

The impact of socioeconomic status on subsequent neurological outcomes in multiple sclerosis

Supplementary Material

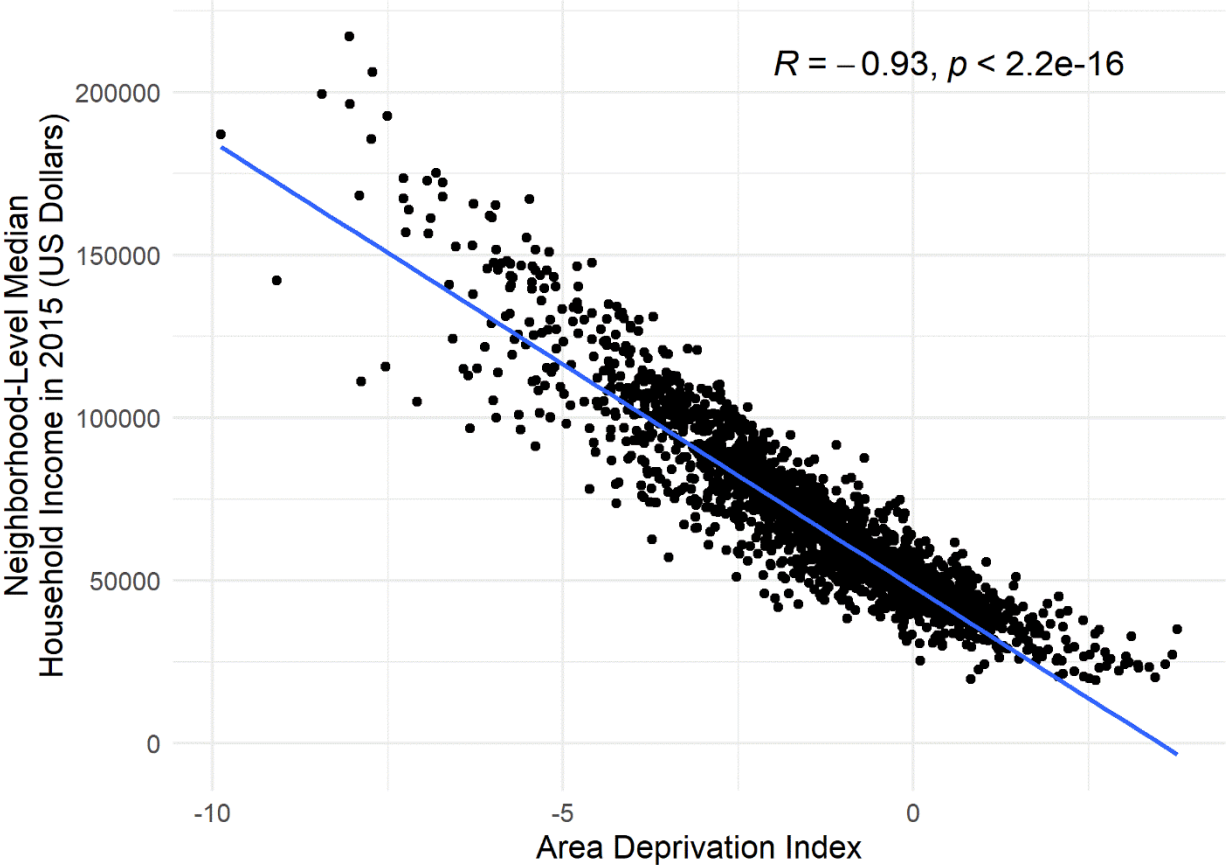
Zip Code Distribution of Research Participants

In this study, the mean (and standard deviation) number of participants per zip code was 2.5 (3.5). The maximum number of participants in a single zip code was 29 participants. Six (out of 723) zip codes had 20 or more participants. To preserve confidentiality given the relatively small number of study participants per zip code, we did not report zip code specific distribution of participants.

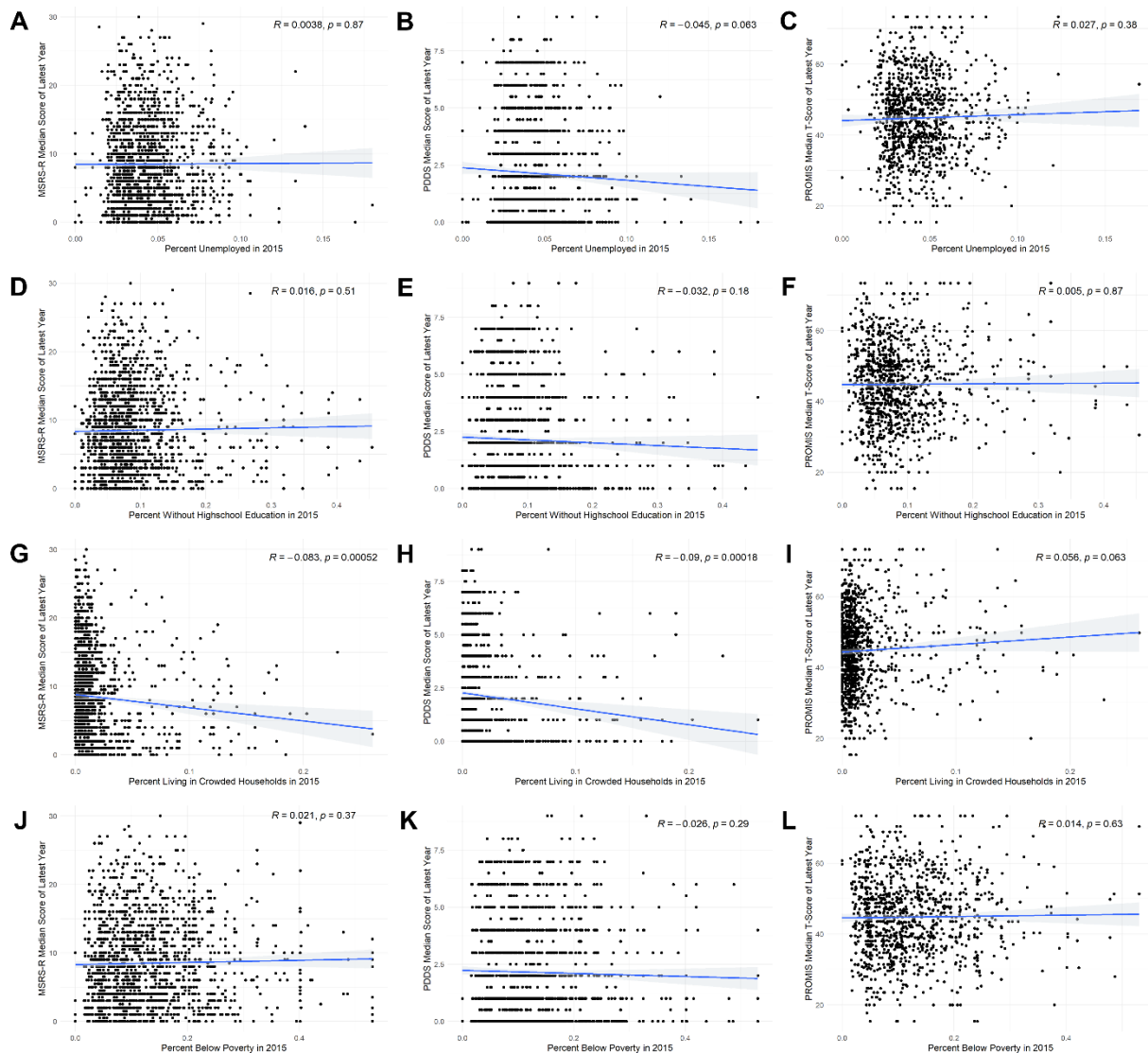
Additional Neighborhood Indicator of Socioeconomic Status (SES)

Using the zip codes of the home residence of each participant at enrollment to query the American Community Survey SES datasets from 2014 to 2018 (abbreviated as 2018), we derived components of the neighborhood SES indicator, and calculated the area deprivation index (ADI) in 2018 as described in the Methods of the main text (section 2.3). The covariate-adjusted regression models using ADI in 2018 were shown in eTable 3.

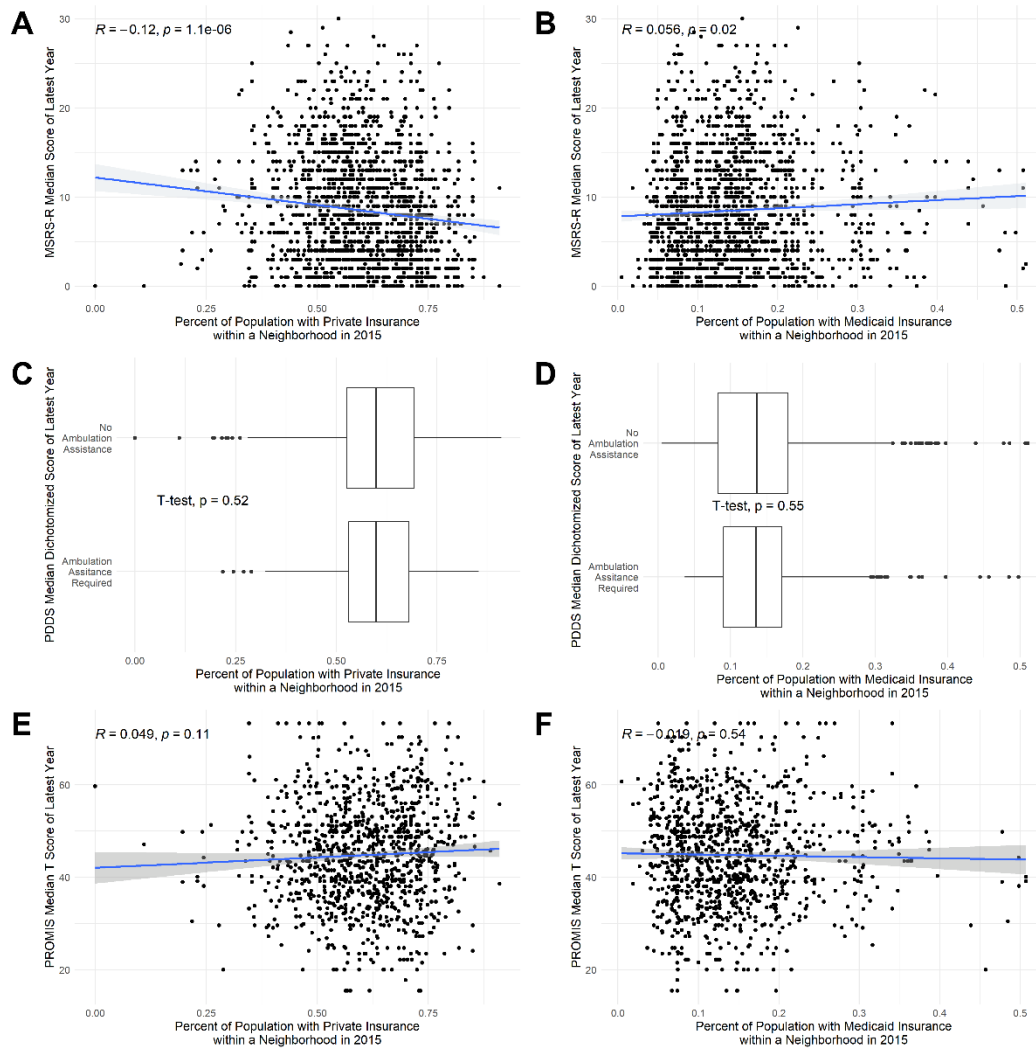
eFigure 1. Pearson correlation between *neighborhood median household income* in 2015 and *area deprivation index* in 2015 in the combined data.



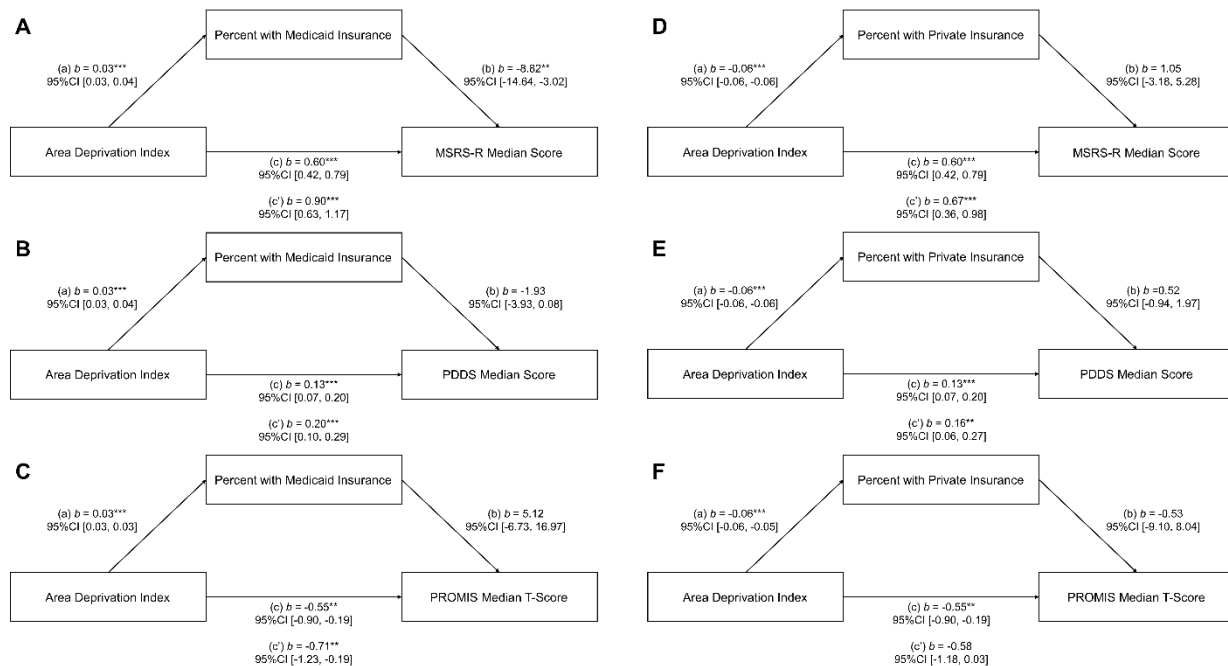
eFigure 2. Scatterplots showing the *non-significant* Pearson correlations between the components of the area deprivation index (ADI) in 2015 and subsequent patient-reported outcomes (PROs) of neurological and physical function. The ADI components in 2015 included percent unemployed (**A-C**), percent without high school education (**D-F**), percent living in crowded households (**G-I**), percent below poverty line (**J-L**) within the zip code of a participant’s residential address. The PROs included the median scores of MSRS-R (**A, D, G, J**), PDDS (**B, E, H, K**), and PROMIS-physical function (**C, F, I, L**) from the latest year between 2018 and 2020.



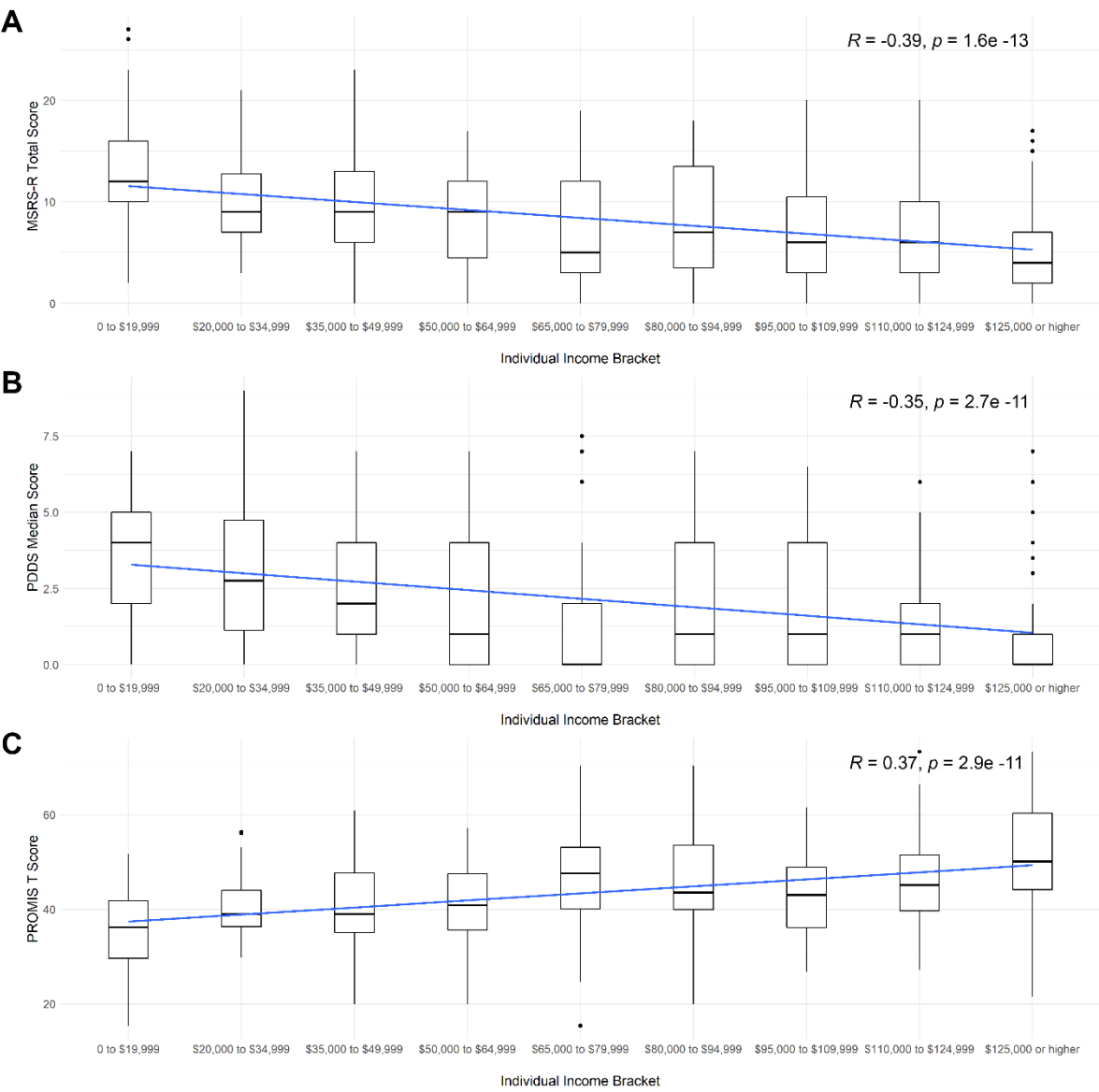
eFigure 3. Pearson correlations between neighborhood insurance coverage in 2015 and subsequent patient-reported outcomes (PROs) of neurological and physical function. Insurance coverage included percent with either *private* (A, C, D) or *Medicaid* (B, D, F) insurance within a neighborhood of the participant’s residential zip code in 2015. The PROs included median scores of MSRS-R (A, B), PDDS (C, D), and PROMIS-physical function (E, F) from the latest year between 2018 and 2020.



eFigure 4. Covariate-adjusted mediation analyses to assess the mediating effect of healthcare insurance coverage. The covariates included age of latest patient-reported outcome (PRO), sex, race and ethnicity, age of first symptom onset, disease duration, and type of disease-modifying therapy. Path model assessed whether the association between area deprivation index (ADI) in 2015 and PROs (*i.e.*, MSRS-R, PDDS, and PROMIS T-Score) from the latest year between 2018 and 2020 was mediated by *neighborhood percent of population with Medicaid insurance* or by *neighborhood percent of population with private insurance* within the same zip code as the participant’s residence. Path *c* represents the covariate-adjusted effect of ADI on PROs *without* mediators in the model. Path *c'* (indirect effect) represents the covariate-adjusted effect of ADI on PROs *with* mediators in the model. Path *a* represents the effect of ADI on neighborhood percent of population with private medical insurance or Medicaid insurance. Path *b* represents the effect of neighborhood percent of population with private or Medicaid insurance on PROs. Non-standardized β regression coefficients, 95% confidence intervals, and significance thresholds (* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$) as reported by PROCESS Macro in SPSS are shown. Please also refer to Table 3 in the main text for the significance level for the mediating effect of healthcare insurance coverage.



eFigure 5. Association between *individual-level household income brackets* in 2020 and the median scores of the patient-reported outcomes of neurological and physical function in 2020 in a subgroup analysis of the joint cohorts.



eTable 1. Eligibility criteria of the original cohort studies. The current study dataset that drew from the original cohort studies only included adult participants (age 18 years or older) with a neurologist confirmed diagnosis of multiple sclerosis.

<i>Cohort Study</i>	<i>Inclusion</i>	<i>Exclusion</i>
PROMOTE ¹	Age 7 years or older Neurologist-confirmed diagnosis of multiple sclerosis (MS) or related disorders, including a first central nervous system demyelinating episode with a positive MRI scan or abnormal MRI scans characteristic of MS but no clinical symptoms of the disease OR controls	None
Pittsburgh COVID-19 and MS Study	Age 18 years or older Neurologist-confirmed diagnosis of multiple sclerosis (MS) or related disorders OR controls Live in the United States	None
CUIMC ² MS Genetics Study	Neurologist-confirmed diagnosis of multiple sclerosis (MS) or related disorders	None
CUIMC ² COVID-19 and MS Study ⁴	Age 18 years or older Neurologist-confirmed diagnosis of multiple sclerosis (MS) or related disorders OR controls Live in the United States	None
GEMS ³	Age 5 years or older First-degree family members of patients with multiple sclerosis (MS), or patients who have received anti-TNF alpha therapy as treatment for inflammatory diseases other than MS (e.g., Crohn's disease, psoriasis and rheumatoid arthritis) with OR without a neurologist-confirmed diagnosis of MS OR Patients that have been referred for an evaluation of first presentation of neurological symptoms but do not have a diagnosis of MS Live in the United States	None

1. Prospective Investigation of Multiple Sclerosis in the Three Rivers Region (PROMOTE), NCT02994121
2. Columbia University Irving Medical Center (CUIMC)
3. Genes and Environment in Multiple Sclerosis (GEMS), NCT01353547
4. Also referred to as Multiple Sclerosis (MS) Patient Response to COVID-19 Outbreak Study

eTable 2. Covariate-adjusted regression analysis using *area deprivation index* in **2015** as the exposure and the median scores of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020.

	MSRS-R			PDDS			PROMIS			
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	
Discovery Cohorts	Predictors									
	ADI	0.62	0.36, 0.89	<0.001	0.11	0.02, 0.20	0.02	-0.49	-1.08, 0.10	0.106
	Age of latest PRO	0.16	0.11, 0.21	<0.001	0.09	0.07, 0.10	<0.001	-0.5	-0.63, -0.37	<0.001
	Sex, Male	-0.01	-0.78, 0.76	0.98	0.55	0.29, 0.81	<0.001	-0.24	-1.98, 1.49	0.785
	Sex, Other	3.71	-8.09, 15.50	0.538	0.71	-3.27, 4.70	0.726	-3.53	-22.73, 15.67	0.718
	Race and Ethnicity, Other	1.23	0.10, 2.36	0.033	0.11	-0.28, 0.49	0.586	0.09	-3.04, 3.21	0.956
	Age of First Symptom Onset	-0.08	-0.13, -0.02	0.005	-0.04	-0.06, -0.02	<0.001	0.19	0.07, 0.32	0.003
	Disease Duration	0	-0.06, 0.06	0.933	0	-0.02, 0.02	0.633	0.03	-0.12, 0.17	0.716
	DMT Group, High Efficacy	0.94	0.02, 1.86	0.046	0.55	0.24, 0.87	0.001	-2.31	-4.37, -0.24	0.029
	DMT Group, Standard Efficacy	-1.44	-2.41, -0.46	0.004	-0.37	-0.70, -0.04	0.03	2.05	-0.10, 4.20	0.061
	Observations	1248			1234			645		
R ² / R ² adjusted	0.104 / 0.097			0.208 / 0.202			0.244 / 0.234			
Replication Cohorts	ADI	0.46	0.21, 0.72	<0.001	0.12	0.03, 0.21	0.009	-0.6	-1.12, -0.08	0.025
	Age of latest PRO	0.17	0.10, 0.25	<0.001	0.07	0.04, 0.10	<0.001	-0.4	-0.56, -0.24	<0.001
	Sex, Male	0.33	-0.87, 1.53	0.588	0.15	-0.28, 0.57	0.496	1.58	-0.96, 4.11	0.221
	Race and Ethnicity, Other	-0.24	-1.60, 1.12	0.725	0.02	-0.46, 0.50	0.939	-0.92	-3.79, 1.95	0.53
	Age of First Symptom Onset	-0.08	-0.15, -0.01	0.036	-0.01	-0.04, 0.01	0.335	0.09	-0.06, 0.24	0.248
	Disease Duration	-0.05	-0.15, 0.05	0.313	0.03	-0.00, 0.06	0.084	-0.07	-0.26, 0.12	0.467
	DMT Group, High Efficacy	0.32	-1.67, 2.32	0.751	0.1	-0.61, 0.80	0.789	-2.63	-6.55, 1.29	0.188
	DMT Group, Standard Efficacy	-2.43	-4.50, -0.36	0.022	-1.02	-1.75, -0.29	0.006	2.68	-1.41, 6.77	0.199
	Observations	421			416			378		
	R ² / R ² adjusted	0.152 / 0.136			0.255 / 0.241			0.214 / 0.197		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 3. Covariate-adjusted regression analysis using *area deprivation index* in **2018** as the exposure and the median scores of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020.

	Predictors	MSRS-R			PDDS			PROMIS		
		Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Discovery Cohorts	ADI	0.63	-0.90, -0.36	<0.001	0.12	-0.21, -0.03	0.011	-0.6	0.00, 1.19	0.048
	Age of latest PRO	0.16	0.11, 0.22	<0.001	0.09	0.07, 0.10	<0.001	-0.5	-0.63, -0.38	<0.001
	Sex, Male	-0.01	-0.78, 0.75	0.972	0.55	0.29, 0.81	<0.001	-0.31	-2.05, 1.42	0.722
	Sex, Other	3.62	-8.18, 15.41	0.547	0.72	-3.27, 4.70	0.724	-3.64	-22.81, 15.53	0.709
	Race and Ethnicity, Other	1.29	0.17, 2.42	0.025	0.11	-0.27, 0.50	0.566	0.03	-3.09, 3.14	0.987
	Age of First Symptom Onset	-0.08	-0.13, -0.02	0.005	-0.04	-0.06, -0.02	<0.001	0.19	0.07, 0.32	0.003
	Disease Duration	0	-0.06, 0.06	0.92	0	-0.02, 0.02	0.634	0.03	-0.11, 0.17	0.714
	DMT Group, High Efficacy	0.94	0.02, 1.86	0.046	0.55	0.24, 0.87	0.001	-2.36	-4.43, -0.30	0.025
	DMT Group, Standard Efficacy	-1.44	-2.42, -0.47	0.004	-0.37	-0.70, -0.04	0.03	2.02	-0.12, 4.16	0.064
	Observations	1248			1234			645		
	R2 / R2 adjusted	0.104 / 0.097			0.208 / 0.202			0.246 / 0.235		
Replication Cohorts	ADI	0.53	-0.79, -0.26	<0.001	0.14	-0.23, -0.04	0.004	-0.71	0.17, 1.26	0.011
	Age of latest PRO	0.17	0.09, 0.25	<0.001	0.07	0.04, 0.10	<0.001	-0.39	-0.55, -0.24	<0.001
	Sex, Male	0.39	-0.80, 1.59	0.517	0.16	-0.26, 0.59	0.446	1.47	-1.07, 4.00	0.256
	Race and Ethnicity, Other	-0.26	-1.61, 1.09	0.707	0.01	-0.46, 0.49	0.963	-0.83	-3.69, 2.03	0.57
	Age of First Symptom Onset	-0.08	-0.15, -0.00	0.042	-0.01	-0.04, 0.01	0.358	0.08	-0.06, 0.23	0.264
	Disease Duration	-0.04	-0.14, 0.05	0.36	0.03	-0.00, 0.06	0.071	-0.08	-0.27, 0.11	0.424
	DMT Group, High Efficacy	0.33	-1.66, 2.32	0.748	0.1	-0.60, 0.80	0.787	-2.64	-6.55, 1.28	0.186
	DMT Group, Standard Efficacy	-2.43	-4.50, -0.37	0.021	-1.02	-1.75, -0.29	0.006	2.68	-1.40, 6.76	0.198
	Observations	421			416			378		
	R2 / R2 adjusted	0.157 / 0.140			0.258 / 0.243			0.217 / 0.200		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 4. Covariate-adjusted regression analysis of *neighborhood median household income* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

<i>Predictors</i>	MSRS-R			PDDS			PROMIS		
	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>
Median Household Income	-3.80e-05	-5.05e-05, -2.56e-05	<0.001	-8.58e-06	-1.28e-05, -4.32e-06	0.045	2.55e-05	5.96e-07, 5.05e-05	<0.001
Age of Latest PRO	0.16	0.12, 0.21	<0.001	-0.46	-0.56, -0.36	<0.001	0.08	0.07, 0.10	<0.001
Sex, Male	0.09	-0.57, 0.74	0.791	0.28	-1.14, 1.71	0.698	0.47	0.25, 0.69	<0.001
Sex, Other	3.46	-8.07, 14.99	0.556	-4.04	-23.56, 15.47	0.684	0.84	-3.08, 4.75	0.674
Race and Ethnicity, Other	0.45	-0.43, 1.33	0.316	-0.4	-2.42, 1.63	0.7	0.01	-0.29, 0.31	0.958
Age of First Symptom Onset	-0.08	-0.12, -0.03	0.001	0.15	0.05, 0.24	0.003	-0.03	-0.05, -0.01	<0.001
Disease Duration	-0.01	-0.06, 0.04	0.575	-0.01	-0.12, 0.10	0.844	0.01	-0.01, 0.03	0.245
DMT Group, High Efficacy	0.63	-0.19, 1.46	0.131	-1.99	-3.78, -0.20	0.03	0.44	0.16, 0.72	0.002
DMT Group, Standard Efficacy	-1.81	-2.68, -0.94	<0.001	2.65	0.76, 4.53	0.006	-0.52	-0.82, -0.22	0.001
Observations	1665			1646			1020		
R ² / R ² adjusted	0.118 / 0.113			0.223 / 0.219			0.227 / 0.220		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 5. Covariate-adjusted regression analysis of *neighborhood median home value* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Median Home Value	-6.50e-06	-8.16e-06, -4.84e-06	<0.001	-1.54e-06	-2.11e-06, -9.65e-07	0.002	4.98e-06	1.81e-06, 8.14e-06	<0.001
Age of Latest PRO	0.16	0.11, 0.20	<0.001	-0.45	-0.55, -0.35	<0.001	0.08	0.07, 0.10	<0.001
Sex, Male	0.14	-0.51, 0.79	0.674	0.22	-1.20, 1.64	0.761	0.48	0.26, 0.70	<0.001
Sex, Other	5.84	-5.62, 17.31	0.318	-5.9	-25.40, 13.60	0.553	1.4	-2.50, 5.31	0.481
Race and Ethnicity, Other	1.2	0.33, 2.06	0.007	-1.11	-3.14, 0.91	0.281	0.18	-0.12, 0.47	0.246
Age of First Symptom Onset	-0.07	-0.12, -0.03	0.001	0.14	0.05, 0.24	0.004	-0.03	-0.04, -0.01	<0.001
Disease Duration	-0.01	-0.06, 0.04	0.77	-0.02	-0.13, 0.09	0.704	0.01	-0.01, 0.03	0.175
DMT Group, High Efficacy	0.76	-0.06, 1.58	0.068	-2.19	-3.98, -0.39	0.017	0.47	0.19, 0.75	0.001
DMT Group, Standard Efficacy	-1.72	-2.58, -0.86	<0.001	2.51	0.64, 4.39	0.009	-0.49	-0.79, -0.20	0.001
Observations	1666			1647			1021		
R ² / R ² adjusted	0.130 / 0.125			0.230 / 0.225			0.232 / 0.225		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 6 Covariate-adjusted regression analysis of *neighborhood percentage of population with college education* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Percent with College Education	-7.31	-8.99, -5.64	<0.001	-1.62	-2.20, -1.05	<0.001	9.31	5.73, 12.89	<0.001
Age of Latest PRO	0.17	0.12, 0.21	<0.001	0.08	0.07, 0.10	<0.001	-0.45	-0.55, -0.35	<0.001
Sex, Male	0.16	-0.48, 0.81	0.62	0.48	0.26, 0.71	<0.001	0.03	-1.38, 1.44	0.966
Sex, Other	5.27	-6.14, 16.68	0.365	1.24	-2.66, 5.13	0.534	-6.52	-25.85, 12.80	0.508
Race and Ethnicity, Other	0.76	-0.10, 1.62	0.083	0.08	-0.22, 0.37	0.618	-0.45	-2.44, 1.54	0.656
Age of First Symptom Onset	-0.07	-0.12, -0.03	0.001	-0.03	-0.04, -0.01	<0.001	0.13	0.04, 0.23	0.007
Disease Duration	-0.01	-0.06, 0.04	0.768	0.01	-0.01, 0.03	0.181	-0.03	-0.14, 0.08	0.596
DMT Group, High Efficacy	0.74	-0.08, 1.55	0.077	0.46	0.18, 0.74	0.001	-2.41	-4.19, -0.63	0.008
DMT Group, Standard Efficacy	-1.74	-2.60, -0.88	<0.001	-0.5	-0.80, -0.21	0.001	2.19	0.32, 4.06	0.022
Observations	1668			1649			1022		
R ² / R ² adjusted	0.138 / 0.133			0.231 / 0.226			0.245 / 0.238		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 7. Covariate-adjusted regression analysis of *neighborhood percentage of population with more than one occupant per room* (indicating a crowded household) in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Percent Living in Crowded Households	-16.83	-28.78, -4.89	0.006	-3.86	-7.91, 0.18	0.061	-3.94	-27.30, 19.41	0.741
Age of Latest PRO	0.17	0.12, 0.21	<0.001	0.08	0.07, 0.10	<0.001	-0.47	-0.56, -0.37	<0.001
Sex, Male	-0.05	-0.71, 0.60	0.875	0.44	0.21, 0.66	<0.001	0.47	-0.95, 1.89	0.518
Sex, Other	3.7	-7.93, 15.33	0.533	0.89	-3.04, 4.82	0.656	-3.67	-23.24, 15.89	0.713
Race and Ethnicity, Other	1.32	0.41, 2.24	0.005	0.2	-0.11, 0.52	0.199	-0.51	-2.68, 1.66	0.645
Age of First Symptom Onset	-0.08	-0.12, -0.03	0.001	-0.03	-0.05, -0.02	<0.001	0.15	0.05, 0.25	0.002
Disease Duration	-0.02	-0.07, 0.03	0.539	0.01	-0.01, 0.03	0.263	-0.01	-0.12, 0.11	0.895
DMT Group, High Efficacy	0.48	-0.35, 1.31	0.254	0.41	0.12, 0.69	0.005	-1.76	-3.54, 0.03	0.053
DMT Group, Standard Efficacy	-2.03	-2.91, -1.16	<0.001	-0.57	-0.87, -0.27	<0.001	2.86	0.99, 4.74	0.003
Observations	1668			1649			1022		
R ² / R ² adjusted	0.104 / 0.099			0.218 / 0.214			0.226 / 0.219		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 8. Covariate-adjusted regression analysis of *neighborhood percentage of population without high school education* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Percent without High School Education	4.14	-1.26, 9.54	0.133	0.82	-1.01, 2.64	0.381	-11.39	-22.25, -0.52	0.04
Age of Latest PRO	0.17	0.13, 0.22	<0.001	0.08	0.07, 0.10	<0.001	-0.47	-0.57, -0.37	<0.001
Sex, Male	-0.04	-0.70, 0.62	0.901	0.44	0.22, 0.66	<0.001	0.39	-1.03, 1.81	0.59
Sex, Other	3.22	-8.42, 14.86	0.587	0.78	-3.15, 4.71	0.697	-4.22	-23.73, 15.29	0.672
Race and Ethnicity, Other	0.72	-0.20, 1.63	0.126	0.07	-0.24, 0.38	0.654	0.1	-2.03, 2.24	0.923
Age of First Symptom Onset	-0.08	-0.13, -0.04	<0.001	-0.03	-0.05, -0.02	<0.001	0.15	0.05, 0.25	0.002
Disease Duration	-0.02	-0.07, 0.03	0.514	0.01	-0.01, 0.03	0.273	-0.01	-0.12, 0.10	0.861
DMT Group, High Efficacy	0.44	-0.39, 1.27	0.3	0.4	0.11, 0.68	0.006	-1.79	-3.57, -0.01	0.049
DMT Group, Standard Efficacy	-2.02	-2.90, -1.15	<0.001	-0.57	-0.87, -0.27	<0.001	2.79	0.92, 4.66	0.003
Observations	1668			1649			1022		
R ² / R ² adjusted	0.101 / 0.096			0.217 / 0.212			0.228 / 0.222		

- 1 Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
- 2 95% confidence intervals

eTable 9. Covariate-adjusted regression analysis of *neighborhood percentage of population unemployed* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

<i>Predictors</i>	MSRS-R			PDDS			PROMIS		
	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>	<i>Estimate</i> ¹	<i>95% CI</i> ²	<i>P-value</i>
Percent Unemployed	6.36	-10.09, 22.81	0.448	-0.22	-5.81, 5.36	0.937	-2.46	-37.74, 32.81	0.891
Age of Latest PRO	0.17	0.13, 0.22	<0.001	0.08	0.07, 0.10	<0.001	-0.46	-0.56, -0.37	<0.001
Sex, Male	-0.05	-0.71, 0.61	0.88	0.43	0.21, 0.66	<0.001	0.46	-0.96, 1.88	0.524
Sex, Other	3.03	-8.62, 14.67	0.61	0.75	-3.17, 4.68	0.706	-3.79	-23.34, 15.76	0.704
Race and Ethnicity, Other	0.82	-0.09, 1.74	0.077	0.12	-0.19, 0.43	0.462	-0.61	-2.69, 1.47	0.564
Age of First Symptom Onset	-0.08	-0.12, -0.03	0.001	-0.03	-0.05, -0.02	<0.001	0.15	0.05, 0.25	0.002
Disease Duration	-0.02	-0.07, 0.03	0.527	0.01	-0.01, 0.03	0.277	-0.01	-0.12, 0.10	0.884
DMT Group, High Efficacy	0.45	-0.38, 1.28	0.291	0.4	0.11, 0.68	0.006	-1.77	-3.56, 0.01	0.052
DMT Group, Standard Efficacy	-2.03	-2.91, -1.16	<0.001	-0.57	-0.87, -0.27	<0.001	2.86	0.99, 4.73	0.003
Observations	1668			1649			1022		
R ² / R ² adjusted	0.100 / 0.095			0.216 / 0.212			0.226 / 0.219		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 10. Covariate-adjusted regression analysis of *neighborhood percentage of population living below the poverty line* in 2015 as the exposure and the median score of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Percent Below Poverty Line	1.54	-2.00, 5.09	0.393	0.23	-0.97, 1.43	0.706	1.14	-6.63, 8.92	0.773
Age of Latest PRO	0.17	0.13, 0.22	<0.001	0.08	0.07, 0.10	<0.001	-0.46	-0.56, -0.37	<0.001
Sex, Male	-0.05	-0.71, 0.61	0.876	0.44	0.21, 0.66	<0.001	0.48	-0.94, 1.90	0.509
Sex, Other	2.87	-8.78, 14.53	0.629	0.72	-3.21, 4.65	0.719	-3.97	-23.54, 15.61	0.691
Race and Ethnicity, Other	0.8	-0.12, 1.72	0.088	0.09	-0.22, 0.41	0.554	-0.73	-2.81, 1.36	0.495
Age of First Symptom Onset	-0.08	-0.12, -0.03	0.001	-0.03	-0.05, -0.02	<0.001	0.15	0.05, 0.25	0.002
Disease Duration	-0.02	-0.07, 0.03	0.516	0.01	-0.01, 0.03	0.273	-0.01	-0.12, 0.10	0.892
DMT Group, High Efficacy	0.45	-0.38, 1.28	0.283	0.4	0.12, 0.68	0.006	-1.75	-3.54, 0.04	0.055
DMT Group, Standard Efficacy	-2.02	-2.89, -1.14	<0.001	-0.57	-0.87, -0.27	<0.001	2.89	1.01, 4.77	0.003
Observations	1668			1649			1022		
R ² / R ² adjusted	0.100 / 0.095			0.216 / 0.212			0.226 / 0.219		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods.
2. 95% confidence intervals

eTable 11. Covariate-adjusted regression analysis using *neighborhood percent of population with private insurance* in 2015 as the exposure and the median scores of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-Value	Estimate ¹	95% CI ²	P-Value	Estimate ¹	95% CI ²	P-Value
Percent with Private Insurance	1.2	-3.03, 5.42	0.578	0.68	-0.77, 2.12	0.356	-0.34	-9.23, 8.54	0.94
ADI	0.71	0.40, 1.02	<0.001	0.18	0.08, 0.29	0.001	-0.65	-1.28, -0.02	0.043
Age of Latest PRO	0.17	0.12, 0.21	<0.001	0.08	0.07, 0.10	<0.001	-0.46	-0.56, -0.36	<0.001
Sex, Male	0.12	-0.53, 0.78	0.709	0.48	0.25, 0.70	<0.001	0.2	-1.22, 1.63	0.779
Sex, Other	4.09	-7.40, 15.59	0.485	0.97	-2.94, 4.88	0.626	-4.77	-24.24, 14.69	0.63
Race and Ethnicity, Other	0.41	-0.48, 1.30	0.366	0.01	-0.29, 0.32	0.931	-0.21	-2.29, 1.87	0.841
Age of First Symptom Onset	-0.07	-0.12, -0.03	0.001	-0.03	-0.04, -0.01	<0.001	0.14	0.05, 0.24	0.004
Disease Duration	-0.01	-0.06, 0.04	0.674	0.01	-0.01, 0.03	0.204	-0.02	-0.13, 0.09	0.734
DMT Group, High Efficacy	0.68	-0.14, 1.50	0.106	0.45	0.17, 0.73	0.002	-2.17	-3.96, -0.38	0.018
DMT Group, Standard Efficacy	-1.76	-2.63, -0.89	<0.001	-0.51	-0.81, -0.21	0.001	2.43	0.55, 4.31	0.011
Observations	1668			1649			1022		
R ² / R ² adjusted	0.124 / 0.119			0.226 / 0.221			0.233 / 0.226		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods. These analyses *additionally* adjust for the area deprivation index (**ADI**) in 2015.
2. 95% confidence intervals

eTable 12. Covariate-adjusted regression analysis using *neighborhood percent of population with Medicaid insurance* in 2015 as the exposure and the median scores of patient-reported outcomes of neurological and physical function from the latest year between 2018 and 2020 from the joint cohorts.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-Value	Estimate ¹	95% CI ²	P-Value	Estimate ¹	95% CI ²	P-Value
Percent with Medicaid Insurance	-9.53	-15.39, -3.67	0.001	-2.37	-4.38, -0.36	0.021	5.38	-7.06, 17.82	0.396
ADI	0.96	0.69, 1.23	<0.001	0.22	0.13, 0.32	<0.001	-0.81	-1.36, -0.25	0.004
Age of Latest PRO	0.16	0.12, 0.21	<0.001	0.08	0.07, 0.10	<0.001	-0.46	-0.55, -0.36	<0.001
Sex, Male	0.15	-0.50, 0.80	0.649	0.48	0.26, 0.70	<0.001	0.19	-1.23, 1.61	0.793
Sex, Other	4.18	-7.28, 15.64	0.475	1	-2.91, 4.90	0.616	-4.8	-24.25, 14.66	0.629
Race and Ethnicity, Other	0.8	-0.11, 1.72	0.086	0.1	-0.22, 0.41	0.545	-0.52	-2.67, 1.64	0.638
Age of First Symptom Onset	-0.07	-0.12, -0.03	0.001	-0.03	-0.04, -0.01	<0.001	0.14	0.04, 0.24	0.004
Disease Duration	-0.01	-0.06, 0.04	0.714	0.01	-0.01, 0.03	0.195	-0.02	-0.13, 0.09	0.72
DMT Group, High Efficacy	0.74	-0.08, 1.56	0.077	0.46	0.18, 0.75	0.001	-2.21	-4.00, -0.42	0.016
DMT Group, Standard Efficacy	-1.73	-2.59, -0.86	<0.001	-0.5	-0.80, -0.20	0.001	2.42	0.54, 4.30	0.012
Observations	1668			1649			1022		
R ² / R ² adjusted	0.129 / 0.124			0.228 / 0.223			0.234 / 0.227		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods. These analyses *additionally* adjust for the area deprivation index (**ADI**) in 2015.
2. 95% confidence intervals

eTable 13. Covariate-adjusted regression analysis using nine *individual household income brackets* ranging from “\$0 to \$19,999” to “\$125,000 or higher” as exposure and the patient-reported outcomes of neurological and physical function for each participant in subgroups of the joint cohorts that accounts for the area deprivation index.

Predictors	MSRS-R			PDDS			PROMIS		
	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value	Estimate ¹	95% CI ²	P-value
Individual Household Income Bracket	-0.71	-0.92, -0.50	<0.001	-0.25	-0.33, -0.17	<0.001	1.29	0.87, 1.71	<0.001
Age of latest PRO	0.25	0.16, 0.34	<0.001	0.1	0.07, 0.13	<0.001	-0.51	-0.69, -0.34	<0.001
Sex, Male	-0.09	-1.53, 1.36	0.905	0.55	0.01, 1.09	0.047	-0.41	-3.25, 2.42	0.776
Sex, Other	0.98	-8.95, 10.91	0.846	1.06	-2.67, 4.79	0.576	-8.4	-26.90, 10.10	0.372
Race and Ethnicity, Other	1.19	-1.15, 3.52	0.317	-0.31	-1.19, 0.56	0.484	0.74	-3.89, 5.38	0.752
Age of First Symptom Onset	-0.19	-0.27, -0.10	<0.001	-0.06	-0.09, -0.02	0.001	0.24	0.08, 0.41	0.004
Disease Duration	-0.13	-0.23, -0.02	0.018	-0.03	-0.07, 0.01	0.172	0.09	-0.11, 0.29	0.365
DMT Group, High Efficacy	1.27	-0.33, 2.86	0.119	0.45	-0.15, 1.05	0.141	-1.91	-4.96, 1.15	0.22
DMT Group, Standard Efficacy	0.39	-1.31, 2.08	0.653	-0.18	-0.82, 0.45	0.574	2.72	-0.57, 6.01	0.105
ADI	0.19	-0.22, 0.60	0.365	-0.02	-0.18, 0.13	0.756	-0.19	-1.00, 0.62	0.648
Observations	320			320			284		
R ² / R ² adjusted	0.264 / 0.240			0.306 / 0.284			0.342 / 0.318		

1. Beta-coefficient from regression analysis adjusting for covariates as described in the Methods. These analyses *additionally* adjust for the area deprivation index (**ADI**) in 2015.
2. 95% confidence intervals