0.205	-3.13 (-4.97, -1.29)	0.001	-0.36 (-3.93, 3.21)	0.844	0.74 (-1.98, 3.47)	0.594
MCS * South Asian * sexual minority	0.08 (-1.79, 1.96)	0.930	-0.07 (-1.77, 1.63)	0.938	-2.01 (-4.33, 0.30)	0.088	1.25 (-1.53, 4.03)	0.377
MCS * Black * sexual minority	1.08 (-3.80, 5.97)	0.664	1.22 (-0.33, 2.77)	0.122	3.14 (-1.19, 7.48)	0.155	4.19 (-0.09, 8.46)	0.055
MCS * Other * sexual minority	-1.44 (-4.41, 1.53)	0.343	-3.89 (-7.19, -0.60)	0.021	1.67 (-1.99, 5.34)	0.371	3.10 (-1.03, 7.23)	0.141
Birth sex * ethnic group * sexual orientation								
Female * Mixed * sexual minority	-1.43 (-4.20, 1.33)	0.309	-2.56 (-4.25, -0.86)	0.003	-1.52 (-4.93, 1.90)	0.384	-1.06 (-3.22, 1.10)	0.335
Female * South Asian * sexual minority	0.38 (-1.37, 2.13)	0.670	0.24 (-1.47, 1.94)	0.785	-0.26 (-2.33, 1.81)	0.804	1.67 (-2.13, 5.48)	0.388
Female * Black * sexual minority	0.52 (-3.29, 4.32)	0.790	0.79 (-1.11, 2.68)	0.415	2.28 (-1.36, 5.93)	0.220	1.45 (-1.09, 3.99)	0.264
Female * Other * sexual minority	0.22 (-2.17, 2.61)	0.855	-0.10 (-3.48, 3.28)	0.954	-0.08 (-3.04, 2.88)	0.957	0.77 (-3.32, 4.87)	0.711
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	2.39 (-0.86, 5.64)	0.149	4.51 (1.95, 7.08)	0.001	1.00 (-3.02, 5.02)	0.625	-0.84 (-4.39, 2.72)	0.644
MCS * Female * South Asian * sexual minority	-0.76 (-3.26, 1.75)	0.554	-1.68 (-4.52, 1.15)	0.244	3.22 (0.19, 6.25)	0.037	1.02 (-3.53, 5.58)	0.659
MCS * Female * Black * sexual minority	-3.23 (-8.93, 2.46)	0.266	-3.43 (-5.78, -1.08)	0.004	-5.53 (-11.18, 0.12)	0.055	-7.22 (-11.72, -2.73)	0.002
MCS * Female * Other * sexual minority	0.25 (-3.48, 3.97)	0.897	2.71 (-1.02, 6.45)	0.155	-0.31 (-4.92, 4.29)	0.894	-1.73 (-6.50, 3.05)	0.478
Intercept	4.54 (4.43, 4.65)	<0.001	4.58 (4.39, 4.77)	<0.001	6.79 (6.66, 6.92)	<0.001	6.77 (6.52, 7.01)	<0.001

Note. CI: confidence interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; MCS: Millennium Cohort Study (born in 2000-2002); NS: Next Steps study (born in 1990); ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles Loneliness scale.

Weighted results are adjusted for survey design characteristics, including survey and non-response weights. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Female * Mixed * sexual minority	-0.09 (-3.07, 2.89)	0.951	-0.43 (-2.55, 1.70)	0.693	-1.31 (-4.15, 1.53)	0.366	-0.39 (-2.47, 1.68)	0.710
Female * South Asian * sexual minority	-0.50 (-2.55, 1.55)	0.631	-1.86 (-4.58, 0.86)	0.179	-1.74 (-3.64, 0.15)	0.071	-1.33 (-3.08, 0.42)	0.137
Female * Black * sexual minority	3.58 (-0.84, 8.00)	0.112	1.62 (-0.29, 3.52)	0.096	-3.01 (-7.22, 1.21)	0.162	-5.42 (-7.98, -2.86)	<0.001
Female * Other * sexual minority	-2.99 (-6.07, 0.08)	0.056	-2.51 (-5.06, 0.04)	0.054	-1.59 (-4.53, 1.34)	0.287	0.01 (-3.77, 3.79)	0.997
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	-2.02 (-5.84, 1.81)	0.301	-0.39 (-3.72, 2.94)	0.818	0.75 (-2.90, 4.39)	0.688	1.22 (-2.27, 4.72)	0.492
MCS * Female * South Asian * sexual minority	-1.34 (-5.52, 2.84)	0.530	1.35 (-2.26, 4.96)	0.464	2.78 (-1.17, 6.73)	0.168	2.32 (-0.85, 5.50)	0.151
MCS * Female * Black * sexual minority	-3.33 (-9.49, 2.83)	0.290	-0.40 (-2.88, 2.09)	0.754	4.90 (-0.97, 10.78)	0.102	8.32 (5.16, 11.48)	<0.001
MCS * Female * Other * sexual minority	3.40 (-2.18, 8.99)	0.233	5.85 (3.09, 8.61)	<0.001	1.88 (-3.44, 7.21)	0.488	3.44 (0.69, 6.19)	0.014
Cohort * residential IMD rank								
MCS * less deprived	0.09 (-0.21, 0.38)	0.564	0.11 (-0.40, 0.63)	0.666	0.07 (-0.21, 0.35)	0.627	0.12 (-0.39, 0.63)	0.640
Birth sex * residential IMD rank								
Female * less deprived	0.00 (-0.27, 0.28)	0.978	-0.06 (-0.58, 0.46)	0.816	-0.03 (-0.29, 0.23)	0.808	-0.06 (-0.50, 0.37)	0.770
Cohort * birth sex * residential IMD rank								
MCS * female * less deprived	0.01 (-0.37, 0.39)	0.955	-0.08 (-0.76, 0.61)	0.825	-0.07 (-0.44, 0.29)	0.692	-0.35 (-0.99, 0.29)	0.277
Ethnic group * residential IMD rank								
Mixed * Less deprived	0.03 (-0.96, 1.02)	0.956	-0.23 (-1.30, 0.83)	0.666	0.00 (-0.93, 0.94)	0.997	-0.39 (-1.38, 0.61)	0.447
South Asian * Less deprived	0.81 (0.26, 1.37)	0.004	1.01 (0.12, 1.89)	0.025	0.74 (0.20, 1.27)	0.007	0.67 (-0.03, 1.36)	0.060
Black * Less deprived	0.55 (-0.62, 1.73)	0.354	-0.31 (-1.42, 0.79)	0.578	0.25 (-0.87, 1.36)	0.665	-0.66 (-1.62, 0.29)	0.170
Other * Less deprived	-0.34 (-1.76, 1.07)	0.636	-1.70 (-3.43, 0.02)	0.053	-1.53 (-2.88, -0.18)	0.027	-2.58 (-4.19, -0.97)	0.002
Cohort * ethnic group * residential IMD rank								
MCS * Mixed * Less deprived	0.55 (-0.80, 1.89)	0.427	0.96 (-0.56, 2.49)	0.215	0.14 (-1.14, 1.42)	0.830	0.22 (-1.84, 2.29)	0.830
MCS * South Asian * Less deprived	-0.69 (-1.58, 0.20)	0.127	-0.90 (-1.97, 0.17)	0.098	-0.50 (-1.35, 0.35)	0.253	-0.10 (-1.26, 1.07)	0.870
MCS * Black * Less deprived	0.14 (-1.61, 1.88)	0.879	1.10 (-0.52, 2.72)	0.183	0.67 (-0.99, 2.34)	0.428	1.50 (-0.17, 3.16)	0.078
MCS * Other * Less deprived	0.06 (-1.86, 1.98)	0.950	0.95 (-1.62, 3.52)	0.469	0.89 (-0.94, 2.73)	0.339	1.66 (-0.07, 3.39)	0.060
Birth sex * ethnic group * residential IMD rank								
Female * Mixed * Less deprived	0.72 (-0.48, 1.91)	0.241	0.12 (-1.50, 1.75)	0.881	0.86 (-0.28, 1.99)	0.139	0.24 (-1.34, 1.81)	0.766
Female * South Asian * Less deprived	-0.45 (-1.16, 0.26)	0.210	-0.29 (-1.40, 0.82)	0.609	-0.50 (-1.18, 0.18)	0.150	-0.32 (-1.15, 0.51)	0.448
Female * Black * Less deprived	-0.64 (-2.08, 0.81)	0.387	0.62 (-1.44, 2.69)	0.554	0.05 (-1.33, 1.42)	0.946	2.28 (-0.08, 4.64)	0.058
Female * Other * Less deprived	-0.47 (-2.15, 1.21)	0.585	0.54 (-1.38, 2.46)	0.581	0.64 (-0.96, 2.24)	0.433	1.80 (-0.15, 3.75)	0.071
Cohort * birth sex * ethnic group * residential IMD rank								
MCS * Female * Mixed * Less deprived	-1.52 (-3.20, 0.16)	0.076	-0.94 (-3.15, 1.26)	0.403	-0.81 (-2.41, 0.78)	0.317	-0.22 (-2.78, 2.34)	0.868
MCS * Female * South Asian * Less deprived	0.18 (-0.97, 1.33)	0.758	-0.14 (-1.79, 1.51)	0.868	0.20 (-0.89, 1.30)	0.716	-1.39 (-3.67, 0.88)	0.230
MCS * Female * Black * Less deprived	-0.25 (-2.45, 1.95)	0.826	-1.04 (-3.88, 1.80)	0.474	-0.42 (-2.52, 1.68)	0.696	-2.35 (-5.70, 0.99)	0.167
MCS * Female * Other * Less deprived	2.02 (-0.31, 4.35)	0.090	2.71 (-0.24, 5.66)	0.072	0.92 (-1.30, 3.14)	0.418	0.90 (-1.43, 3.22)	0.449
Sexual orientation * residential IMD rank								
Sexual minority * Less deprived	-0.17 (-0.94, 0.60)	0.671	-0.05 (-1.15, 1.05)	0.928	-0.04 (-0.78, 0.69)	0.910	-0.59 (-1.81, 0.63)	0.346
Cohort * sexual orientation * residential IMD rank								
MCS * sexual minority * Less deprived	0.62 (-0.39, 1.63)	0.230	-0.48 (-2.02, 1.07)	0.543	0.44 (-0.52, 1.40)	0.370	0.47 (-1.09, 2.03)	0.554
Birth sex * sexual orientation * residential IMD rank								
Female * sexual minority * Less deprived	0.34 (-0.67, 1.35)	0.513	1.29 (-0.37, 2.96)	0.128	-0.16 (-1.12, 0.81)	0.749	1.51 (-0.12, 3.14)	0.069
Cohort * birth sex * sexual orientation * residential IMD rank								
MCS * Female * sexual minority * Less deprived	-1.02 (-2.29, 0.26)	0.117	-0.20 (-2.39, 1.99)	0.859	-0.41 (-1.63, 0.80)	0.506	-0.91 (-2.99, 1.16)	0.389
Ethnic group * sexual orientation * residential IMD rank								
Mixed * sexual minority * Less deprived	-3.52 (-7.84, 0.80)	0.110	-2.03 (-6.70, 2.64)	0.395	-2.88 (-7.00, 1.24)	0.171	-4.43 (-8.46, -0.40)	0.031
South Asian * sexual minority * Less deprived	-1.62 (-3.73, 0.50)	0.134	-1.21 (-3.75, 1.33)	0.349	-1.82 (-3.83, 0.20)	0.077	-0.19 (-2.09, 1.72)	0.849
Black * sexual minority * Less deprived	2.58 (-1.38, 6.54)	0.201	1.45 (-0.89, 3.78)	0.225	-1.63 (-5.40, 2.15)	0.399	-3.70 (-6.30, -1.11)	0.005
Other * sexual minority * Less deprived	-0.65 (-3.86, 2.56)	0.692	0.89 (-1.74, 3.53)	0.507	0.76 (-2.31, 3.82)	0.629	2.90 (-0.93, 6.72)	0.137
Cohort * ethnic group * sexual orientation * residential IMD rank								
MCS * Mixed * sexual minority * Less deprived	0.25 (-2.86, 3.35)	0.876	0.57 (-3.06, 4.19)	0.760	0.45 (-2.51, 3.42)	0.763	2.85 (-0.48, 6.18)	0.093

MCS * South Asian * sexual minority * Less deprived	-0.12 (-4.58, 4.34)	0.958	1.11 (-1.86, 4.07)	0.464	2.04 (-2.21, 6.30)	0.347	2.13 (-1.18, 5.44)	0.208
MCS * Black * sexual minority * Less deprived	-3.64 (-10.05, 2.77)	0.266	-1.70 (-4.56, 1.15)	0.242	3.42 (-2.69, 9.54)	0.272	5.94 (2.85, 9.02)	<0.001
MCS * Other * sexual minority * Less deprived	-1.08 (-6.18, 4.02)	0.678	-1.99 (-4.77, 0.80)	0.161	-1.50 (-6.37, 3.36)	0.544	-1.07 (-3.68, 1.55)	0.423
Birth sex * ethnic group * sexual orientation * residential IMD rank								
Female * Mixed * sexual minority * Less deprived	3.77 (0.32, 7.23)	0.032	1.69 (-2.51, 5.89)	0.430	3.27 (-0.02, 6.57)	0.052	3.41 (0.09, 6.73)	0.044
Female * South Asian * sexual minority * Less deprived	1.61 (-2.69, 5.90)	0.463	-1.15 (-4.53, 2.23)	0.505	-1.24 (-5.34, 2.85)	0.551	-2.72 (-6.70, 1.26)	0.180
Female * Black * sexual minority * Less deprived								
Female * Other * sexual minority * Less deprived	-0.54 (-5.75, 4.66)	0.839	-3.07 (-6.34, 0.20)	0.065	-1.78 (-6.75, 3.18)	0.481	-5.12 (-9.27, -0.98)	0.015
Intercept	1.30 (1.14, 1.46)	<0.001	1.22 (0.95, 1.49)	<0.001	1.37 (1.22, 1.52)	<0.001	1.28 (1.03, 1.52)	<0.001

	UCLA-3				ONS life satisfaction			
	Unweighted Coefficient (95% CI)	P	Weighted Coefficient (95% CI)	P	Unweighted Coefficient (95% CI)	P	Weighted Coefficient (95% CI)	P
Cohort (MCS)	0.44 (0.21, 0.66)	<0.001	0.38 (0.03, 0.73)	0.033	-0.46 (-0.74, -0.19)	0.001	-0.51 (-0.97, -0.06)	0.027
Birth sex (female)	0.29 (0.09, 0.49)	0.005	0.37 (0.09, 0.66)	0.011	-0.11 (-0.36, 0.13)	0.362	-0.31 (-0.67, 0.05)	0.090
Ethnic group								
Mixed	0.35 (-0.33, 1.04)	0.311	0.66 (0.09, 1.23)	0.023	-0.62 (-1.47, 0.22)	0.147	-1.17 (-2.58, 0.24)	0.103
South Asian	-0.11 (-0.43, 0.20)	0.470	0.17 (-0.55, 0.90)	0.635	0.38 (-0.01, 0.76)	0.055	0.32 (-0.27, 0.91)	0.292
Black	0.14 (-0.49, 0.76)	0.669	0.66 (-0.40, 1.71)	0.220	0.29 (-0.46, 1.05)	0.448	-1.36 (-3.24, 0.51)	0.154
Other	0.66 (-0.29, 1.62)	0.175	1.57 (-0.58, 3.73)	0.152	-1.36 (-2.54, -0.18)	0.024	-1.83 (-3.54, -0.12)	0.036
Sexual orientation (sexual minority)	0.73 (0.24, 1.22)	0.004	0.72 (-0.07, 1.52)	0.075	-0.85 (-1.46, -0.24)	0.006	-0.69 (-2.26, 0.88)	0.388
Residential IMD rank (Less deprived)	-0.20 (-0.42, 0.01)	0.064	0.04 (-0.38, 0.45)	0.867	0.37 (0.10, 0.63)	0.006	0.04 (-0.49, 0.57)	0.884
Cohort * birth sex								
MCS * female	0.03 (-0.26, 0.32)	0.849	0.13 (-0.35, 0.60)	0.592	-0.17 (-0.52, 0.19)	0.355	-0.25 (-0.90, 0.40)	0.452
Cohort * ethnic group								
MCS * Mixed	-0.44 (-1.34, 0.47)	0.342	0.12 (-1.00, 1.24)	0.835	0.84 (-0.28, 1.95)	0.142	1.14 (-0.36, 2.65)	0.135
MCS * South Asian	-0.53 (-1.01, -0.05)	0.029	-0.73 (-1.58, 0.12)	0.091	-0.12 (-0.71, 0.47)	0.688	-0.09 (-0.99, 0.82)	0.854
MCS * Black	-0.69 (-1.56, 0.18)	0.119	-1.04 (-2.49, 0.42)	0.163	-0.18 (-1.24, 0.88)	0.740	0.70 (-1.69, 3.09)	0.565
MCS * Other	-0.63 (-1.89, 0.62)	0.323	-0.41 (-2.89, 2.06)	0.743	1.58 (0.06, 3.10)	0.041	0.22 (-2.26, 2.71)	0.860
Birth sex * ethnic group								
Female * Mixed	-0.30 (-1.11, 0.51)	0.467	-0.14 (-1.26, 0.99)	0.814	0.94 (-0.06, 1.94)	0.064	0.90 (-0.96, 2.75)	0.342
Female * South Asian	0.14 (-0.26, 0.54)	0.488	-0.23 (-1.05, 0.58)	0.576	-0.51 (-1.01, -0.02)	0.041	-0.15 (-0.86, 0.55)	0.668
Female * Black	-0.31 (-1.05, 0.43)	0.414	-0.65 (-2.07, 0.76)	0.365	-0.44 (-1.34, 0.46)	0.340	0.95 (-1.02, 2.92)	0.345
Female * Other	0.02 (-1.08, 1.13)	0.970	-1.32 (-3.81, 1.16)	0.296	0.94 (-0.43, 2.30)	0.180	1.96 (0.02, 3.91)	0.048
Cohort * birth sex * ethnic group								
MCS * Female * Mixed	0.16 (-0.95, 1.28)	0.778	-0.81 (-2.45, 0.83)	0.330	-1.38 (-2.76, -0.01)	0.049	-1.77 (-3.91, 0.36)	0.103
MCS * Female * South Asian	0.39 (-0.24, 1.01)	0.222	1.68 (-0.35, 3.71)	0.105	0.25 (-0.51, 1.01)	0.522	-0.53 (-2.35, 1.30)	0.572
MCS * Female * Black	0.89 (-0.20, 1.99)	0.111	0.71 (-1.32, 2.73)	0.494	0.72 (-0.62, 2.07)	0.293	0.51 (-2.19, 3.20)	0.712
MCS * Female * Other	-0.28 (-1.77, 1.21)	0.708	-0.31 (-3.17, 2.56)	0.833	-1.52 (-3.33, 0.30)	0.101	0.02 (-2.79, 2.83)	0.990
Cohort * sexual orientation								
MCS * sexual minority	0.33 (-0.36, 1.02)	0.348	0.49 (-0.60, 1.58)	0.380	0.09 (-0.76, 0.94)	0.833	-0.51 (-2.36, 1.34)	0.590
Birth sex * sexual orientation								
Female * sexual minority	0.28 (-0.41, 0.97)	0.427	0.04 (-1.17, 1.26)	0.946	-0.30 (-1.15, 0.55)	0.489	-0.09 (-2.04, 1.86)	0.926
Cohort * birth sex * sexual orientation								
MCS * Female * sexual minority	-0.52 (-1.42, 0.37)	0.251	-0.75 (-2.43, 0.94)	0.384	0.22 (-0.88, 1.33)	0.690	0.81 (-1.45, 3.06)	0.484
Ethnic group * sexual orientation								
Mixed * sexual minority	1.27 (-1.27, 3.81)	0.328	1.70 (0.45, 2.94)	0.007	0.89 (-2.25, 4.03)	0.579	1.11 (-0.97, 3.20)	0.296
South Asian * sexual minority	1.02 (-0.38, 2.42)	0.152	0.58 (-1.69, 2.84)	0.617	-0.97 (-2.70, 0.76)	0.272	-0.64 (-3.38, 2.09)	0.644
Black * sexual minority	-1.82 (-7.15, 3.52)	0.504	1.86 (-0.99, 4.70)	0.201	-2.59 (-8.46, 3.28)	0.387	-4.09 (-7.34, -0.85)	0.013

Other * sexual minority	-0.37 (-2.60, 1.86)	0.743	-0.54 (-4.94, 3.85)	0.809	-1.05 (-3.80, 1.71)	0.456	-1.22 (-6.14, 3.69)	0.625
Cohort * ethnic group * sexual orientation								
MCS * Mixed * sexual minority	-1.66 (-4.96, 1.63)	0.322	-2.69 (-5.15, -0.23)	0.032	-1.46 (-5.53, 2.61)	0.481	-1.61 (-4.77, 1.56)	0.320
MCS * South Asian * sexual minority	0.48 (-3.24, 4.20)	0.801	0.84 (-1.58, 3.25)	0.496	-4.65 (-9.25, -0.05)	0.047	-4.63 (-7.59, -1.67)	0.002
MCS * Black * sexual minority	0.80 (-4.29, 5.90)	0.758	0.34 (-1.74, 2.42)	0.751	7.11 (-0.16, 14.39)	0.055	9.72 (6.04, 13.40)	<0.001
MCS * Other * sexual minority	1.03 (-5.13, 7.19)	0.743	-2.23 (-6.46, 1.99)	0.300	-2.12 (-9.73, 5.49)	0.585	-2.25 (-6.06, 1.55)	0.246
Birth sex * ethnic group * sexual orientation								
Female * Mixed * sexual minority	-1.93 (-4.90, 1.03)	0.202	-2.60 (-4.71, -0.50)	0.015	-0.70 (-4.36, 2.96)	0.709	-0.64 (-3.85, 2.56)	0.694
Female * South Asian * sexual minority	-0.99 (-3.03, 1.05)	0.340	0.17 (-2.40, 2.73)	0.899	0.79 (-1.65, 3.22)	0.528	-0.21 (-4.41, 4.00)	0.923
Female * Black * sexual minority	1.30 (-3.72, 6.32)	0.613	-1.39 (-3.57, 0.79)	0.212	3.42 (-2.01, 8.85)	0.218	4.93 (2.22, 7.65)	<0.001
Female * Other * sexual minority	-0.25 (-3.31, 2.80)	0.871	0.30 (-4.55, 5.15)	0.903	1.48 (-2.30, 5.26)	0.443	0.71 (-4.71, 6.13)	0.798
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	2.50 (-1.30, 6.30)	0.197	4.44 (1.05, 7.83)	0.010	1.24 (-3.46, 5.94)	0.605	1.20 (-3.38, 5.78)	0.607
MCS * Female * South Asian * sexual minority	-0.06 (-4.22, 4.09)	0.976	-2.45 (-6.35, 1.45)	0.218	4.75 (-0.35, 9.84)	0.068	6.78 (1.82, 11.74)	0.007
MCS * Female * Black * sexual minority	-2.53 (-8.47, 3.42)	0.404	-2.42 (-5.49, 0.64)	0.121	-9.34 (-16.91, -1.77)	0.016	-12.61 (-16.03, -9.19)	<0.001
MCS * Female * Other * sexual minority	-1.19 (-6.74, 4.37)	0.676	2.28 (-1.33, 5.88)	0.215	2.44 (-4.43, 9.30)	0.486	2.59 (-0.54, 5.72)	0.105
Cohort * residential IMD rank								
MCS * less deprived	0.23 (-0.07, 0.52)	0.130	0.19 (-0.33, 0.71)	0.476	-0.28 (-0.64, 0.08)	0.133	-0.24 (-0.91, 0.44)	0.490
Birth sex * residential IMD rank								
Female * less deprived	0.10 (-0.17, 0.37)	0.473	-0.03 (-0.52, 0.46)	0.904	-0.21 (-0.54, 0.13)	0.230	0.20 (-0.41, 0.81)	0.521
Cohort * birth sex * residential IMD rank								
MCS * female * less deprived	-0.34 (-0.72, 0.04)	0.083	-0.59 (-1.25, 0.07)	0.080	0.30 (-0.17, 0.77)	0.207	0.44 (-0.42, 1.30)	0.313
Ethnic group * residential IMD rank								
Mixed * Less deprived	0.08 (-0.89, 1.06)	0.867	-0.72 (-1.83, 0.39)	0.202	0.15 (-1.06, 1.35)	0.808	1.15 (-0.63, 2.93)	0.205
South Asian * Less deprived	0.67 (0.11, 1.23)	0.018	-0.06 (-1.18, 1.06)	0.913	-1.17 (-1.85, -0.49)	0.001	-0.74 (-1.92, 0.44)	0.219
Black * Less deprived	-0.21 (-1.42, 0.99)	0.728	-1.15 (-2.60, 0.29)	0.117	-0.16 (-1.60, 1.27)	0.822	2.04 (-0.48, 4.55)	0.113
Other * Less deprived	-0.38 (-1.79, 1.03)	0.600	-1.68 (-4.00, 0.65)	0.158	0.76 (-0.98, 2.50)	0.389	0.99 (-0.87, 2.86)	0.298
Cohort * ethnic group * residential IMD rank								
MCS * Mixed * Less deprived	-0.49 (-1.82, 0.83)	0.466	-0.08 (-1.87, 1.71)	0.931	-0.57 (-2.21, 1.06)	0.493	-1.98 (-4.46, 0.51)	0.119
MCS * South Asian * Less deprived	0.09 (-0.79, 0.97)	0.841	0.70 (-0.65, 2.04)	0.312	0.70 (-0.38, 1.79)	0.204	-0.11 (-1.59, 1.36)	0.879
MCS * Black * Less deprived	0.66 (-1.11, 2.43)	0.464	0.86 (-1.20, 2.93)	0.413	-1.38 (-3.53, 0.76)	0.207	-2.90 (-6.88, 1.07)	0.152
MCS * Other * Less deprived	0.51 (-1.41, 2.44)	0.601	1.67 (-1.43, 4.77)	0.290	-1.29 (-3.65, 1.06)	0.282	1.13 (-1.61, 3.87)	0.419
Birth sex * ethnic group * residential IMD rank								
Female * Mixed * Less deprived	0.10 (-1.08, 1.28)	0.869	-0.24 (-1.85, 1.36)	0.766	-1.10 (-2.56, 0.36)	0.139	-1.37 (-3.81, 1.07)	0.269
Female * South Asian * Less deprived	-0.81 (-1.52, -0.10)	0.025	0.22 (-1.15, 1.58)	0.756	1.39 (0.52, 2.25)	0.002	0.67 (-0.66, 2.00)	0.325
Female * Black * Less deprived	0.29 (-1.18, 1.75)	0.703	2.00 (-0.23, 4.22)	0.078	-0.10 (-1.87, 1.67)	0.915	-2.66 (-5.35, 0.03)	0.053
Female * Other * Less deprived	-0.68 (-2.35, 0.99)	0.427	1.25 (-1.55, 4.05)	0.380	-0.23 (-2.29, 1.83)	0.828	-1.66 (-4.11, 0.78)	0.183
Cohort * birth sex * ethnic group * residential IMD rank								
MCS * Female * Mixed * Less deprived	1.17 (-0.49, 2.83)	0.167	1.95 (-0.40, 4.30)	0.104	1.44 (-0.60, 3.49)	0.167	2.53 (-0.72, 5.78)	0.127
MCS * Female * South Asian * Less deprived	0.30 (-0.84, 1.45)	0.601	-1.58 (-4.25, 1.09)	0.245	-0.97 (-2.38, 0.43)	0.173	0.38 (-2.25, 3.01)	0.776
MCS * Female * Black * Less deprived	-0.48 (-2.69, 1.73)	0.670	-1.26 (-4.32, 1.81)	0.422	1.22 (-1.48, 3.92)	0.376	3.34 (-1.26, 7.94)	0.154
MCS * Female * Other * Less deprived	1.14 (-1.19, 3.47)	0.338	-0.08 (-3.66, 3.50)	0.964	-0.56 (-3.43, 2.30)	0.700	-2.89 (-6.28, 0.51)	0.096
Sexual orientation * residential IMD rank								
Sexual minority * Less deprived	0.47 (-0.30, 1.23)	0.233	-0.58 (-2.03, 0.87)	0.433	-0.77 (-1.72, 0.17)	0.109	-0.34 (-2.52, 1.84)	0.761
Cohort * sexual orientation * residential IMD rank								
MCS * sexual minority * Less deprived	-0.77 (-1.77, 0.23)	0.133	-0.22 (-2.10, 1.66)	0.817	0.77 (-0.46, 2.01)	0.221	0.71 (-1.78, 3.21)	0.574
Birth sex * sexual orientation * residential IMD rank								
Female * sexual minority * Less deprived	-0.94 (-1.95, 0.07)	0.067	0.66 (-1.27, 2.58)	0.504	1.24 (0.00, 2.48)	0.051	0.23 (-2.50, 2.97)	0.867
Cohort * birth sex * sexual orientation * residential IMD rank								
MCS * Female * sexual minority * Less deprived	1.16 (-0.10, 2.43)	0.072	0.67 (-1.78, 3.12)	0.591	-1.05 (-2.61, 0.51)	0.187	-1.03 (-4.11, 2.04)	0.510

Ethnic group * sexual orientation * residential IMD rank									
Mixed * sexual minority * Less deprived	-0.07 (-4.37, 4.22)	0.973	1.42 (-2.58, 5.42)	0.487	-0.02 (-5.33, 5.28)	0.993	3.10 (-2.39, 8.58)	0.268	
South Asian * sexual minority * Less deprived	-2.05 (-4.16, 0.05)	0.056	0.13 (-2.79, 3.05)	0.931	1.10 (-1.50, 3.69)	0.407	-2.40 (-5.75, 0.94)	0.159	
Black * sexual minority * Less deprived	1.26 (-2.68, 5.20)	0.532	-1.09 (-3.53, 1.35)	0.381	1.63 (-3.24, 6.50)	0.512	2.40 (0.13, 4.68)	0.039	
Other * sexual minority * Less deprived	0.45 (-2.75, 3.64)	0.783	1.92 (-2.81, 6.64)	0.426	2.97 (-0.98, 6.92)	0.140	2.54 (-2.65, 7.73)	0.337	
Cohort * ethnic group * sexual orientation * residential IMD rank									
MCS * Mixed * sexual minority * Less deprived	-0.57 (-3.66, 2.52)	0.717	-1.26 (-4.32, 1.80)	0.420	2.36 (-1.46, 6.17)	0.226	0.41 (-3.92, 4.74)	0.853	
MCS * South Asian * sexual minority * Less deprived	-0.18 (-4.62, 4.26)	0.937	-1.55 (-4.90, 1.81)	0.367	3.28 (-2.20, 8.76)	0.241	7.51 (3.73, 11.29)	<0.001	
MCS * Black * sexual minority * Less deprived					-6.17 (-14.05, 1.70)	0.124	-7.71 (-11.73, -3.70)	<0.001	
MCS * Other * sexual minority * Less deprived	-2.64 (-7.71, 2.44)	0.308	-2.73 (-6.05, 0.58)	0.106	2.55 (-3.72, 8.81)	0.426	2.25 (-0.72, 5.22)	0.138	
Birth sex * ethnic group * sexual orientation * residential IMD rank									
Female * Mixed * sexual minority * Less deprived	0.80 (-2.63, 4.24)	0.647	0.03 (-3.43, 3.49)	0.988	-2.15 (-6.40, 2.09)	0.320	-4.50 (-9.05, 0.06)	0.053	
Female * South Asian * sexual minority * Less deprived	0.47 (-3.80, 4.74)	0.828	0.67 (-2.96, 4.29)	0.718	-2.73 (-8.00, 2.54)	0.310	-4.90 (-8.92, -0.87)	0.017	
Female * Black * sexual minority * Less deprived									
Female * Other * sexual minority * Less deprived	1.18 (-4.00, 6.36)	0.654	-1.28 (-6.55, 4.00)	0.635	-2.47 (-8.87, 3.92)	0.448	-0.28 (-6.02, 5.46)	0.924	
Intercept	4.65 (4.49, 4.80)	<0.001	4.55 (4.31, 4.79)	<0.001	6.59 (6.39, 6.78)	<0.001	6.75 (6.46, 7.04)	<0.001	

Note. CI: confidence interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; MCS: Millennium Cohort Study (born in 2000-2002); NS: Next Steps study (born in 1990); ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.

Weighted results are adjusted for survey design characteristics, including survey and non-response weights. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Table S8. Results from the fixed-effects multiple regression approach using stratification 80b (cohort * birth sex * ethnic group * sexual orientation * housing tenure).

	GAD-2				PHQ-2			
	Unweighted		Weighted		Unweighted		Weighted	
	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p	Coefficient (95% CI)	p
Cohort (MCS)	0.07 (-0.15, 0.28)	0.536	0.14 (-0.25, 0.54)	0.473	0.04 (-0.17, 0.24)	0.707	0.12 (-0.26, 0.49)	0.541
Birth sex (female)	0.73 (0.51, 0.94)	<0.001	0.78 (0.36, 1.20)	<0.001	0.33 (0.13, 0.53)	0.002	0.48 (0.11, 0.84)	0.011
Ethnic group								
Mixed	0.12 (-0.60, 0.83)	0.747	-0.20 (-1.13, 0.73)	0.676	-0.14 (-0.80, 0.52)	0.681	-0.09 (-0.88, 0.69)	0.815
South Asian	-0.03 (-0.45, 0.39)	0.890	-0.04 (-0.61, 0.54)	0.905	-0.20 (-0.60, 0.20)	0.323	-0.38 (-0.90, 0.13)	0.143
Black	-0.74 (-1.44, -0.05)	0.037	-0.03 (-1.01, 0.94)	0.945	-0.50 (-1.16, 0.16)	0.141	-0.06 (-0.82, 0.70)	0.881
Other	-0.34 (-1.33, 0.65)	0.501	0.38 (-1.28, 2.05)	0.652	-0.04 (-0.98, 0.91)	0.935	0.75 (-1.19, 2.69)	0.447
Sexual orientation (sexual minority)	0.43 (-0.08, 0.95)	0.098	-0.23 (-1.02, 0.57)	0.573	0.56 (0.08, 1.05)	0.024	0.87 (0.22, 1.52)	0.009
Housing tenure (homeowner/part owner)	-0.41 (-0.63, -0.19)	<0.001	-0.43 (-0.83, -0.02)	0.040	-0.49 (-0.70, -0.28)	<0.001	-0.57 (-0.90, -0.25)	0.001
Cohort * birth sex								
MCS * female	0.31 (0.03, 0.59)	0.029	0.27 (-0.25, 0.79)	0.310	0.25 (-0.02, 0.51)	0.069	0.07 (-0.43, 0.56)	0.795
Cohort * ethnic group								
MCS * Mixed	-0.23 (-1.21, 0.76)	0.654	0.67 (-0.71, 2.04)	0.341	-0.09 (-1.02, 0.83)	0.844	0.38 (-1.12, 1.88)	0.616
MCS * South Asian	-0.37 (-1.01, 0.28)	0.262	-0.72 (-1.40, -0.04)	0.037	-0.04 (-0.65, 0.57)	0.905	-0.09 (-0.89, 0.72)	0.835
MCS * Black	0.51 (-0.46, 1.48)	0.300	-0.36 (-1.50, 0.78)	0.536	0.51 (-0.41, 1.43)	0.274	0.49 (-0.72, 1.71)	0.427
MCS * Other	1.03 (-0.40, 2.46)	0.159	1.42 (-0.63, 3.46)	0.174	0.64 (-0.72, 2.01)	0.355	-0.42 (-2.40, 1.55)	0.673
Birth sex * ethnic group								
Female * Mixed	-0.41 (-1.25, 0.43)	0.341	0.19 (-1.23, 1.61)	0.793	-0.01 (-0.80, 0.78)	0.981	0.11 (-1.22, 1.45)	0.866
Female * South Asian	-0.33 (-0.85, 0.20)	0.222	-0.28 (-1.00, 0.44)	0.448	-0.13 (-0.63, 0.36)	0.598	-0.24 (-0.87, 0.39)	0.463
Female * Black	-0.09 (-0.94, 0.76)	0.833	-0.58 (-1.77, 0.62)	0.345	-0.05 (-0.86, 0.75)	0.896	-0.69 (-1.62, 0.24)	0.147
Female * Other	-0.43 (-1.58, 0.72)	0.462	-0.77 (-2.76, 1.21)	0.443	-0.50 (-1.60, 0.59)	0.365	-1.22 (-3.26, 0.83)	0.244
Cohort * birth sex * ethnic group								
MCS * Female * Mixed	0.42 (-0.76, 1.60)	0.482	-0.67 (-2.57, 1.23)	0.489	0.27 (-0.84, 1.38)	0.637	-0.16 (-2.09, 1.78)	0.872
MCS * Female * South Asian	0.80 (-0.02, 1.62)	0.056	1.16 (0.03, 2.29)	0.045	0.69 (-0.09, 1.47)	0.082	0.85 (-0.18, 1.88)	0.107
MCS * Female * Black	0.18 (-1.02, 1.38)	0.768	0.75 (-0.88, 2.38)	0.366	-0.07 (-1.21, 1.08)	0.909	-0.17 (-1.94, 1.61)	0.855
MCS * Female * Other	-0.92 (-2.59, 0.75)	0.279	-1.39 (-3.90, 1.13)	0.279	0.21 (-1.37, 1.80)	0.791	1.06 (-1.18, 3.30)	0.354
Cohort * sexual orientation								
MCS * sexual minority	0.42 (-0.23, 1.08)	0.202	1.01 (-0.09, 2.11)	0.072	0.35 (-0.27, 0.97)	0.274	-0.08 (-0.93, 0.78)	0.862
Birth sex * sexual orientation								
Female * sexual minority	0.05 (-0.62, 0.73)	0.877	0.38 (-0.96, 1.71)	0.583	0.16 (-0.48, 0.80)	0.624	-0.44 (-1.51, 0.62)	0.415
Cohort * birth sex * sexual orientation								
MCS * Female * sexual minority	-0.36 (-1.19, 0.46)	0.390	-0.56 (-2.17, 1.05)	0.492	-0.30 (-1.09, 0.48)	0.448	0.43 (-0.85, 1.71)	0.512
Ethnic group * sexual orientation								
Mixed * sexual minority	0.03 (-3.48, 3.53)	0.989	1.07 (-0.11, 2.25)	0.076	1.04 (-2.29, 4.36)	0.541	0.71 (-0.27, 1.69)	0.154
South Asian * sexual minority	0.67 (-0.85, 2.20)	0.388	2.71 (0.11, 5.31)	0.041	-0.23 (-1.69, 1.22)	0.753	0.53 (-1.51, 2.57)	0.611
Black * sexual minority	-0.11 (-3.61, 3.39)	0.950	-0.10 (-1.32, 1.12)	0.877	2.40 (-0.93, 5.72)	0.158	1.68 (0.72, 2.64)	0.001
Other * sexual minority	2.23 (0.21, 4.26)	0.031	3.62 (1.51, 5.73)	0.001	0.69 (-1.24, 2.61)	0.484	0.49 (-3.17, 4.16)	0.792
Cohort * ethnic group * sexual orientation								
MCS * Mixed * sexual minority	-0.60 (-4.69, 3.49)	0.773	-0.97 (-3.40, 1.46)	0.432	-1.96 (-5.84, 1.93)	0.323	-2.23 (-3.98, -0.48)	0.012
MCS * South Asian * sexual minority	-0.62 (-3.53, 2.29)	0.674	-2.33 (-5.36, 0.71)	0.133	-1.51 (-4.28, 1.25)	0.283	-2.03 (-4.30, 0.24)	0.080
MCS * Black * sexual minority	0.00 (-4.94, 4.93)	0.999	0.21 (-1.33, 1.75)	0.791	-4.90 (-9.59, -0.21)	0.041	-4.53 (-5.97, -3.09)	<0.001
MCS * Other * sexual minority	-2.87 (-8.01, 2.28)	0.275	-6.11 (-9.60, -2.62)	0.001	-5.07 (-9.96, -0.18)	0.042	-5.32 (-9.61, -1.02)	0.015
Birth sex * ethnic group * sexual orientation								
Female * Mixed * sexual minority	-1.12 (-5.06, 2.82)	0.577	-2.13 (-4.21, -0.05)	0.044	-2.23 (-5.97, 1.51)	0.243	-1.96 (-4.05, 0.13)	0.066

Female * South Asian * sexual minority	-0.62 (-3.16, 1.92)	0.632	-3.63 (-7.01, -0.24)	0.036	-0.77 (-3.00, 1.45)	0.497	-1.96 (-4.29, 0.37)	0.100
Female * Black * sexual minority	1.56 (-2.38, 5.50)	0.437	1.58 (-1.33, 4.48)	0.287	-1.94 (-5.68, 1.81)	0.311	-1.02 (-3.59, 1.56)	0.439
Female * Other * sexual minority	-2.60 (-5.33, 0.14)	0.063	-4.32 (-7.30, -1.34)	0.004	-0.98 (-3.59, 1.62)	0.458	-1.28 (-5.32, 2.76)	0.535
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	1.71 (-2.90, 6.32)	0.467	2.67 (-0.81, 6.14)	0.132	3.66 (-0.72, 8.05)	0.102	4.15 (1.08, 7.22)	0.008
MCS * Female * South Asian * sexual minority	-0.21 (-3.98, 3.57)	0.915	3.00 (-0.89, 6.90)	0.131	2.66 (-0.81, 6.12)	0.133	3.82 (0.74, 6.91)	0.015
MCS * Female * Black * sexual minority	-0.88 (-6.69, 4.93)	0.767	-0.95 (-4.18, 2.27)	0.562	4.13 (-1.40, 9.65)	0.143	3.94 (0.89, 6.99)	0.011
MCS * Female * Other * sexual minority	4.02 (-1.19, 9.22)	0.130	6.94 (3.09, 10.79)	<0.001	4.14 (-0.81, 9.09)	0.101	4.66 (0.20, 9.11)	0.040
Cohort * housing tenure								
MCS * homeowner/part owner	0.41 (0.11, 0.71)	0.008	0.27 (-0.24, 0.78)	0.295	0.43 (0.14, 0.72)	0.003	0.33 (-0.13, 0.80)	0.162
Birth sex * housing tenure								
Female * homeowner/part owner	-0.03 (-0.31, 0.25)	0.852	-0.02 (-0.54, 0.50)	0.943	-0.02 (-0.29, 0.25)	0.876	-0.05 (-0.46, 0.36)	0.820
Cohort * birth sex * housing tenure								
MCS * female * homeowner/part owner	-0.18 (-0.57, 0.22)	0.380	-0.16 (-0.82, 0.49)	0.625	-0.08 (-0.46, 0.29)	0.673	0.00 (-0.61, 0.62)	0.993
Ethnic group * housing tenure								
Mixed * homeowner/part owner	-0.26 (-1.28, 0.75)	0.610	-0.05 (-1.15, 1.06)	0.936	0.27 (-0.69, 1.22)	0.587	0.13 (-0.99, 1.25)	0.823
South Asian * homeowner/part owner	0.07 (-0.47, 0.60)	0.808	0.24 (-0.56, 1.04)	0.560	0.19 (-0.32, 0.70)	0.460	0.36 (-0.29, 1.00)	0.277
Black * homeowner/part owner	0.18 (-0.86, 1.22)	0.737	-0.68 (-1.71, 0.35)	0.195	0.35 (-0.64, 1.34)	0.487	0.04 (-1.19, 1.27)	0.948
Other * homeowner/part owner	0.14 (-1.29, 1.58)	0.845	0.91 (-1.59, 3.42)	0.473	-0.01 (-1.37, 1.35)	0.990	0.78 (-1.75, 3.30)	0.546
Cohort * ethnic group * housing tenure								
MCS * Mixed * homeowner/part owner	0.57 (-0.83, 1.97)	0.424	-0.15 (-1.79, 1.50)	0.862	0.68 (-0.65, 2.00)	0.316	1.25 (-0.80, 3.30)	0.232
MCS * South Asian * homeowner/part owner	0.10 (-0.75, 0.95)	0.824	0.44 (-0.61, 1.50)	0.407	-0.15 (-0.96, 0.65)	0.707	-0.01 (-1.16, 1.13)	0.983
MCS * Black * homeowner/part owner	-0.27 (-1.86, 1.31)	0.737	0.82 (-0.54, 2.19)	0.236	-0.22 (-1.73, 1.29)	0.776	-0.22 (-2.30, 1.85)	0.832
MCS * Other * homeowner/part owner	-1.14 (-3.19, 0.90)	0.273	-2.41 (-5.38, 0.57)	0.113	-1.11 (-3.06, 0.83)	0.262	-1.63 (-4.22, 0.96)	0.216
Birth sex * ethnic group * housing tenure								
Female * Mixed * homeowner/part owner	0.67 (-0.55, 1.89)	0.285	0.25 (-1.53, 2.03)	0.780	0.22 (-0.93, 1.38)	0.703	0.26 (-1.53, 2.04)	0.777
Female * South Asian * homeowner/part owner	0.11 (-0.57, 0.78)	0.756	-0.06 (-1.05, 0.94)	0.907	0.17 (-0.47, 0.81)	0.601	0.28 (-0.52, 1.08)	0.491
Female * Black * homeowner/part owner	0.12 (-1.15, 1.39)	0.857	1.81 (0.01, 3.60)	0.049	-0.08 (-1.29, 1.13)	0.899	1.35 (-0.57, 3.27)	0.169
Female * Other * homeowner/part owner	0.60 (-1.11, 2.30)	0.495	-0.06 (-2.86, 2.73)	0.965	0.83 (-0.79, 2.46)	0.315	0.27 (-2.39, 2.92)	0.842
Cohort * birth sex * ethnic group * housing tenure								
MCS * Female * Mixed * homeowner/part owner	-1.25 (-3.05, 0.54)	0.170	0.33 (-2.22, 2.89)	0.797	-1.00 (-2.69, 0.70)	0.251	-1.18 (-3.96, 1.60)	0.405
MCS * Female * South Asian * homeowner/part owner	-0.59 (-1.69, 0.51)	0.292	-0.32 (-2.18, 1.53)	0.732	-0.42 (-1.46, 0.63)	0.435	0.64 (-1.80, 3.07)	0.608
MCS * Female * Black * homeowner/part owner	-0.71 (-3.20, 1.79)	0.578	-2.28 (-4.48, -0.08)	0.043	-0.69 (-3.06, 1.68)	0.569	-1.92 (-4.78, 0.94)	0.189
MCS * Female * Other * homeowner/part owner	1.07 (-1.42, 3.57)	0.399	3.48 (-0.31, 7.27)	0.072	0.32 (-2.06, 2.69)	0.794	1.62 (-1.55, 4.80)	0.315
Sexual orientation * housing tenure								
Sexual minority * homeowner/part owner	0.31 (-0.43, 1.06)	0.411	0.46 (-0.67, 1.58)	0.429	-0.16 (-0.87, 0.55)	0.662	-0.62 (-1.61, 0.36)	0.214
Cohort * sexual orientation * housing tenure								
MCS * sexual minority * homeowner/part owner	-0.40 (-1.44, 0.64)	0.452	-0.31 (-1.85, 1.22)	0.690	0.41 (-0.58, 1.40)	0.422	0.63 (-0.65, 1.90)	0.336
Birth sex * sexual orientation * housing tenure								
Female * sexual minority * homeowner/part owner	-0.07 (-1.07, 0.94)	0.895	-0.08 (-1.75, 1.59)	0.925	0.12 (-0.83, 1.08)	0.801	0.69 (-0.74, 2.11)	0.344
Cohort * birth sex * sexual orientation * housing tenure								
MCS * Female * sexual minority * homeowner/part owner	0.31 (-1.01, 1.62)	0.646	-0.61 (-2.90, 1.68)	0.601	-0.46 (-1.72, 0.79)	0.467	-1.38 (-3.34, 0.58)	0.169
Ethnic group * sexual orientation * housing tenure								
Mixed * sexual minority * homeowner/part owner	-0.64 (-5.60, 4.32)	0.800	-0.98 (-2.51, 0.55)	0.207	-1.62 (-6.33, 3.10)	0.502	-0.93 (-2.37, 0.51)	0.205
South Asian * sexual minority * homeowner/part owner	-1.47 (-3.51, 0.57)	0.157	-2.48 (-5.31, 0.34)	0.085	0.04 (-1.90, 1.98)	0.967	0.00 (-2.25, 2.24)	0.997
Black * sexual minority * homeowner/part owner	-0.08 (-5.04, 4.88)	0.974	0.65 (-0.82, 2.13)	0.385	-0.70 (-5.42, 4.02)	0.771	0.16 (-1.38, 1.69)	0.843
Other * sexual minority * homeowner/part owner	-0.30 (-3.64, 3.05)	0.861	-1.60 (-4.75, 1.55)	0.320	1.91 (-1.27, 5.09)	0.240	0.79 (-3.27, 4.85)	0.703
Cohort * ethnic group * sexual orientation * housing tenure								
MCS * Mixed * sexual minority * homeowner/part owner	2.75 (-3.05, 8.55)	0.352	2.45 (-0.96, 5.86)	0.159	2.48 (-3.03, 8.00)	0.377	1.59 (-1.24, 4.43)	0.271
MCS * South Asian * sexual minority * homeowner/part owner	1.39 (-2.44, 5.22)	0.476	2.72 (-0.55, 5.99)	0.102	1.57 (-2.08, 5.21)	0.399	3.70 (0.72, 6.67)	0.015

Female * sexual minority * homeowner/part owner	-0.23 (-1.22, 0.77)	0.657	0.64 (-0.73, 2.01)	0.358	-0.12 (-1.35, 1.11)	0.851	-1.46 (-3.70, 0.79)	0.204
Cohort * birth sex * sexual orientation * housing tenure								
MCS * Female * sexual minority * homeowner/part owner	0.61 (-0.69, 1.92)	0.358	-0.97 (-3.28, 1.34)	0.411	0.47 (-1.13, 2.08)	0.562	1.20 (-1.54, 3.94)	0.391
Ethnic group * sexual orientation * housing tenure								
Mixed * sexual minority * homeowner/part owner	2.70 (-2.23, 7.62)	0.283	4.25 (2.90, 5.59)	<0.001	-0.21 (-6.29, 5.87)	0.946	-2.86 (-5.35, -0.37)	0.024
South Asian * sexual minority * homeowner/part owner	0.29 (-1.73, 2.32)	0.778	0.29 (-2.68, 3.26)	0.849	-1.04 (-3.54, 1.46)	0.413	-3.47 (-7.23, 0.28)	0.070
Black * sexual minority * homeowner/part owner	2.38 (-1.52, 6.27)	0.231	1.99 (-0.01, 3.98)	0.051	-0.02 (-6.11, 6.06)	0.994	-2.53 (-5.70, 0.65)	0.119
Other * sexual minority * homeowner/part owner	-1.80 (-5.13, 1.52)	0.288	-1.92 (-6.42, 2.58)	0.402	-0.54 (-4.65, 3.56)	0.795	1.33 (-3.91, 6.57)	0.620
Cohort * ethnic group * sexual orientation * housing tenure								
MCS * Mixed * sexual minority * homeowner/part owner	-1.10 (-6.86, 4.66)	0.708	-2.52 (-5.79, 0.75)	0.130	-2.21 (-9.32, 4.90)	0.543	-2.54 (-7.26, 2.18)	0.292
MCS * South Asian * sexual minority * homeowner/part owner	0.32 (-3.48, 4.13)	0.868	1.02 (-2.79, 4.83)	0.600	1.33 (-3.36, 6.03)	0.577	3.20 (-2.39, 8.79)	0.261
MCS * Black * sexual minority * homeowner/part owner								
MCS * Other * sexual minority * homeowner/part owner	0.40 (-4.70, 5.51)	0.877	1.18 (-3.73, 6.09)	0.636	0.24 (-6.05, 6.54)	0.939	-1.31 (-6.82, 4.20)	0.640
Birth sex * ethnic group * sexual orientation * housing tenure								
Female * Mixed * sexual minority * homeowner/part owner	-2.55 (-8.10, 3.00)	0.368	-3.07 (-5.57, -0.56)	0.016	-0.77 (-7.62, 6.08)	0.826	1.38 (-3.27, 6.03)	0.561
Female * South Asian * sexual minority * homeowner/part owner	-0.64 (-4.14, 2.86)	0.720	0.05 (-3.27, 3.37)	0.975	0.66 (-3.49, 4.81)	0.756	3.96 (-2.92, 10.83)	0.259
Female * Black * sexual minority * homeowner/part owner								
Female * Other * sexual minority * homeowner/part owner								
Cohort * birth sex * ethnic group * sexual orientation * housing tenure								
MCS * Female * Mixed * sexual minority * homeowner/part owner	1.63 (-4.92, 8.19)	0.626	2.36 (-2.74, 7.46)	0.364	1.92 (-6.17, 10.01)	0.643	3.02 (-4.49, 10.53)	0.431
MCS * Female * South Asian * sexual minority * homeowner/part owner	-0.93 (-6.01, 4.15)	0.719	-2.12 (-7.04, 2.81)	0.399	-1.01 (-7.16, 5.14)	0.748	-5.13 (-13.70, 3.44)	0.240
Intercept	4.90 (4.74, 5.07)	<0.001	4.88 (4.57, 5.18)	<0.001	6.45 (6.25, 6.66)	<0.001	6.42 (6.00, 6.83)	<0.001

Note. CI: confidence interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; MCS: Millennium Cohort Study (born in 2000-2002); NS: Next Steps study (born in 1990); ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles Loneliness scale.

Weighted results are adjusted for survey design characteristics, including survey and non-response weights. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Table S9. Results from the fixed-effects multiple regression approach using stratification 80c (cohort * birth sex * ethnic group * sexual orientation * childhood social class).

	GAD-2				PHQ-2			
	Unweighted		Weighted		Unweighted		Weighted	
	Coefficient (95% CI)	P	Coefficient (95% CI)	P	Coefficient (95% CI)	P	Coefficient (95% CI)	P
Cohort (MCS)	0.33 (0.01, 0.65)	0.043	0.30 (-0.14, 0.74)	0.177	0.36 (0.06, 0.67)	0.019	0.32 (-0.18, 0.81)	0.211
Birth sex (female)	0.88 (0.64, 1.13)	<0.001	1.02 (0.58, 1.46)	<0.001	0.51 (0.27, 0.74)	<0.001	0.79 (0.42, 1.17)	<0.001
Ethnic group								
Mixed	-0.09 (-0.96, 0.78)	0.837	-0.65 (-1.23, -0.07)	0.029	0.07 (-0.76, 0.90)	0.864	0.14 (-0.45, 0.73)	0.638
South Asian	-0.05 (-0.42, 0.32)	0.799	-0.03 (-0.58, 0.52)	0.915	-0.17 (-0.52, 0.18)	0.343	-0.28 (-0.71, 0.14)	0.194
Black	-0.59 (-1.59, 0.41)	0.246	-0.28 (-1.11, 0.56)	0.519	-0.57 (-1.52, 0.38)	0.237	0.09 (-1.24, 1.41)	0.900
Other	-0.45 (-1.50, 0.59)	0.392	0.11 (-1.59, 1.81)	0.900	-0.24 (-1.23, 0.75)	0.634	0.40 (-1.58, 2.38)	0.694
Sexual orientation (sexual minority)	0.62 (-0.05, 1.29)	0.068	-0.32 (-1.03, 0.38)	0.372	0.62 (-0.02, 1.25)	0.058	0.49 (-0.62, 1.61)	0.386
Childhood social class (advantaged)	0.17 (-0.06, 0.41)	0.147	0.11 (-0.28, 0.50)	0.573	0.05 (-0.17, 0.27)	0.652	0.12 (-0.23, 0.47)	0.506
Cohort * birth sex								
MCS * female	0.34 (-0.07, 0.75)	0.103	0.21 (-0.44, 0.85)	0.527	0.26 (-0.13, 0.65)	0.193	-0.09 (-0.74, 0.57)	0.798
Cohort * ethnic group								
MCS * Mixed	0.00 (-1.65, 1.66)	0.997	0.46 (-0.84, 1.75)	0.490	-0.01 (-1.58, 1.57)	0.991	-0.33 (-1.64, 0.98)	0.624
MCS * South Asian	-0.05 (-0.75, 0.65)	0.892	-0.23 (-1.01, 0.56)	0.569	-0.06 (-0.72, 0.61)	0.865	0.21 (-1.00, 1.41)	0.737
MCS * Black	1.29 (-0.29, 2.88)	0.109	0.97 (-0.36, 2.31)	0.153	0.47 (-1.03, 1.97)	0.540	0.67 (-1.44, 2.77)	0.533
MCS * Other	-0.25 (-1.92, 1.42)	0.767	-0.73 (-2.66, 1.19)	0.455	-0.65 (-2.24, 0.94)	0.424	-1.15 (-3.34, 1.04)	0.302
Birth sex * ethnic group								
Female * Mixed	-0.06 (-1.12, 1.00)	0.910	0.74 (-0.83, 2.30)	0.357	0.12 (-0.89, 1.13)	0.814	0.09 (-1.47, 1.64)	0.910
Female * South Asian	-0.24 (-0.72, 0.24)	0.334	-0.20 (-0.92, 0.53)	0.600	-0.03 (-0.49, 0.43)	0.889	-0.26 (-0.81, 0.30)	0.365
Female * Black	-0.28 (-1.47, 0.90)	0.638	0.25 (-1.45, 1.95)	0.772	-0.14 (-1.27, 0.99)	0.806	-0.64 (-2.34, 1.07)	0.463
Female * Other	-0.06 (-1.32, 1.20)	0.922	-0.54 (-2.48, 1.41)	0.588	-0.22 (-1.41, 0.98)	0.723	-0.84 (-3.01, 1.33)	0.450
Cohort * birth sex * ethnic group								
MCS * Female * Mixed	-0.02 (-1.94, 1.90)	0.982	-0.14 (-2.26, 1.98)	0.898	-0.84 (-2.67, 0.99)	0.368	-0.01 (-2.07, 2.05)	0.992
MCS * Female * South Asian	0.03 (-0.88, 0.93)	0.955	-0.05 (-1.18, 1.08)	0.929	0.16 (-0.69, 1.02)	0.707	0.23 (-1.10, 1.57)	0.734
MCS * Female * Black	-0.97 (-2.99, 1.06)	0.350	-1.12 (-3.36, 1.13)	0.330	-0.23 (-2.15, 1.70)	0.818	-0.06 (-2.50, 2.37)	0.958
MCS * Female * Other	0.36 (-1.65, 2.36)	0.726	1.19 (-1.55, 3.92)	0.394	1.38 (-0.52, 3.29)	0.155	2.37 (-0.24, 4.97)	0.075
Cohort * sexual orientation								
MCS * sexual minority	0.60 (-0.49, 1.69)	0.279	1.60 (0.26, 2.94)	0.020	0.25 (-0.79, 1.29)	0.636	-0.21 (-1.63, 1.21)	0.773
Birth sex * sexual orientation								
Female * sexual minority	-0.13 (-0.99, 0.72)	0.761	0.04 (-1.42, 1.50)	0.960	-0.05 (-0.87, 0.76)	0.896	-0.39 (-1.90, 1.12)	0.612
Cohort * birth sex * sexual orientation								
MCS * Female * sexual minority	-0.07 (-1.39, 1.24)	0.913	-1.32 (-3.77, 1.13)	0.290	0.45 (-0.80, 1.70)	0.484	0.54 (-1.80, 2.89)	0.650
Ethnic group * sexual orientation								
Mixed * sexual minority	-0.19 (-6.77, 6.40)	0.956	-1.58 (-6.47, 3.31)	0.527	-5.25 (-11.51, 1.01)	0.100	-3.40 (-7.65, 0.84)	0.116
South Asian * sexual minority	0.00 (-1.35, 1.35)	0.999	1.44 (0.27, 2.60)	0.016	-0.35 (-1.64, 0.93)	0.590	0.59 (-0.66, 1.84)	0.353
Black * sexual minority	-0.12 (-3.72, 3.47)	0.947	0.56 (-0.48, 1.61)	0.290	2.72 (-0.70, 6.14)	0.119	2.27 (0.56, 3.98)	0.009
Other * sexual minority	3.74 (1.05, 6.43)	0.007	4.96 (3.08, 6.85)	<0.001	3.38 (0.82, 5.94)	0.010	3.74 (1.43, 6.06)	0.002
Cohort * ethnic group * sexual orientation								
MCS * Mixed * sexual minority	1.63 (-3.77, 7.03)	0.555	3.16 (-1.44, 7.76)	0.178	3.72 (-1.42, 8.85)	0.156	2.84 (-1.10, 6.78)	0.157
MCS * South Asian * sexual minority	0.45 (-2.49, 3.38)	0.764	-0.79 (-2.49, 0.91)	0.362	1.11 (-1.68, 3.90)	0.435	1.94 (-0.30, 4.18)	0.090
MCS * Black * sexual minority	-1.23 (-6.39, 3.93)	0.641	-1.87 (-3.71, -0.03)	0.046	-5.08 (-9.99, -0.18)	0.042	-4.77 (-7.26, -2.29)	<0.001
MCS * Other * sexual minority	-7.00 (-13.97, -0.03)	0.049	-6.75 (-11.19, -2.31)	0.003	-11.17 (-17.80, -4.54)	0.001	-7.64 (-12.07, -3.21)	0.001
Birth sex * ethnic group * sexual orientation								
Female * Mixed * sexual minority	-1.13 (-6.72, 4.46)	0.692	0.72 (-3.77, 5.22)	0.753	2.75 (-2.56, 8.06)	0.310	1.13 (-2.75, 5.00)	0.568

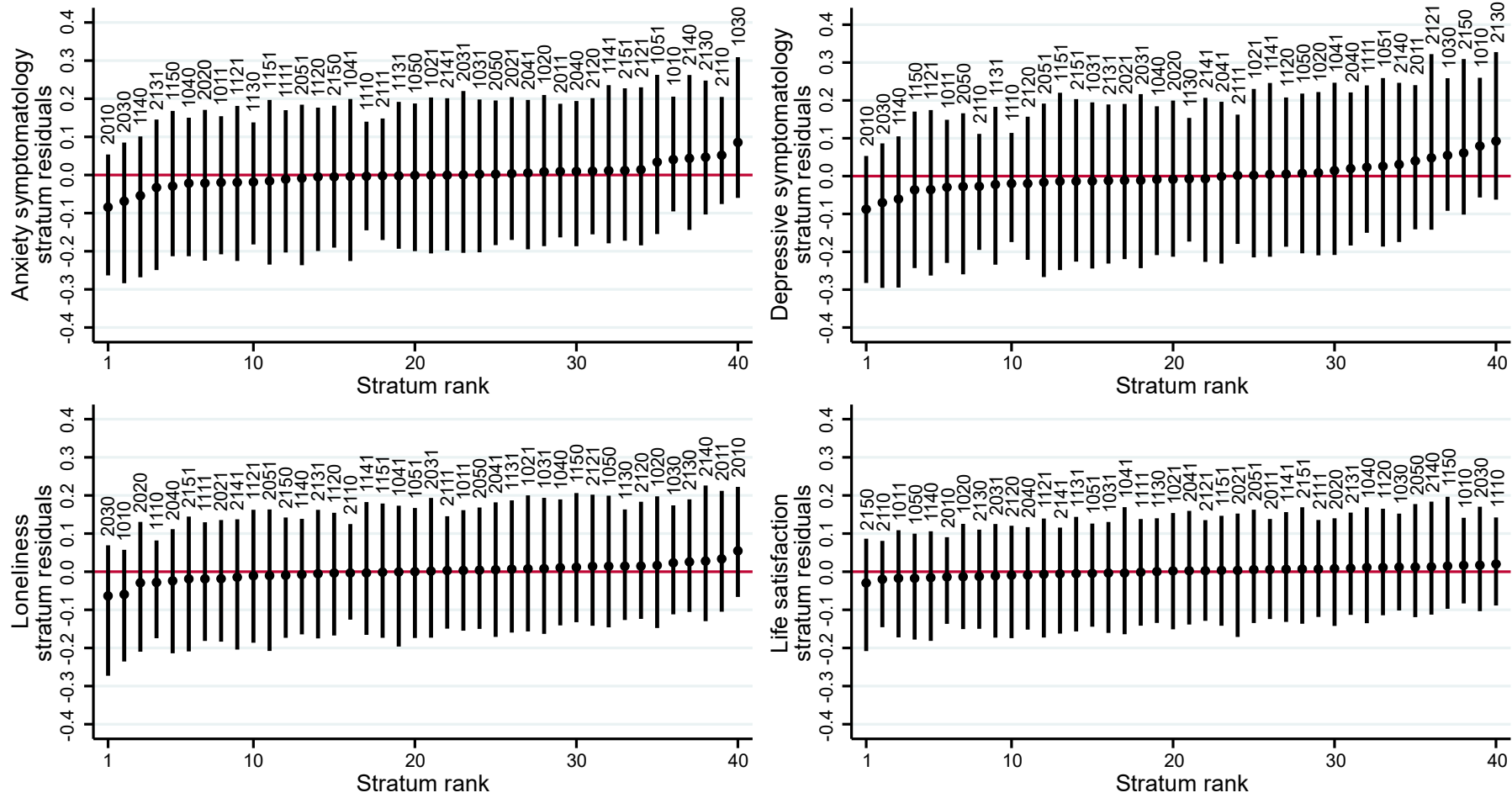
Female * South Asian * sexual minority	-2.18 (-5.88, 1.52)	0.248	-2.98 (-4.64, -1.32)	<0.001	-1.75 (-5.27, 1.77)	0.329	-2.10 (-3.67, -0.53)	0.009
Female * Black * sexual minority	3.53 (-1.48, 8.54)	0.167	2.69 (0.49, 4.89)	0.017	-3.31 (-8.08, 1.45)	0.173	-2.77 (-5.02, -0.52)	0.016
Female * Other * sexual minority	-3.69 (-8.11, 0.73)	0.102	-4.30 (-6.60, -2.01)	<0.001	-1.24 (-5.44, 2.97)	0.564	-1.35 (-3.93, 1.23)	0.305
Cohort * birth sex * ethnic group * sexual orientation								
MCS * Female * Mixed * sexual minority	-0.47 (-3.99, 3.05)	0.792	-1.46 (-4.25, 1.33)	0.306	0.81 (-2.53, 4.16)	0.635	1.97 (-0.95, 4.90)	0.185
MCS * Female * South Asian * sexual minority	0.17 (-4.65, 4.99)	0.944	2.08 (-0.53, 4.69)	0.119	-0.34 (-4.92, 4.25)	0.886	-0.26 (-3.39, 2.87)	0.872
MCS * Female * Black * sexual minority	3.40 (-3.30, 10.10)	0.320	4.16 (-0.69, 9.02)	0.093	5.54 (-0.83, 11.91)	0.088	6.03 (0.83, 11.24)	0.023
MCS * Female * Other * sexual minority	6.69 (1.25, 12.14)	0.016	6.85 (3.58, 10.11)	<0.001	6.12 (0.94, 11.30)	0.021	3.20 (-0.43, 6.82)	0.084
Cohort * childhood social class								
MCS * advantaged	-0.10 (-0.46, 0.26)	0.588	0.01 (-0.50, 0.52)	0.965	-0.09 (-0.43, 0.26)	0.616	-0.03 (-0.58, 0.53)	0.919
Birth sex * childhood social class								
Female * advantaged	-0.28 (-0.58, 0.01)	0.062	-0.39 (-0.89, 0.11)	0.129	-0.30 (-0.59, -0.02)	0.034	-0.61 (-1.05, -0.17)	0.007
Cohort * birth sex * childhood social class								
MCS * female * advantaged	-0.06 (-0.53, 0.41)	0.801	-0.01 (-0.74, 0.72)	0.979	-0.06 (-0.50, 0.38)	0.789	0.27 (-0.46, 1.00)	0.468
Ethnic group * childhood social class								
Mixed * advantaged	0.05 (-1.02, 1.12)	0.922	0.58 (-0.42, 1.59)	0.252	-0.02 (-1.03, 0.99)	0.970	-0.16 (-1.24, 0.92)	0.773
South Asian * advantaged	0.17 (-0.38, 0.73)	0.545	0.29 (-0.49, 1.07)	0.461	0.12 (-0.41, 0.65)	0.657	0.14 (-0.55, 0.83)	0.691
Black * advantaged	0.03 (-1.17, 1.23)	0.959	0.21 (-1.08, 1.51)	0.746	0.50 (-0.64, 1.65)	0.386	-0.02 (-1.52, 1.48)	0.980
Other * advantaged	0.44 (-1.15, 2.04)	0.587	0.95 (-1.42, 3.33)	0.433	0.32 (-1.19, 1.84)	0.675	0.99 (-1.97, 3.96)	0.512
Cohort * ethnic group * childhood social class								
MCS * Mixed * advantaged	-0.01 (-1.86, 1.83)	0.988	-0.10 (-1.75, 1.54)	0.900	0.17 (-1.58, 1.92)	0.851	1.64 (-0.25, 3.53)	0.088
MCS * South Asian * advantaged	-0.55 (-1.47, 0.36)	0.237	-0.50 (-1.55, 0.54)	0.344	-0.17 (-1.04, 0.70)	0.707	-0.17 (-1.67, 1.33)	0.825
MCS * Black * advantaged	-0.84 (-2.74, 1.06)	0.386	-1.30 (-3.15, 0.54)	0.165	-0.58 (-2.38, 1.23)	0.530	-1.34 (-3.70, 1.02)	0.265
MCS * Other * advantaged	0.24 (-2.00, 2.48)	0.834	0.19 (-2.59, 2.97)	0.892	0.67 (-1.47, 2.80)	0.541	-0.64 (-3.79, 2.50)	0.687
Birth sex * ethnic group * childhood social class								
Female * Mixed * advantaged	0.06 (-1.24, 1.36)	0.929	-0.68 (-2.51, 1.16)	0.470	-0.15 (-1.38, 1.08)	0.816	-0.11 (-1.98, 1.76)	0.909
Female * South Asian * advantaged	0.03 (-0.71, 0.76)	0.939	-0.42 (-1.44, 0.61)	0.424	-0.01 (-0.71, 0.69)	0.981	0.23 (-0.61, 1.08)	0.587
Female * Black * advantaged	0.16 (-1.27, 1.60)	0.822	-0.35 (-2.51, 1.81)	0.752	-0.13 (-1.49, 1.23)	0.850	0.80 (-1.34, 2.94)	0.462
Female * Other * advantaged	0.00 (-1.85, 1.86)	0.997	-0.06 (-2.76, 2.64)	0.963	0.53 (-1.23, 2.30)	0.553	-0.04 (-3.18, 3.09)	0.978
Cohort * birth sex * ethnic group * childhood social class								
MCS * Female * Mixed * advantaged	-0.18 (-2.36, 2.01)	0.874	-0.08 (-2.59, 2.44)	0.951	0.64 (-1.43, 2.72)	0.543	-1.31 (-3.96, 1.33)	0.330
MCS * Female * South Asian * advantaged	0.39 (-0.81, 1.60)	0.521	0.93 (-0.57, 2.43)	0.223	0.21 (-0.94, 1.36)	0.721	-0.26 (-1.93, 1.41)	0.763
MCS * Female * Black * advantaged	1.09 (-1.35, 3.52)	0.382	1.93 (-0.91, 4.76)	0.183	0.71 (-1.61, 3.03)	0.549	0.34 (-2.41, 3.10)	0.808
MCS * Female * Other * advantaged	-0.56 (-3.24, 2.13)	0.684	-0.18 (-4.04, 3.67)	0.925	-1.36 (-3.91, 1.19)	0.296	-0.33 (-4.03, 3.37)	0.861
Sexual orientation * childhood social class								
Sexual minority * advantaged	-0.20 (-1.01, 0.60)	0.620	0.48 (-0.51, 1.47)	0.345	-0.29 (-1.05, 0.48)	0.460	-0.10 (-1.43, 1.23)	0.882
Cohort * sexual orientation * childhood social class								
MCS * sexual minority * advantaged	-0.09 (-1.33, 1.15)	0.890	-0.93 (-2.62, 0.75)	0.278	0.54 (-0.64, 1.72)	0.371	0.68 (-1.03, 2.39)	0.435
Birth sex * sexual orientation * childhood social class								
Female * sexual minority * advantaged	0.50 (-0.55, 1.55)	0.352	0.48 (-1.26, 2.23)	0.587	0.61 (-0.39, 1.61)	0.233	0.76 (-1.04, 2.56)	0.410
Cohort * birth sex * sexual orientation * childhood social class								
MCS * Female * sexual minority * advantaged	-0.70 (-2.22, 0.82)	0.368	0.65 (-2.13, 3.44)	0.645	-1.53 (-2.98, -0.09)	0.038	-1.07 (-3.72, 1.58)	0.428
Ethnic group * sexual orientation * childhood social class								
Mixed * sexual minority * advantaged	0.04 (-6.04, 6.12)	0.990	1.53 (-3.24, 6.29)	0.530	5.58 (-0.20, 11.37)	0.059	3.13 (-0.87, 7.13)	0.125
South Asian * sexual minority * advantaged	-1.14 (-3.59, 1.31)	0.363	-2.12 (-3.61, -0.64)	0.005	-0.55 (-2.88, 1.79)	0.645	-1.23 (-2.79, 0.32)	0.119
Black * sexual minority * advantaged	0.00 (-5.01, 5.01)	1.000	-0.80 (-2.39, 0.79)	0.322	-1.27 (-6.03, 3.50)	0.602	-1.00 (-2.97, 0.97)	0.320
Other * sexual minority * advantaged	-2.41 (-5.84, 1.02)	0.169	-2.93 (-5.72, -0.13)	0.040	-2.84 (-6.10, 0.43)	0.089	-4.30 (-8.01, -0.58)	0.023
Cohort * ethnic group * sexual orientation * childhood social class								
MCS * Mixed * sexual minority * advantaged	-1.26 (-5.75, 3.23)	0.582	-2.69 (-6.71, 1.32)	0.188	-4.34 (-8.61, -0.08)	0.046	-3.74 (-7.14, -0.33)	0.031

Female * sexual minority * advantaged	0.22 (-0.82, 1.27)	0.673	-0.29 (-2.17, 1.59)	0.763	-1.20 (-2.48, 0.09)	0.068	-3.24 (-5.83, -0.66)	0.014
Cohort * birth sex * sexual orientation * childhood social class								
MCS * Female * sexual minority * advantaged	-0.43 (-1.94, 1.07)	0.572	0.44 (-2.22, 3.09)	0.747	1.47 (-0.38, 3.33)	0.120	4.92 (1.90, 7.93)	0.001
Ethnic group * sexual orientation * childhood social class								
Mixed * sexual minority * advantaged	3.12 (-2.91, 9.15)	0.310	5.85 (1.89, 9.80)	0.004	-7.34 (-14.76, 0.08)	0.053	-3.95 (-8.58, 0.69)	0.095
South Asian * sexual minority * advantaged	-1.86 (-4.29, 0.57)	0.134	-1.40 (-3.65, 0.84)	0.220	2.29 (-0.71, 5.28)	0.134	4.67 (1.84, 7.51)	0.001
Black * sexual minority * advantaged	-1.33 (-5.57, 2.91)	0.538	-0.33 (-2.37, 1.70)	0.749	1.60 (-4.51, 7.71)	0.608	2.62 (-0.67, 5.91)	0.118
Other * sexual minority * advantaged	-4.56 (-7.96, -1.16)	0.009	-4.77 (-7.52, -2.02)	0.001	3.94 (-0.25, 8.13)	0.065	6.67 (3.09, 10.24)	<0.001
Cohort * ethnic group * sexual orientation * childhood social class								
MCS * Mixed * sexual minority * advantaged	-2.20 (-6.65, 2.24)	0.331	-6.12 (-9.53, -2.70)	<0.001	4.38 (-1.09, 9.85)	0.117	2.43 (-1.48, 6.34)	0.223
MCS * South Asian * sexual minority * advantaged	0.11 (-3.98, 4.19)	0.958	-0.70 (-3.78, 2.38)	0.655	-0.76 (-5.78, 4.27)	0.768	-1.23 (-5.52, 3.05)	0.573
MCS * Black * sexual minority * advantaged								
MCS * Other * sexual minority * advantaged	3.10 (-2.48, 8.68)	0.276	1.03 (-2.28, 4.34)	0.541	-5.01 (-11.88, 1.85)	0.152	-4.24 (-7.65, -0.84)	0.015
Birth sex * ethnic group * sexual orientation * childhood social class								
Female * Mixed * sexual minority * advantaged	-0.98 (-5.72, 3.76)	0.686	-2.19 (-5.65, 1.28)	0.216	3.81 (-2.02, 9.65)	0.200	1.91 (-2.10, 5.91)	0.350
Female * South Asian * sexual minority * advantaged	0.86 (-3.00, 4.73)	0.661	-0.49 (-4.17, 3.18)	0.793	4.96 (-1.69, 11.61)	0.144	4.19 (1.00, 7.38)	0.010
Female * Black * sexual minority * advantaged								
Female * Other * sexual minority * advantaged	2.08 (-3.38, 7.55)	0.455	3.53 (0.07, 7.00)	0.046	1.22 (-5.51, 7.95)	0.722	0.04 (-4.02, 4.11)	0.984
Cohort * birth sex * ethnic group * sexual orientation * childhood social class								
MCS * Female * South Asian * sexual minority * advantaged					-6.54 (-14.71, 1.64)	0.117	-6.09 (-11.52, -0.67)	0.028
Intercept	4.57 (4.38, 4.76)	<0.001	4.70 (4.36, 5.04)	<0.001	6.76 (6.53, 7.00)	<0.001	6.95 (6.60, 7.30)	<0.001

Note. CI: confidence interval; GAD-2: 2-item Generalised Anxiety Disorder questionnaire; MCS: Millennium Cohort Study (born in 2000-2002); NS: Next Steps study (born in 1990); ONS: Office for National Statistics; PHQ-2: 2-item depression Patient Health Questionnaire; UCLA-3: 3-item University of California Los Angeles loneliness scale.

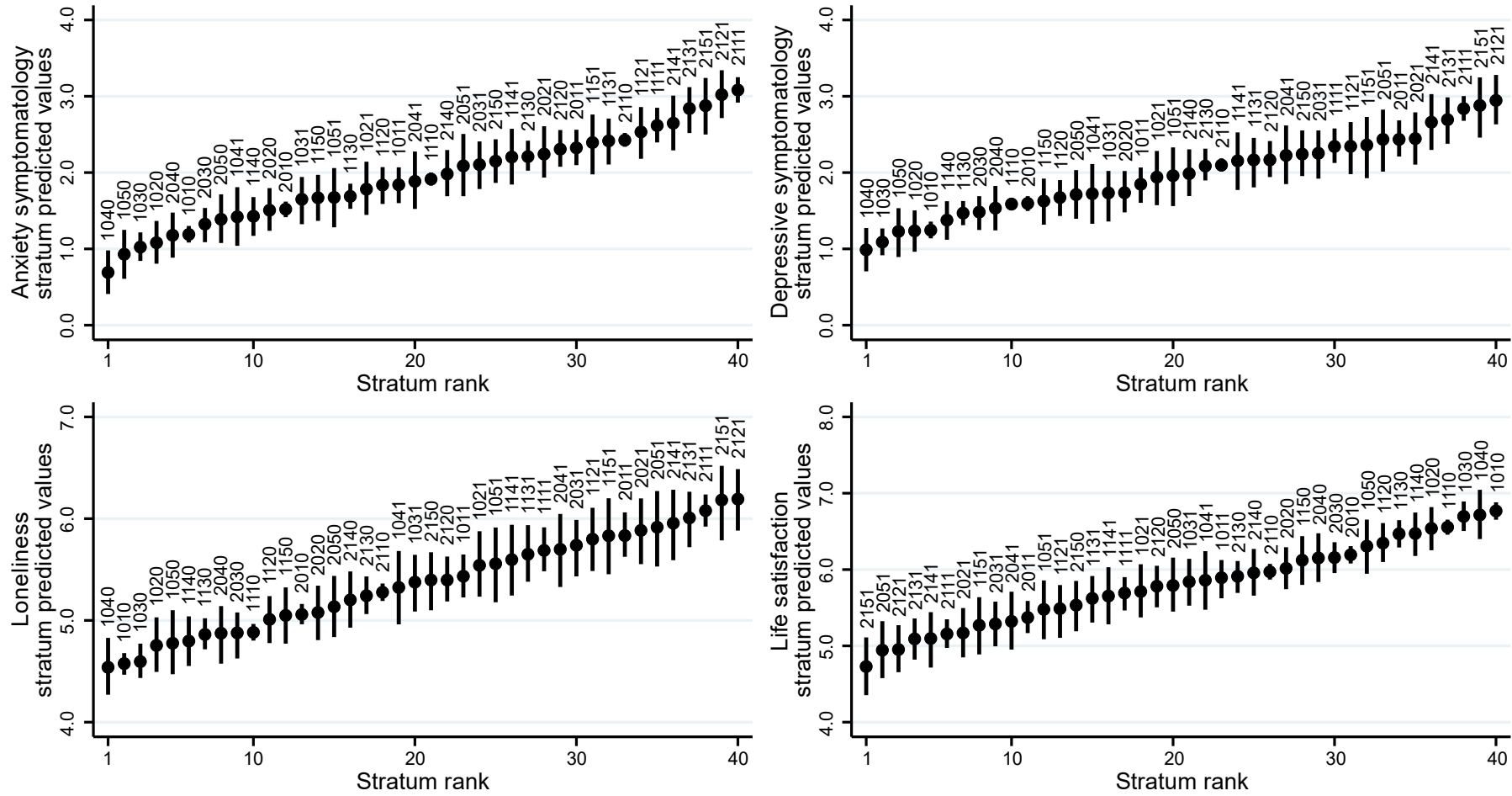
Weighted results are adjusted for survey design characteristics, including survey and non-response weights. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

Figure S1. Stratum-specific residual values and 95% credible intervals for each outcome using 40 strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



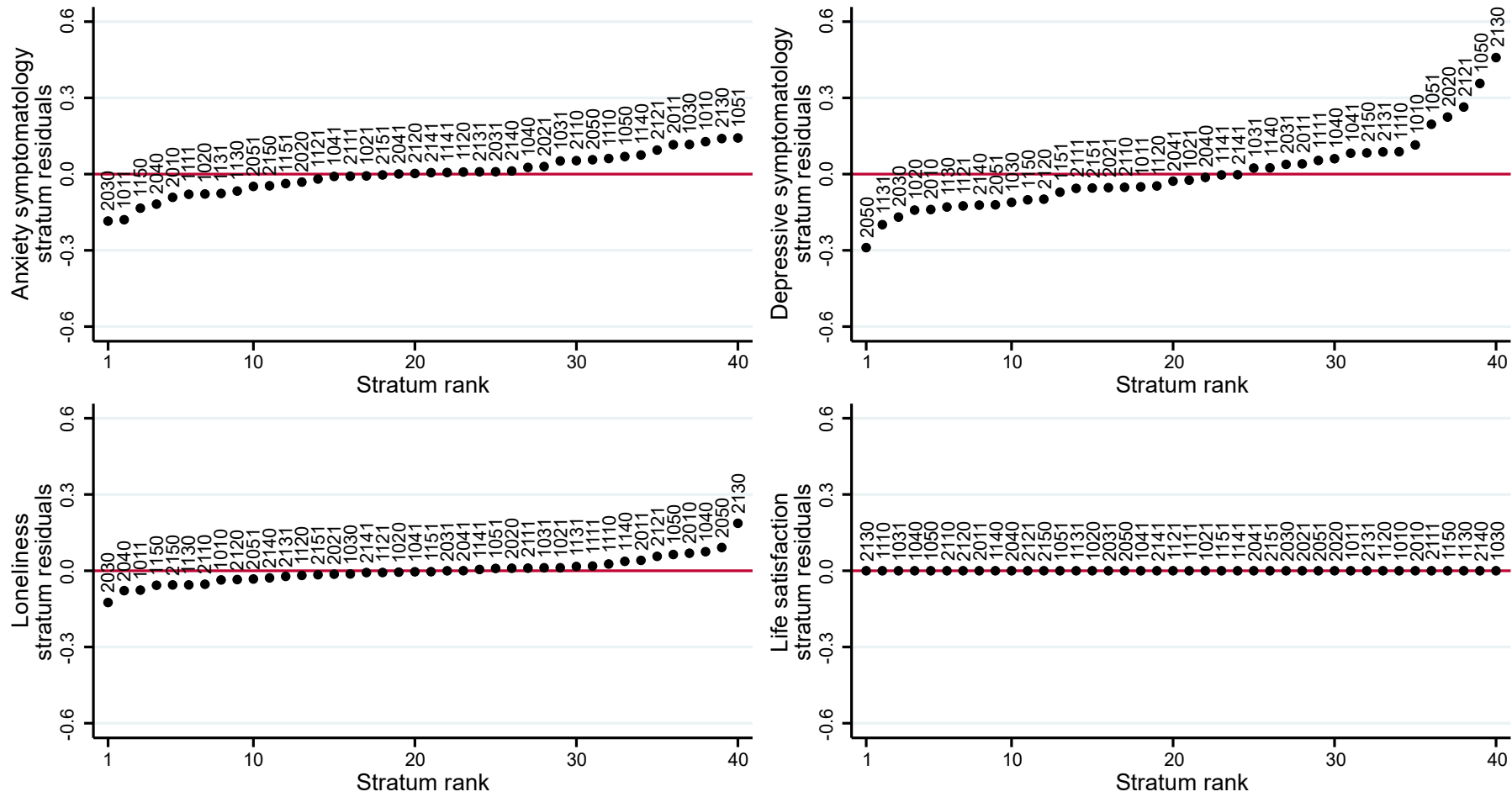
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study /2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority).

Figure S2. Stratum-specific predicted values and 95% credible intervals for each outcome using 40 strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



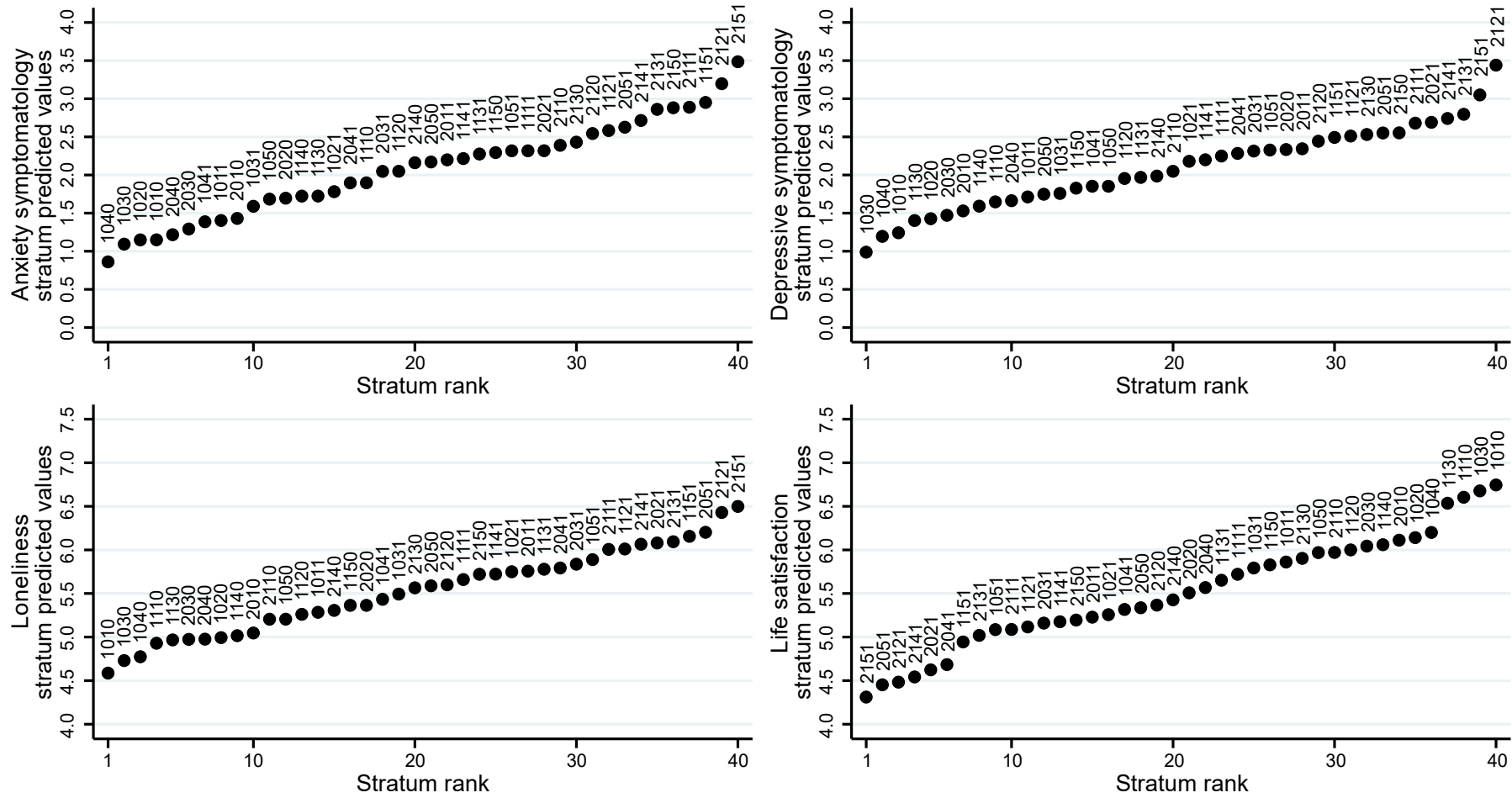
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study /2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority).

Figure S3. Stratum-specific residual values for each outcome using 40 strata. Maximum likelihood estimation, weighted (survey design and non-response) results.



Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study /2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority).

Figure S4. Stratum-specific predicted values for each outcome using 40 strata. Maximum likelihood estimation, weighted (survey design and non-response) results.



Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study /2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority).

Figure S5. Anxiety and depressive symptomatology predicted values of each intersectional strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.

Each of the three parallel grey-shaded lines represents the results using each of the indicators of the socioeconomic position: residential Index of Multiple Deprivation (IMD) rank (leftmost line), housing tenure (centre line), or parental social class during childhood (rightmost line). M: male; F: female. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

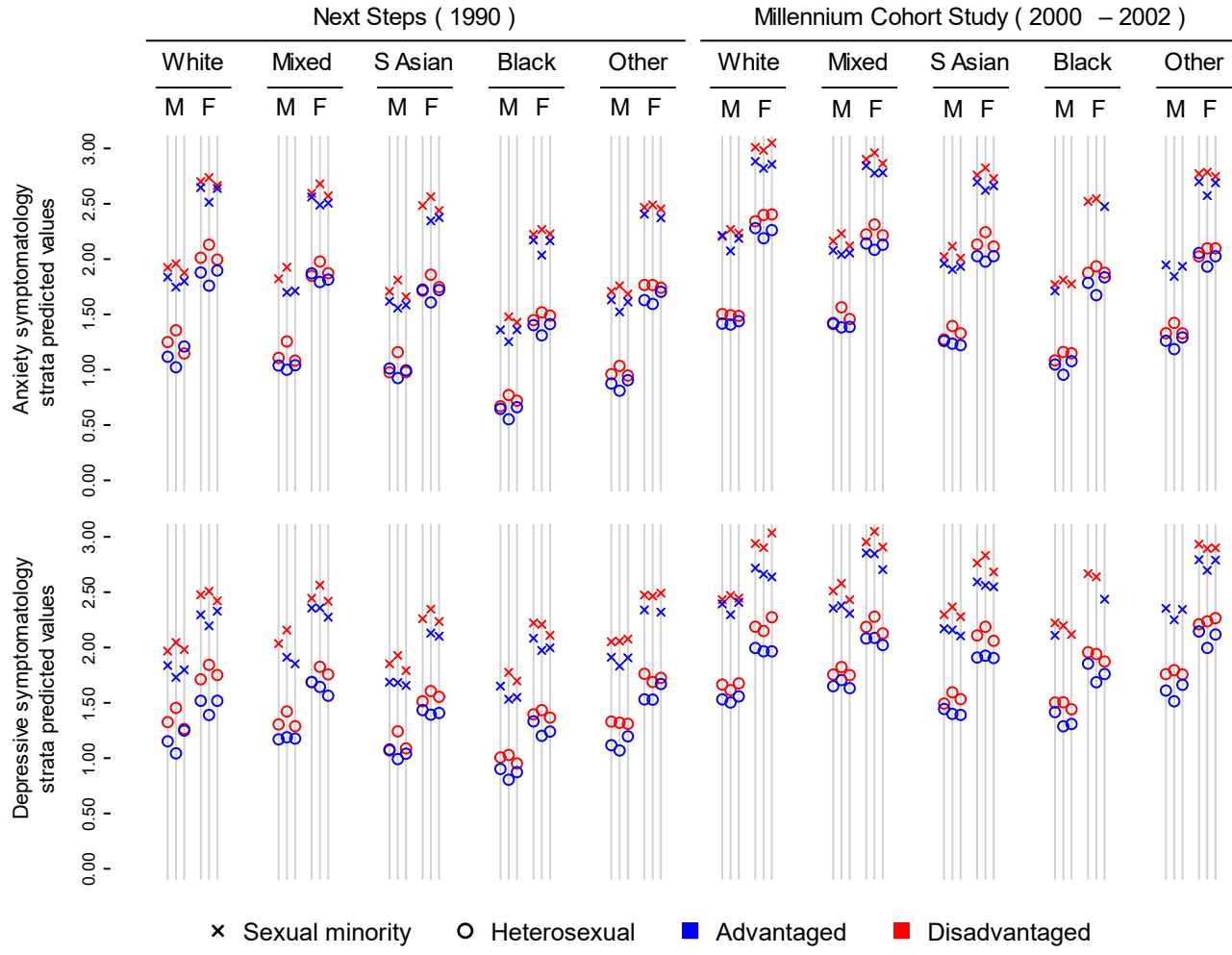


Figure S6. Loneliness and life satisfaction predicted values of each intersectional strata. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.

Each of the three parallel grey-shaded lines represents the results using each of the indicators of the socioeconomic position: residential Index of Multiple Deprivation (IMD) rank (leftmost line), housing tenure (centre line), or parental social class during childhood (rightmost line). M: male; F: female. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

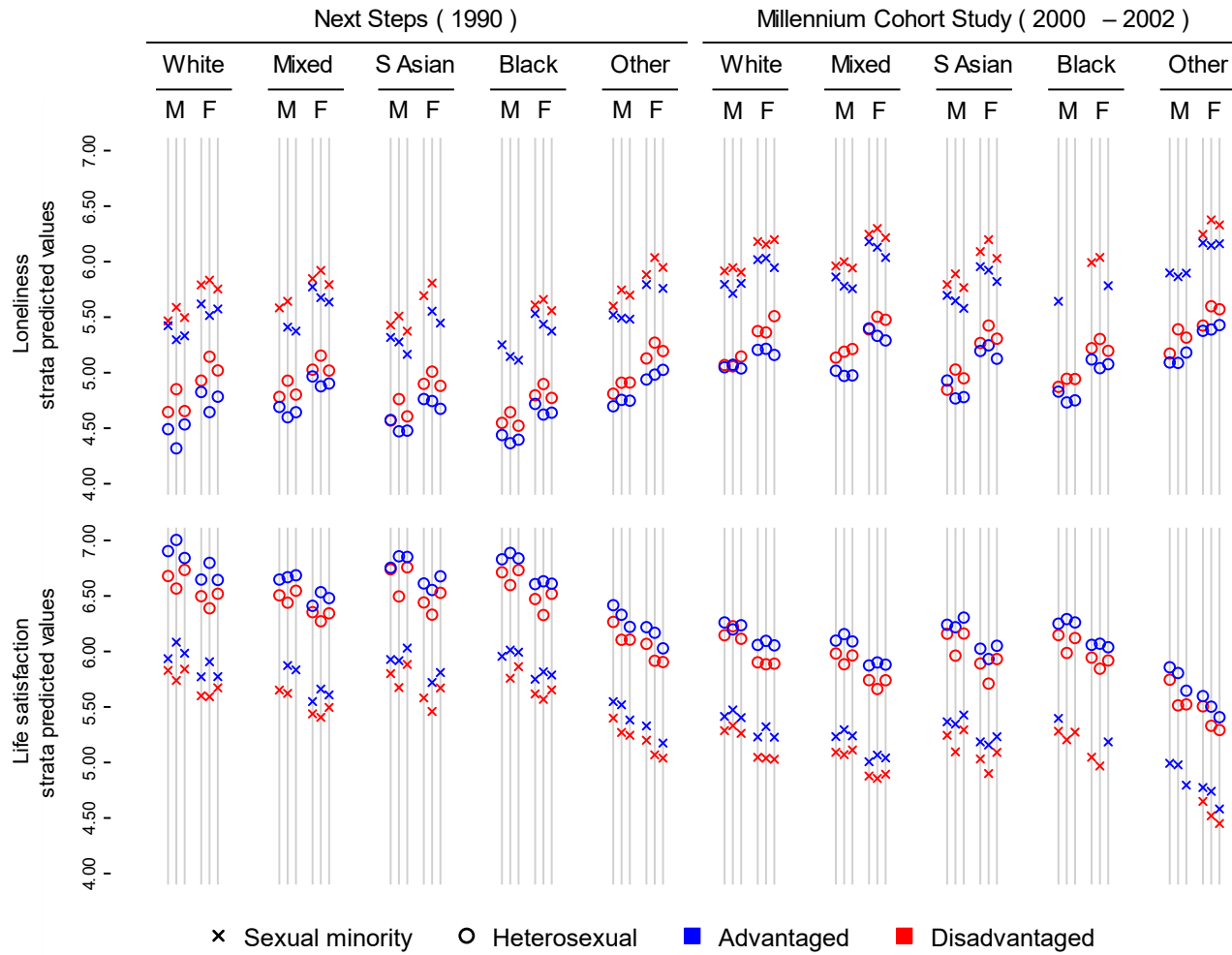


Figure S7. Anxiety and depressive symptomatology predicted values of each intersectional strata. Maximum likelihood estimation, weighted (survey design and non-response) results.

Each of the three parallel grey-shaded lines represents the results using each of the indicators of the socioeconomic position: residential Index of Multiple Deprivation (IMD) rank (leftmost line), housing tenure (centre line), or parental social class during childhood (rightmost line). M: male; F: female. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

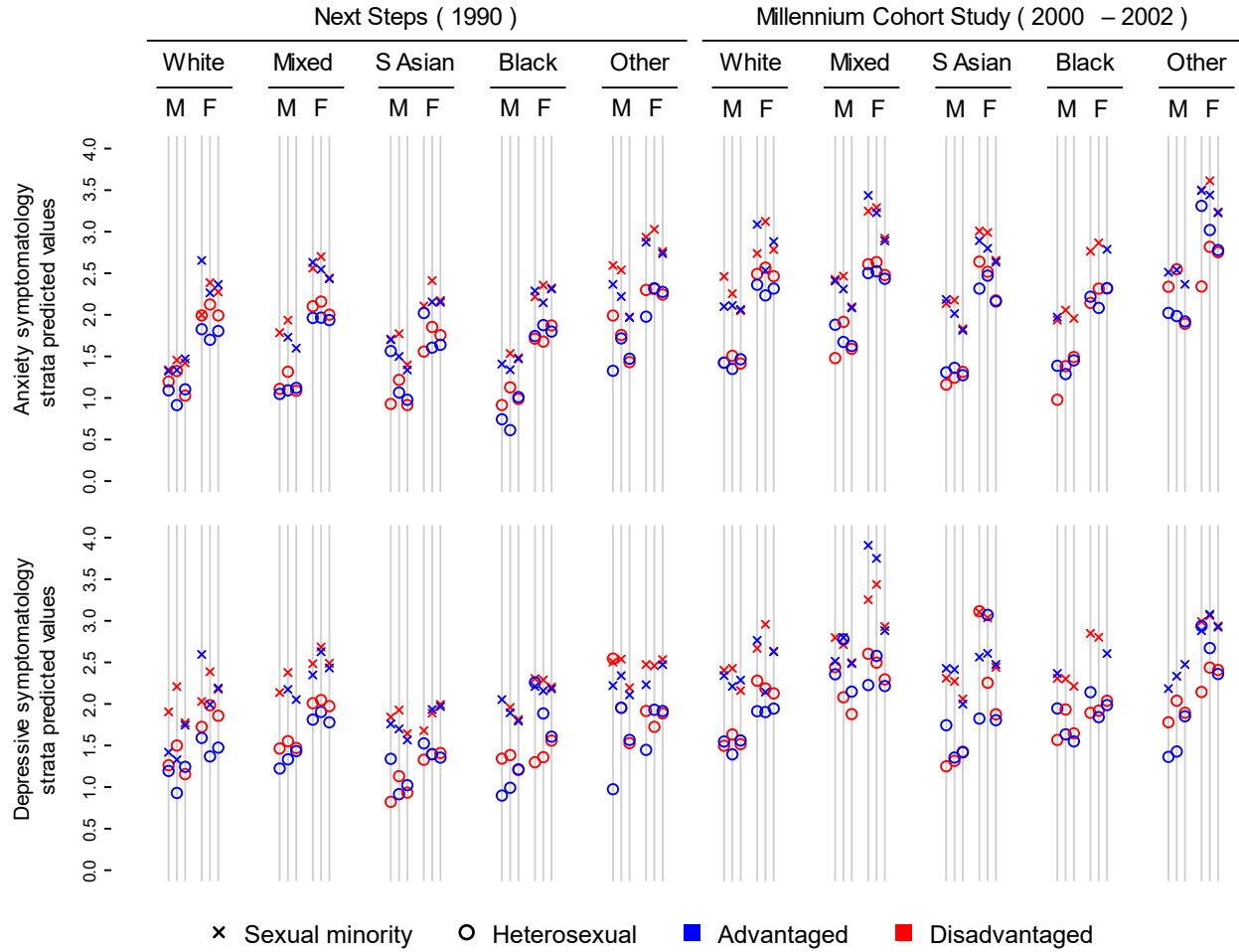


Figure S8. Loneliness and life satisfaction predicted values of each intersectional strata. Maximum likelihood estimation, weighted (survey design and non-response) results.

Each of the three parallel grey-shaded lines represents the results using each of the indicators of the socioeconomic position: residential Index of Multiple Deprivation (IMD) rank (leftmost line), housing tenure (centre line), or parental social class during childhood (rightmost line). M: male; F: female. White includes all White groups; South Asian includes Bangladeshi, Indian, and Pakistani groups; Black includes Black African, Black Caribbean, and Black British groups; Other includes all other ethnic group not included in the other categories.

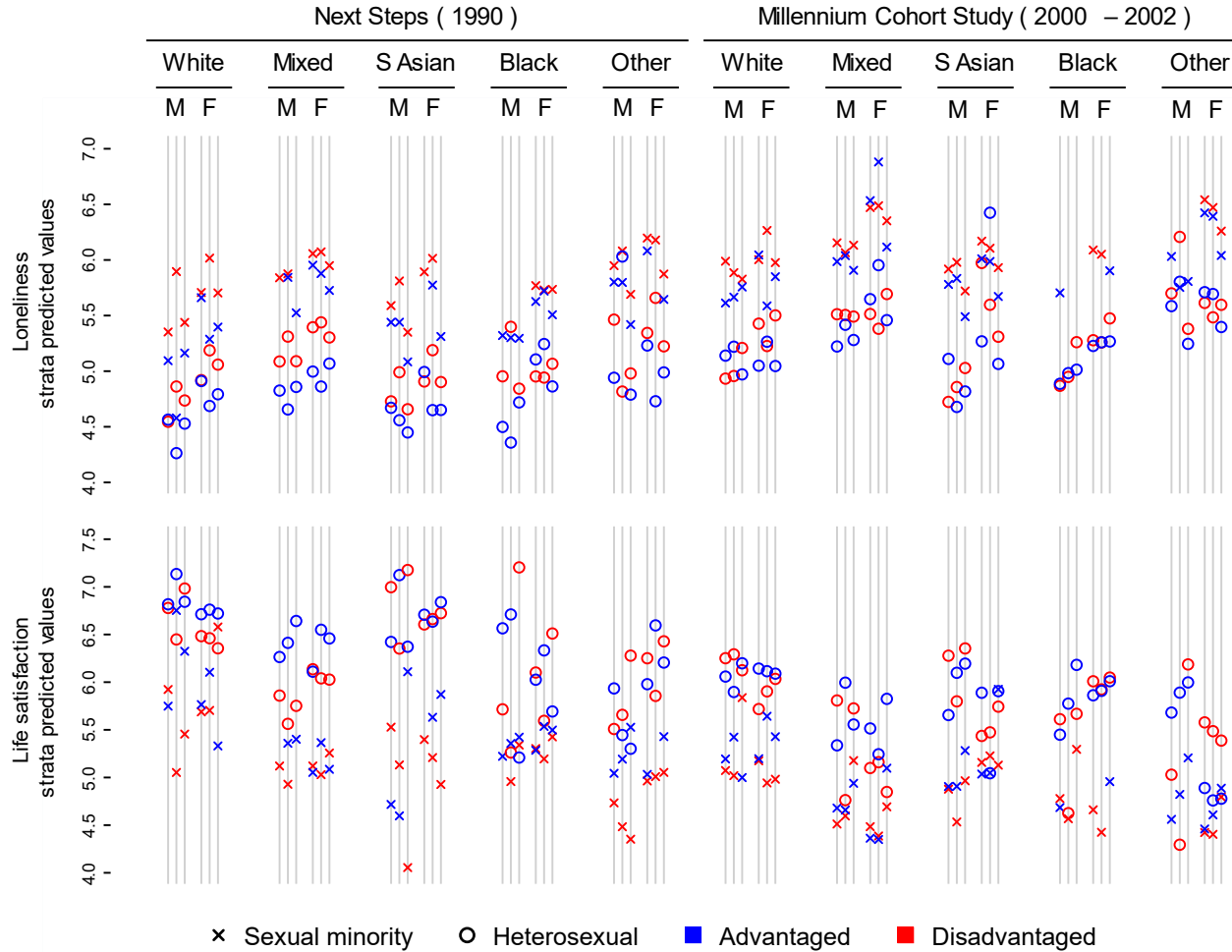
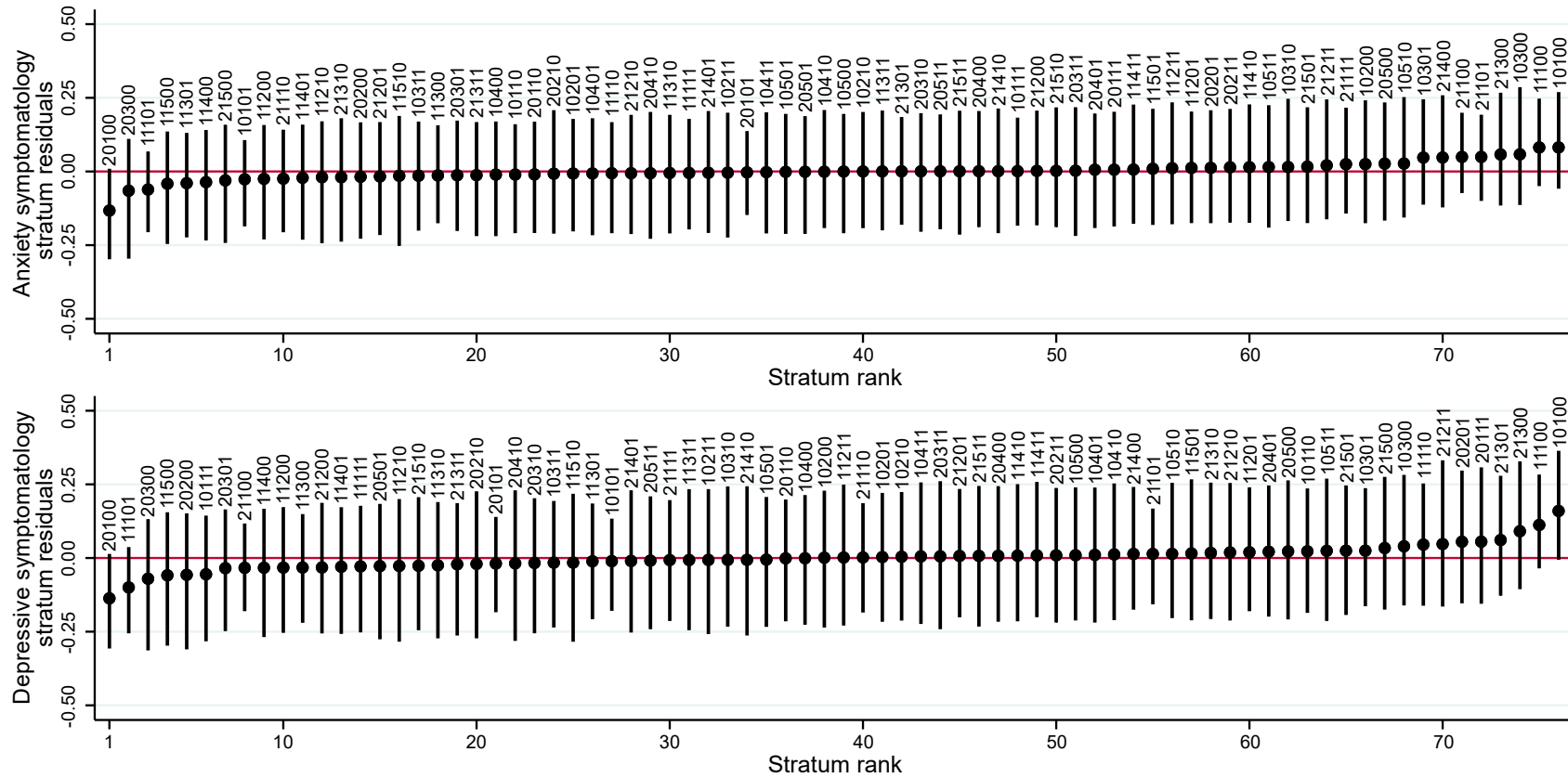
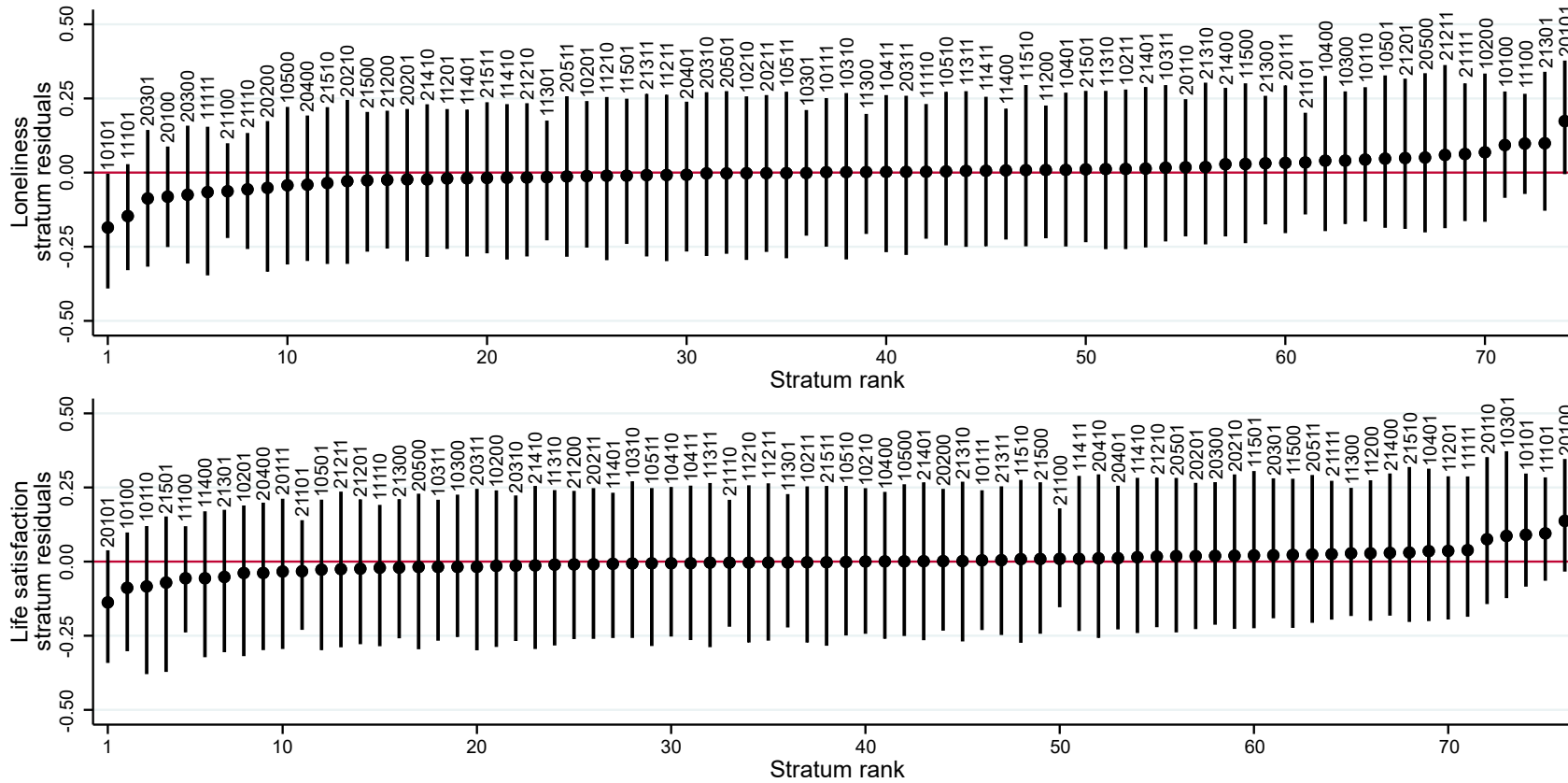


Figure S9. Anxiety and depressive symptomatology residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using housing tenure as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



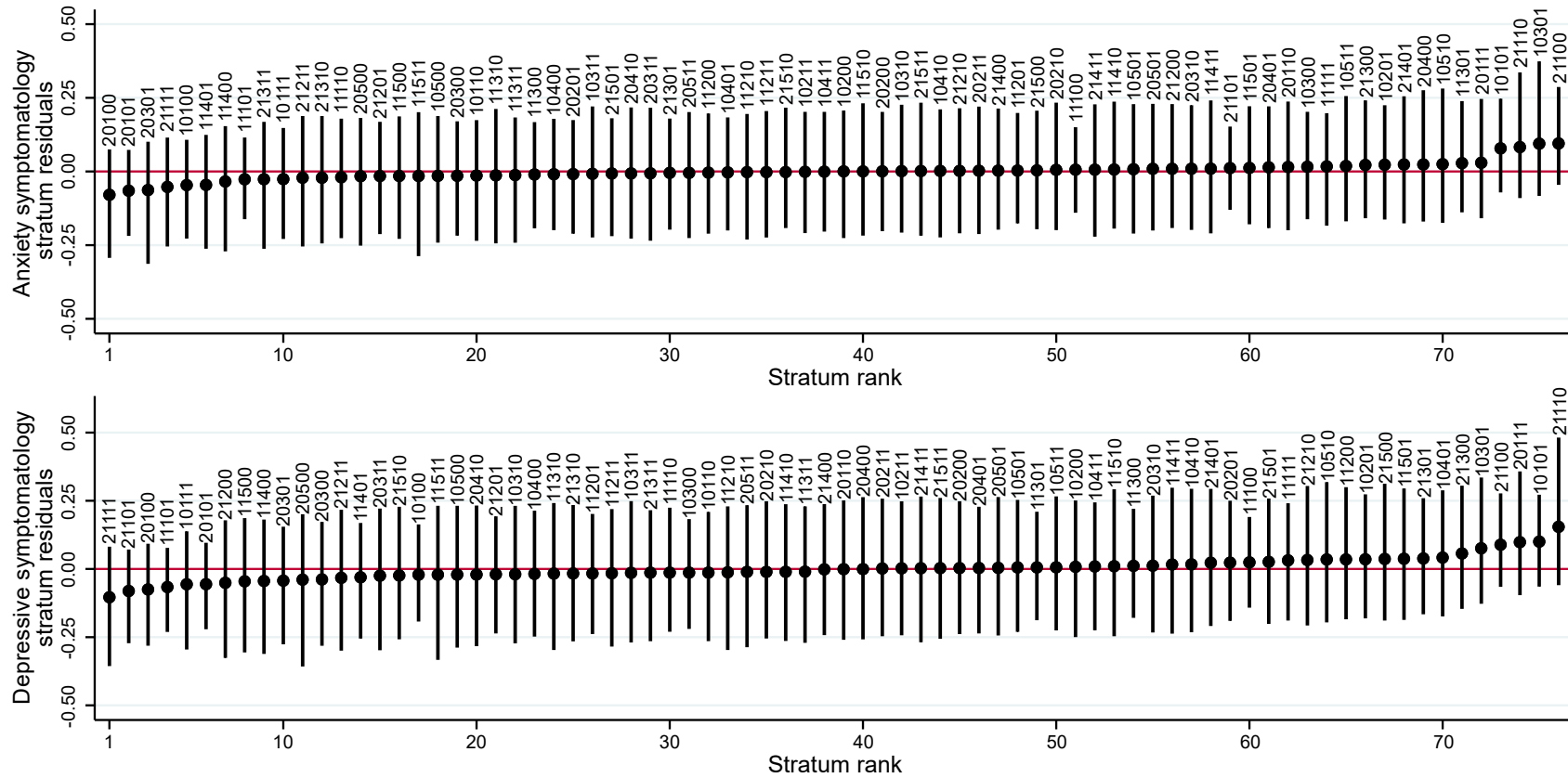
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), housing tenure (fifth digit: 0 Not homeowner, 1 Homeowner/part owner).

Figure S10. Loneliness and life satisfaction residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using housing tenure as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



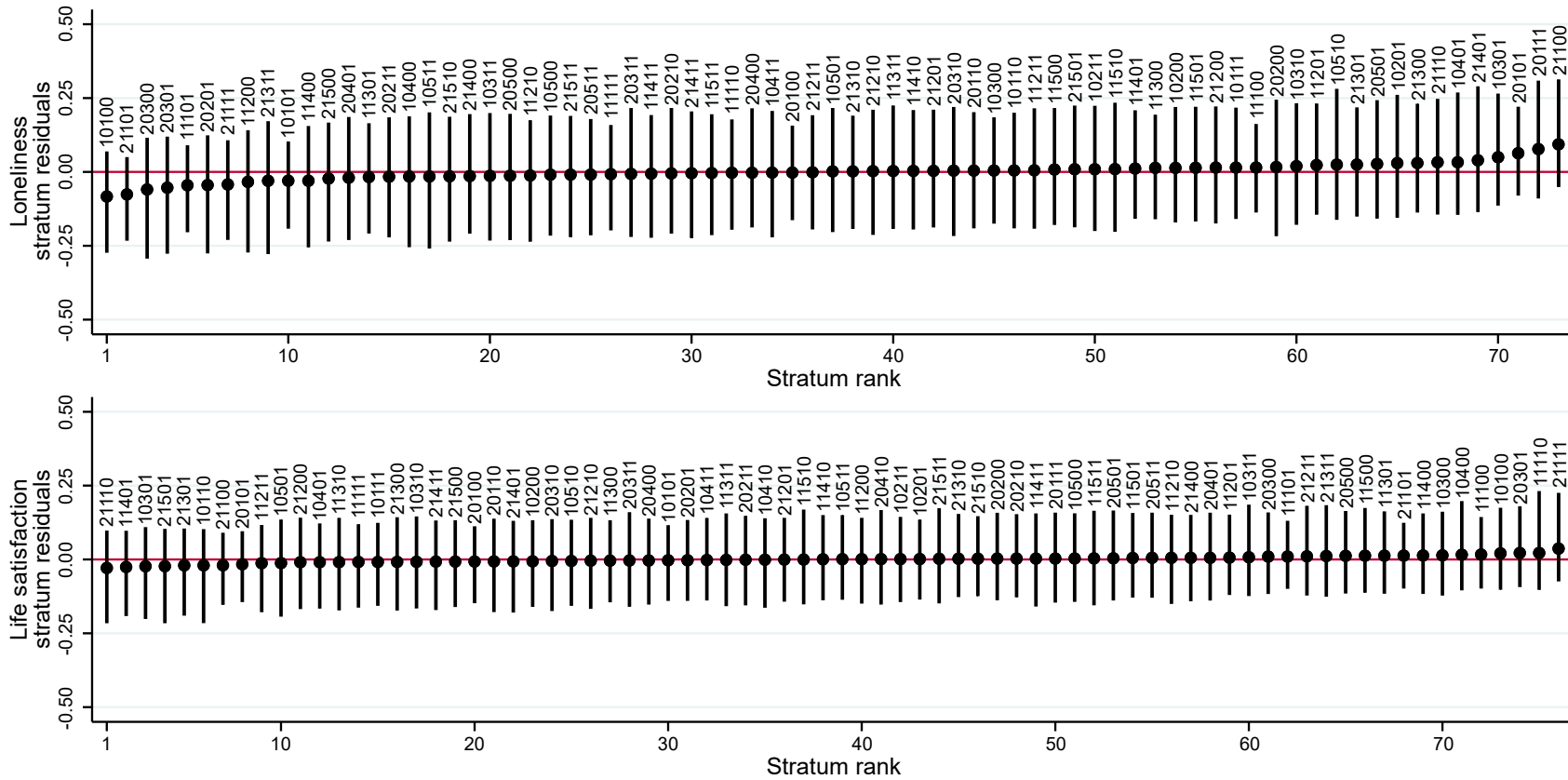
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Figure S11. Anxiety and depressive symptomatology residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using parental social class during childhood as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



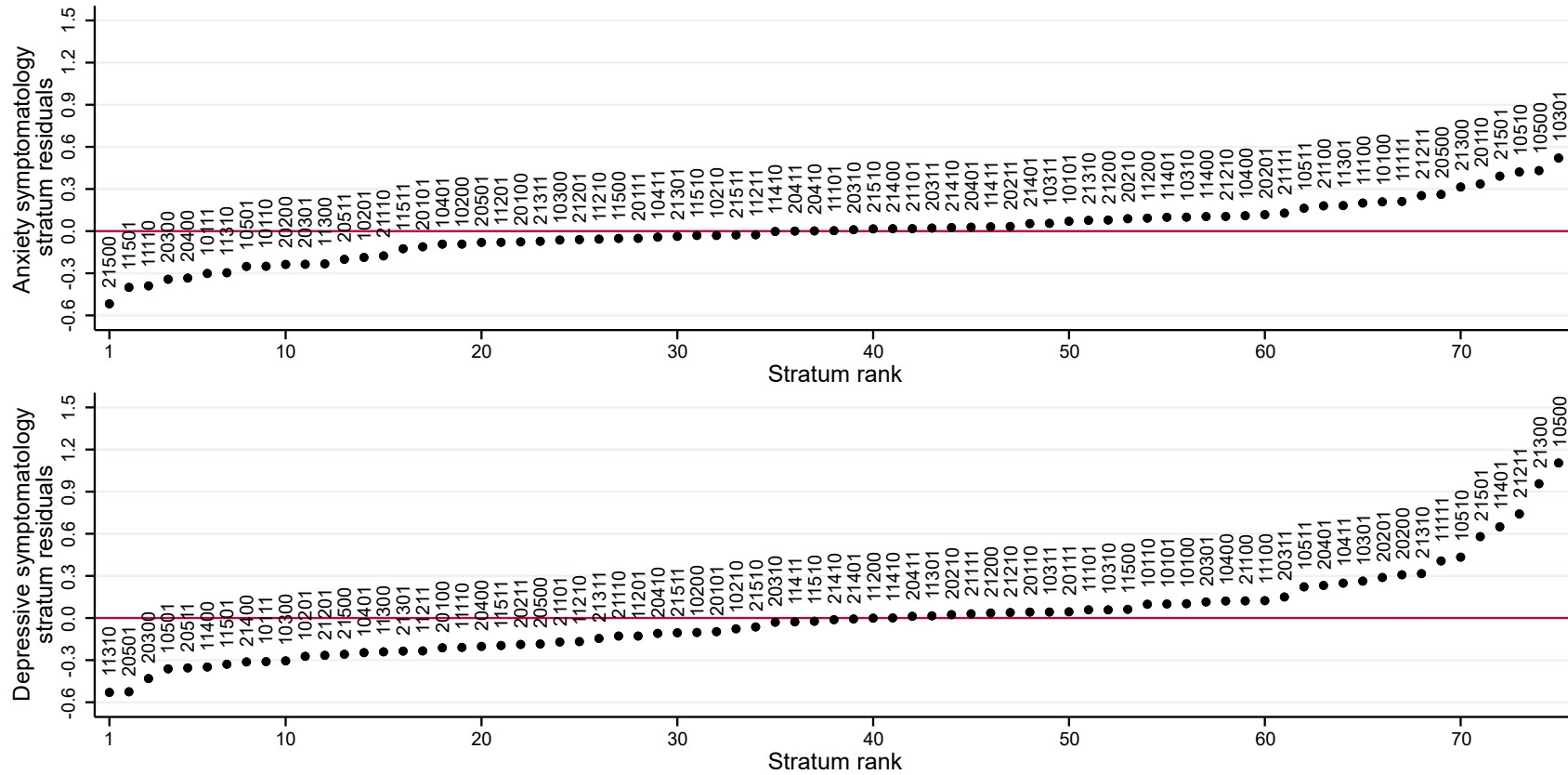
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), parental social class during childhood (fifth digit: 0 Disadvantaged, 1 Advantaged).

Figure S12. Loneliness and life satisfaction residual values (intersectional effects) and 95% credible intervals of each intersectional stratum using parental social class during childhood as the indicator of socioeconomic position. Markov Chain Monte Carlo (MCMC) estimation, unweighted results.



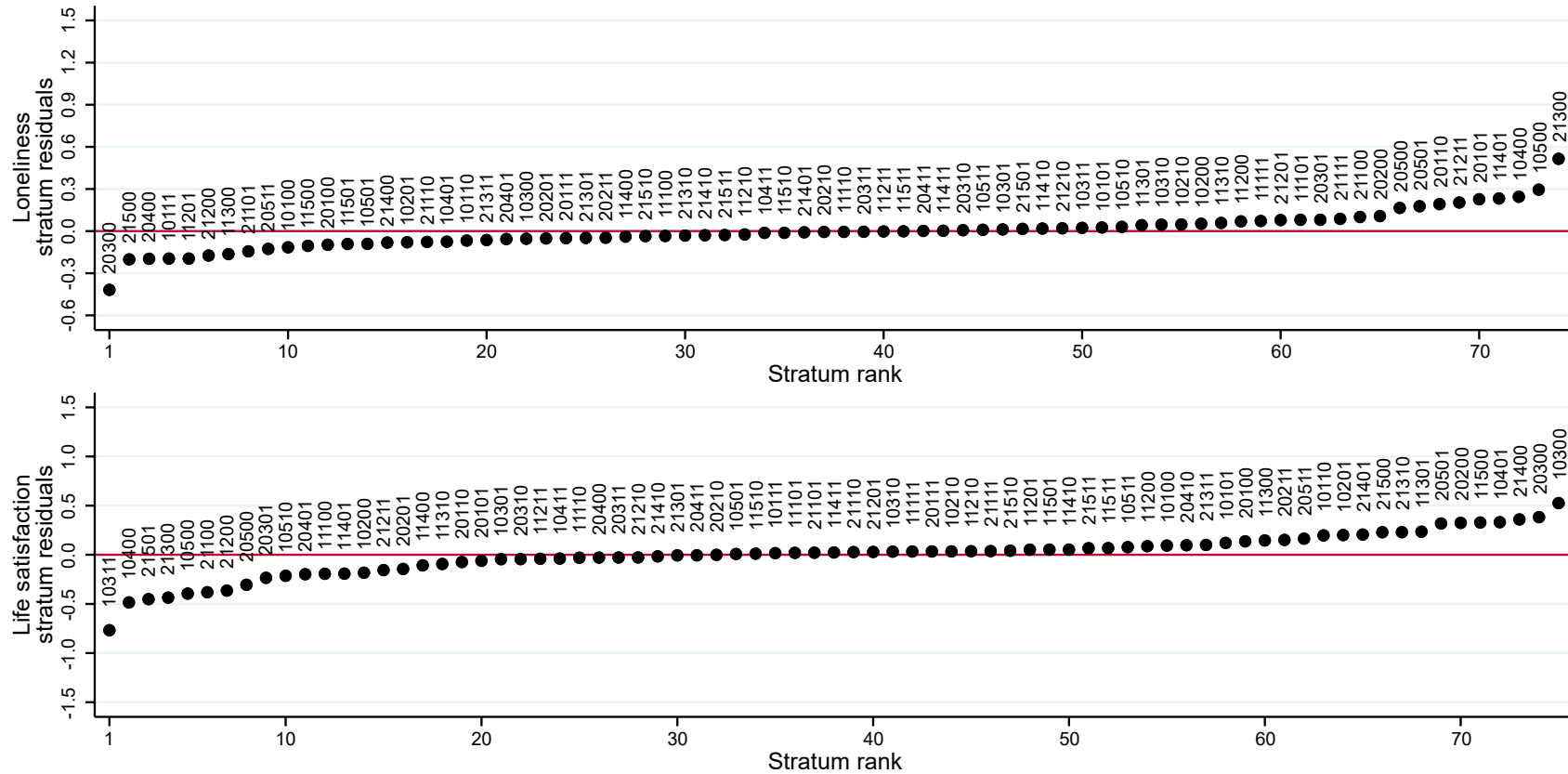
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), parental social class during childhood (fifth digit: 0 Disadvantaged, 1 Advantaged).

Figure S13. Anxiety and depressive symptomatology residual values (intersectional effects) using residential Index of Multiple Deprivation (IMD) rank as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



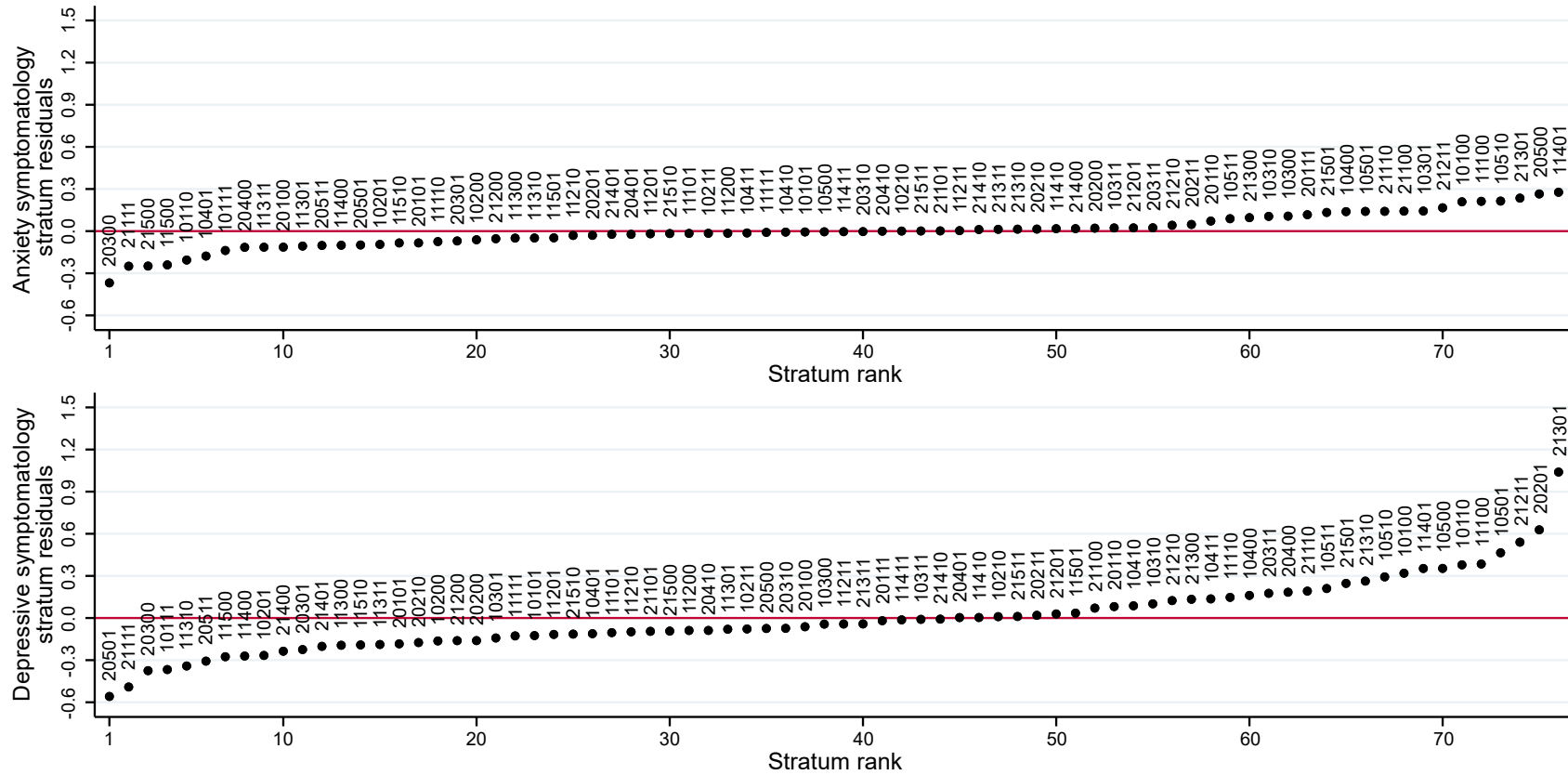
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), residential IMD rank (fifth digit: 0 More deprived, 1 Less deprived).

Figure S14. Loneliness and life satisfaction residual values (intersectional effects) using residential Index of Multiple Deprivation (IMD) rank as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



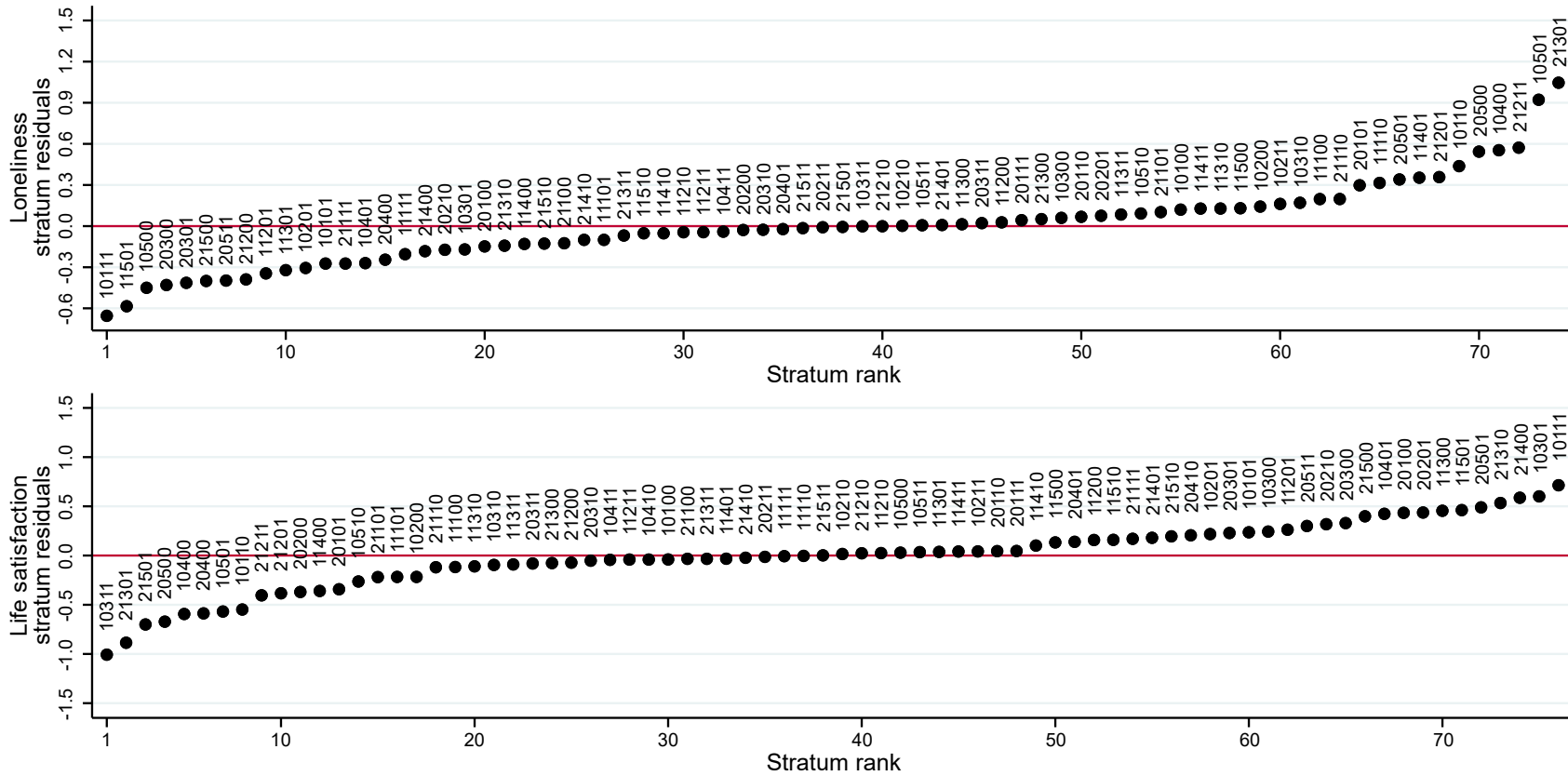
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), residential IMD rank (fifth digit: 0 More deprived, 1 Less deprived).

Figure S15. Anxiety and depressive symptomatology residual values (intersectional effects) using housing tenure as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



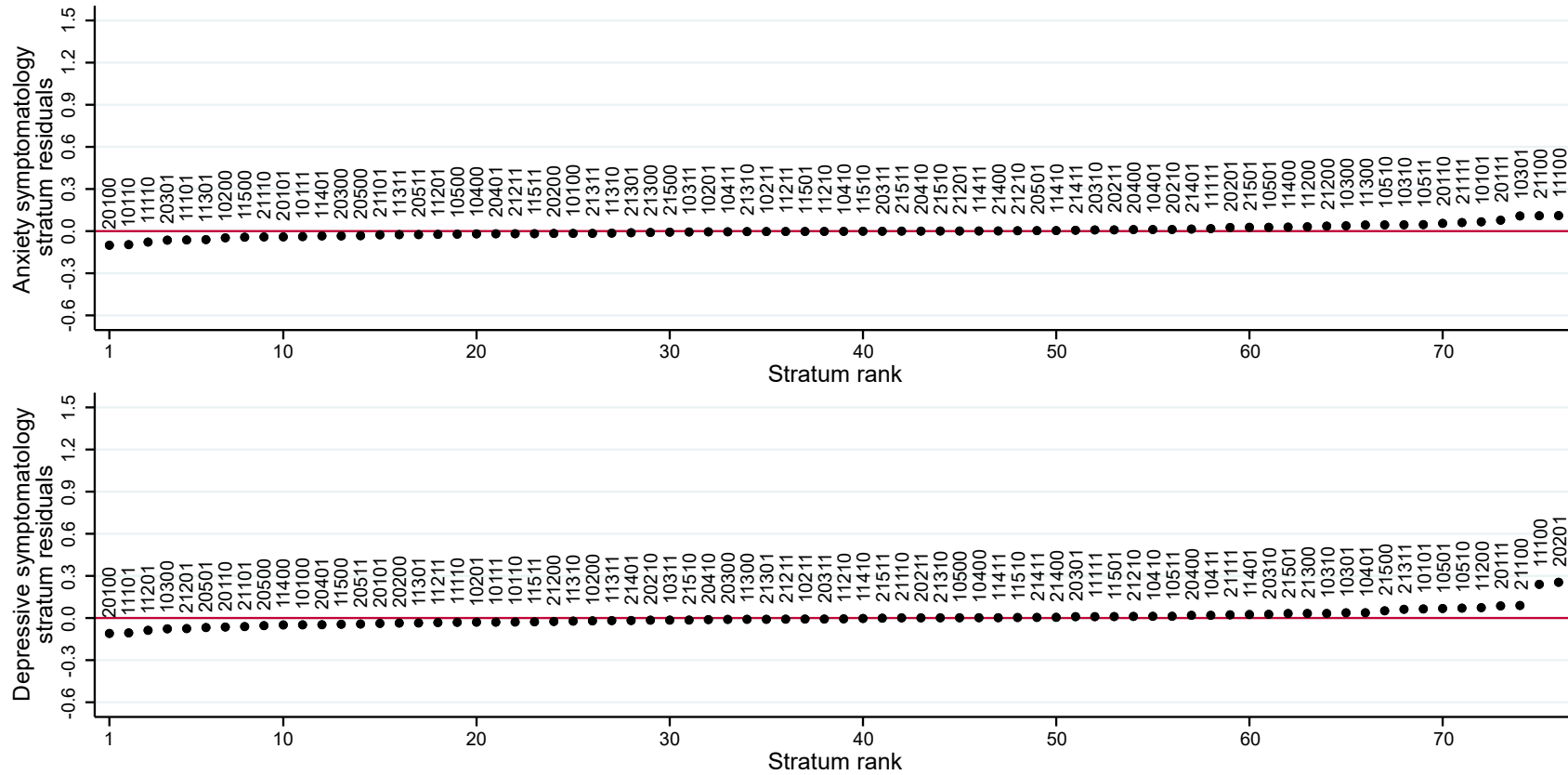
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), housing tenure (fifth digit: 0 Not homeowner, 1 Homeowner/part owner).

Figure S16. Loneliness and life satisfaction residual values (intersectional effects) using housing tenure as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



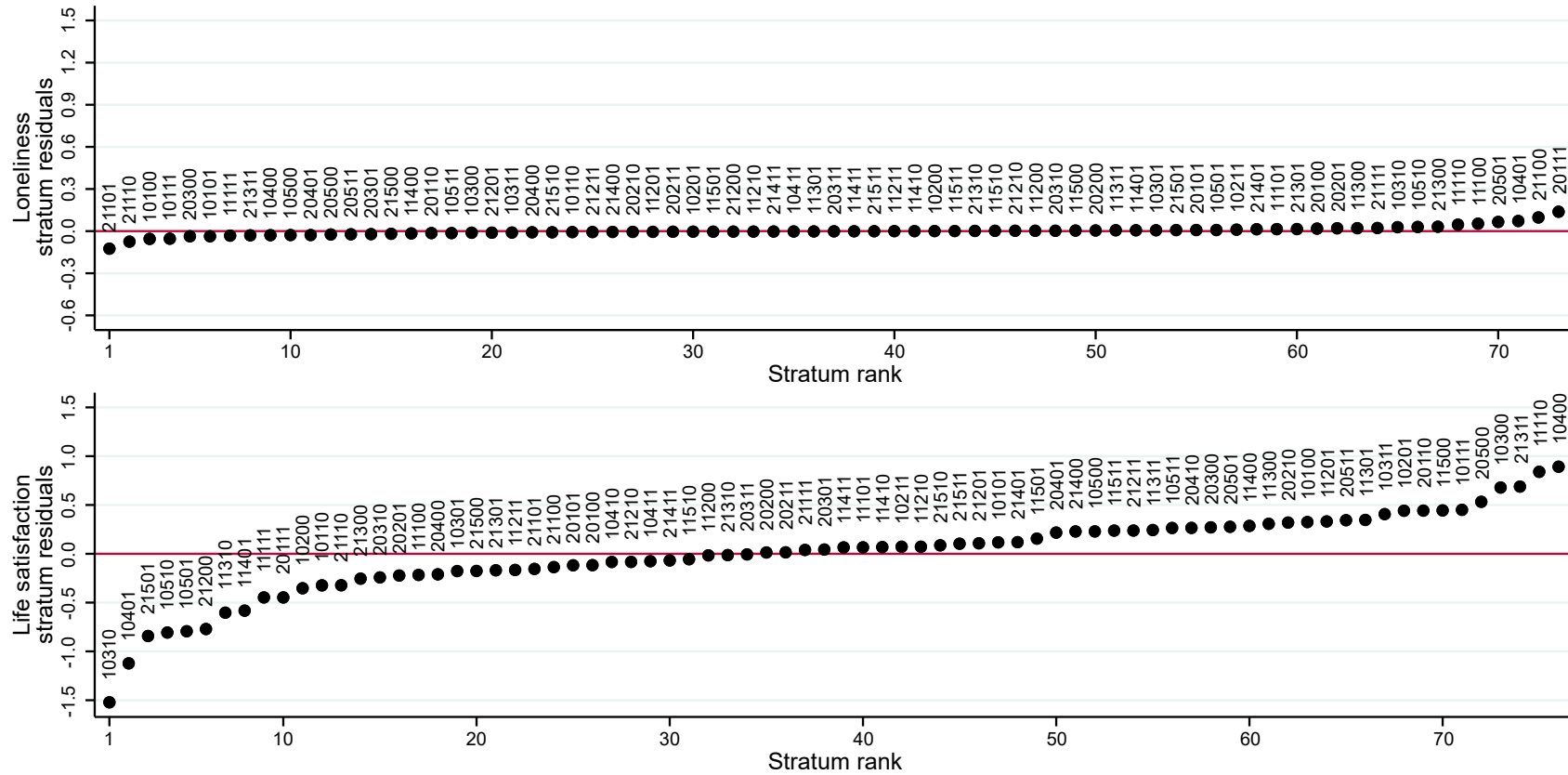
Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), housing tenure (fifth digit: 0 Not homeowner, 1 Homeowner/part owner).

Figure S17. Anxiety and depressive symptomatology residual values (intersectional effects) using parental social class during childhood as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), parental social class during childhood (fifth digit: 0 Disadvantaged, 1 Advantaged).

Figure S18. Loneliness and life satisfaction residual values (intersectional effects) using parental social class during childhood as the indicator of socioeconomic position. Maximum likelihood estimation, weighted (survey design and non-response) results.



Strata defined by generation/cohort (first digit: 1 Next Steps/1990, 2 Millennium Cohort Study/2000-2002), birth sex (second digit: 0 Male, 1 Female), ethnicity (third digit: 1 White, 2 Mixed, 3 South Asian, 4 Black, 5 Other), sexual orientation (fourth digit: 0 Heterosexual, 1 Sexual minority), parental social class during childhood (fifth digit: 0 Disadvantaged, 1 Advantaged).

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