Supplementary 1: Validation of Scottish Index of Multiple Deprivation Data inclusion

Introduction

In the present manuscript we discuss the potential pitfalls in assessing the impact of receipt of benefits in isolation without companion data relating to the socioeconomic circumstances of the individual. The original work(Sharpe *et al.* 2010) highlighted the predictive capacity of receipt of benefits in *unchanged or worse* self-reported clinical global outcome. However, it is unclear whether the receipt of benefit or the underlying mechanisms by which financial benefit is awarded plays a more significant role. As we highlight, both deprivation and health-related financial aid has been associated with worse outcomes across many disease classes. It would therefore be useful to assess in the same model, the relative contributions of both benefit receipt and socioeconomic status.

Every 2-3 years the Scottish government produces one of the most comprehensive assessments of relative deprivation internationally known as the Scottish Index of Multiple Deprivation (SIMD) (https://www2.gov.scot/Topics/Statistics/SIMD).
National census and local authority qualitative and quantitative data are aggregated to form an overall multiple deprivation score. In brief, SIMD overall scores represent *relative* deprivation between regions, they are not a marker of absolute poverty, and the relationship between rank and poverty indices may not be linear. It is derived from 31 indicators aggregated into 6 domains: income, employment, health, education, geographic access and housing. Quintile 5 denotes the most deprived areas relative to the rest of Scotland. By extension, quintile 1 represents those from a relatively least deprived area. To highlight a potential confusion with labelling convention, SIMD rankings reversed after 2006 and more recent iterations use rank 1 as most deprived, we retain the 2004 labelling as

reported. Full technical specifications for the SIMD 2004 are available at https://www.gov.scot/Publications/2004/10/20089/45173.

The present dataset gathered between December 2002 and February 2004 as part of the Scottish Neurological Symptoms Study (SNSS) included individual participants postcodes. These postcodes can be used to map participants to SIMD deprivation quintiles and therefore provide a categorical socioeconomic variable into the present model. However, given that SNSS data were collected over an extended period of time and SIMD from a much shorter period in only 2004, it is possible that there has been significant population relocation or simply too much within-datazone variation in SIMD data to provide meaningful representation of our sample.

In order to assess whether SIMD deprivation data across the time period were likely to provide a valid socioeconomic measure, we assessed the correlation of items in the SNSS questionnaire assessing employment and DLA receipt. If our questionnaire items correlate well with SIMD quintiles, we might infer that their inclusion is probably a valid and more global marker of socioeconomic status. We also undertook univariate analyses, summarised in univariate logistic modelling in our manuscript, assessing the relationship between SIMD and baseline and change in symptomatology as well as outcomes.

Results

Distribution of SIMD quintiles among patient group.

The representation of each SIMD 2004 quintile between groups suggests that those with symptoms likely due to an unexplained disorder are marginally overrepresented by those in the more deprived regions (Figure 1, note scale of Y-axis).

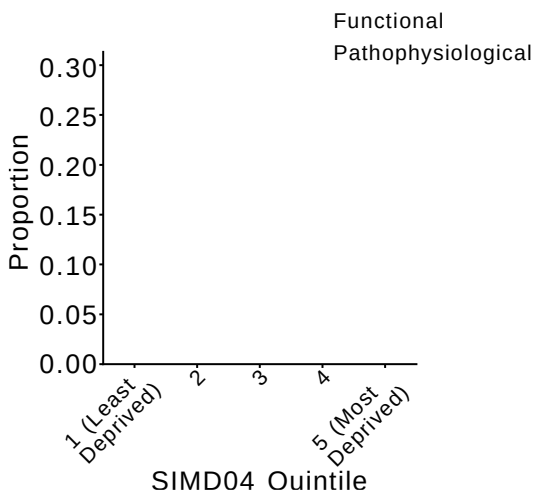


Figure 1: SIMD Quintile Distribution between groups.

Socioeconomic SNSS questionnaire items correlate well with SIMD quintiles.

Figure 2 highlights how SIMD quintiles are associated with proportion of reported unemployment and receipt of disability-related state benefit in the SNSS sample as would be expected if the mapping of postcodes to 2004 data was valid.

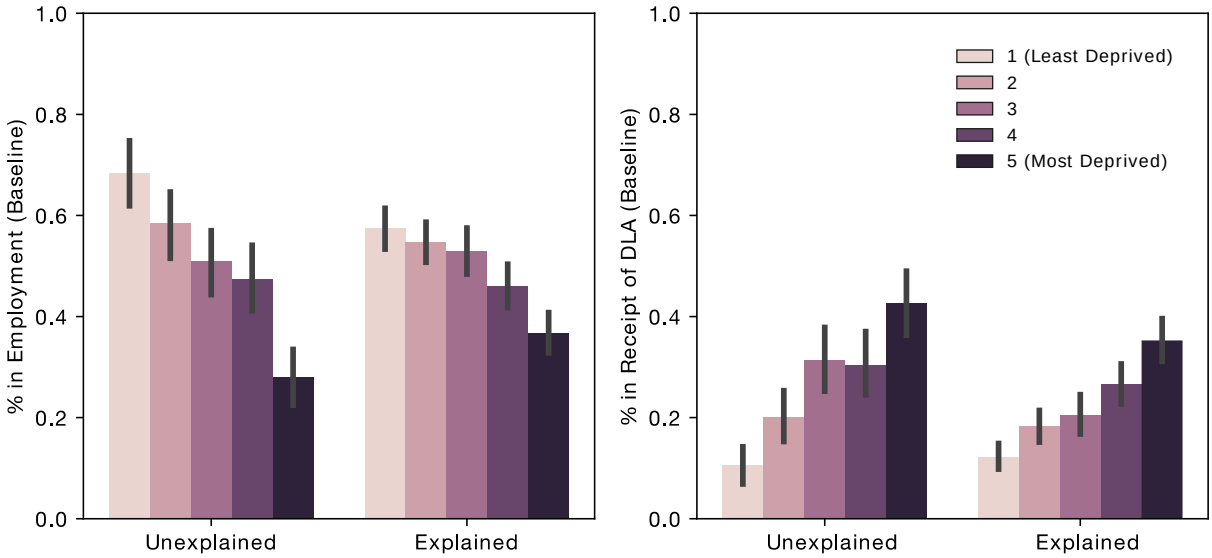
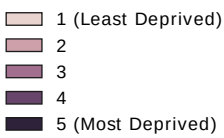


Figure 2: Proportion of those responding to unemployment and disability-related state benefit questionnaire items by SIMD quintile. Frequency bars are shown with 95% confidence intervals.

SIMD 2004 quintiles are modestly associated with worse outcome, more consistently so in the pathophysiological group.

Figure 3 and Table 1 show the distribution of *poor* ('No change', 'Worse', or 'Much Worse') outcomes by SIMD quintile. Formal analyses of contribution of deprivation quintile towards predicting outcome is undertaken in the main manuscript but are displayed here in graphical form for interest. In a univariate assessment one can see how those in the most deprived quintile are overrepresented in those reporting poor outcomes but note this correlation does not persist in a multivariate model.



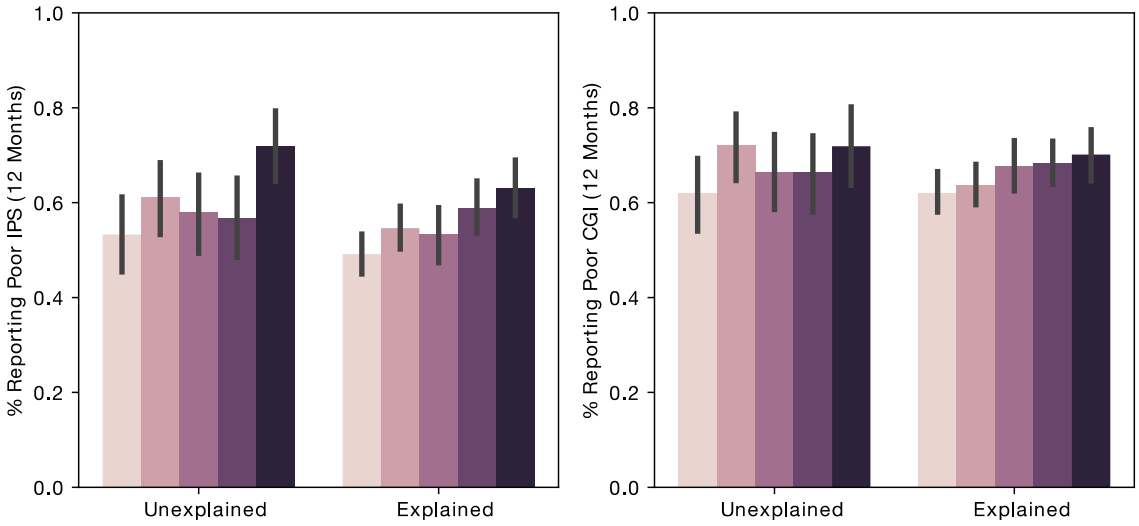


Figure 3: Proportion of those reporting 'No Change', 'Worse', or 'Much Worse' CGI and IPS by SIMD quintile. Frequency bars are shown with 95% confidence intervals.

		Functional						Pathophysiological					
			SIMD 2004 Quintile						SIMD 2004 Quintile				
	12-Month Outcome	Total	1 (Least Deprived)	2	3	4	5 (Most Deprived)	Total	1 (Least Deprived)	2	3	4	5 (Most Deprived)
Clinical Global Improvement	Good	222	51 (36%)	42 (28%)	51 (34%)	44 (34%)	34 (28%)	626	171 (39%)	171 (36%)	97 (32%)	101 (32%)	86 (30%)
	Poor	473	90 (64%)	108 (72%)	101 (66%)	87 (66%)	87 (72%)	1195	273 (61%)	299 (64%)	204 (68%)	217 (68%)	202 (70%)
	Total	695	141	150	152	131	121	1821	444	470	301	318	288
Initial Presenting Symptoms	Good	280	66 (46%)	59 (39%)	64 (42%)	57 (43%)	34 (28%)	823	228 (51%)	216 (45%)	141 (47%)	131 (41%)	107 (37%)
	Poor	420	77 (54%)	93 (61%)	88 (58%)	75 (57%)	87 (72%)	1015	223 (49%)	260 (55%)	161 (53%)	188 (59%)	183 (63%)
	Total	700	143	152	152	132	121	1838	451	476	302	319	290

Table 1: Primary outcomes arranged by patient group and deprivation quintile. Percentages shown are the proportion of outcome response.

Deprivation quintiles are associated with worse baseline disease burden but not with change over time.

Figure 4 shows the relationships between baseline features of disease severity and SIMD 2004 Quintile. Note a significant association with worse median baseline scores and greater relative deprivation.

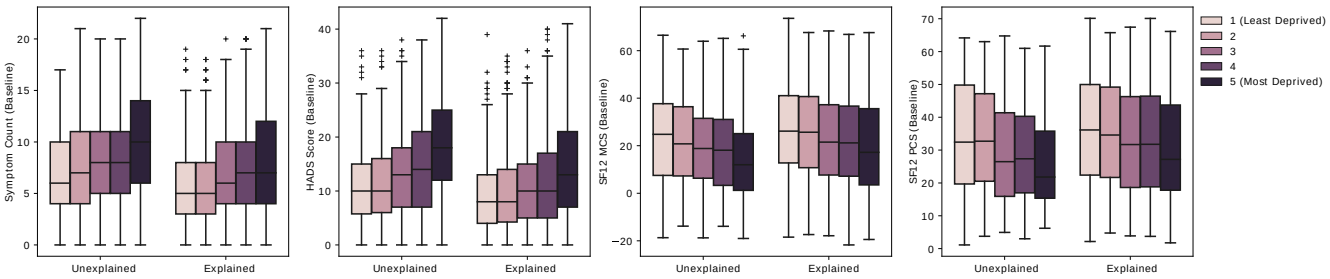


Figure 4: Box plots of SIMD 2004 Quintile against baseline Symptom Count, HADS Score, SF12 MCS & PCS by group.

Figure 5 shows the relationships between change in baseline features over the 12-month study period and SIMD 2004 Quintile. Note poor correlation with deprivation and degree of change.

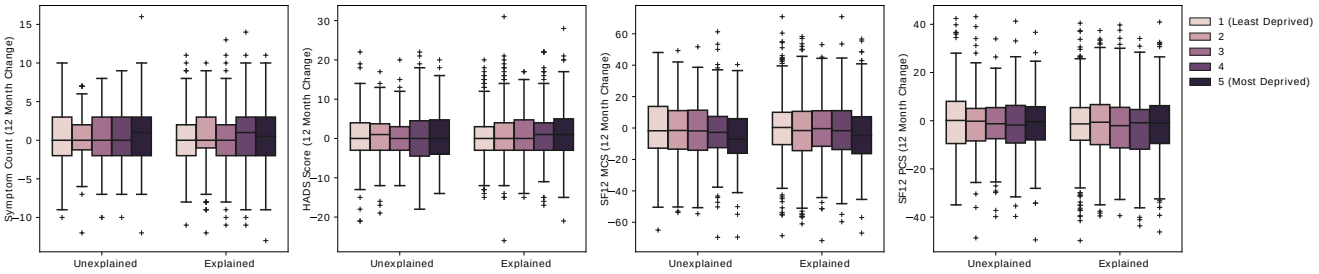


Figure 5: Box plots of SIMD 2004 Quintile against 12-month change in Symptom Count, HADS Score, SF12 MCS & PCS by group.