

Increasing Disability Decreases Employment Levels in Patients with Multiple Sclerosis

Shih TM, Ph.D.,¹ Wu N, Ph.D.,² Wakeford C,² Lakdawalla DN, Ph.D.³

¹Precision Health Economics; ²Biogen, Cambridge, MA, USA; ³University of Southern California

INTRODUCTION

- With peak onset at age 30, MS affects prime productive years and is associated with high unemployment rates.^{1,2}
- The impacts of disability due to MS on mobility, cognition and quality of life have been well-studied, yet the relationship between disability and employment status (ES) has primarily been assessed in small local studies.^{2,3,4}
- The widely used Expanded Disability Status Scale (EDSS) rates disability in MS on a scale from 0-10, where lower scores indicate less disability.⁵
- Estimating the relationship between EDSS and ES may improve our understanding of how clinical impacts on MS patients translate into poorer social outcomes.

OBJECTIVE

- The objective of this study is to characterize the relationship between increasing disability (measured by the EDSS) on ES for MS patients using Disease Modifying Therapies (DMTs) and living in the United States (US).

METHODS

Study Design

- We implemented a cross-sectional cohort analysis of US MS patient-reported and physician-reported data surveyed by the Adelphi MS Disease Specific Programme (DSP) to determine the relationship between ES and EDSS.

Data

- The DSP collected cross-sectional data from surveys of neurologists and their MS patients.
- Patient information for the year 2015 includes demographics, disease characteristics, ES (under or unemployed, and whether under or unemployment is due to MS), and other information.
- Underemployment was defined as part-time work or unemployed, while unemployed was defined as both retired or unemployed due to other reasons.

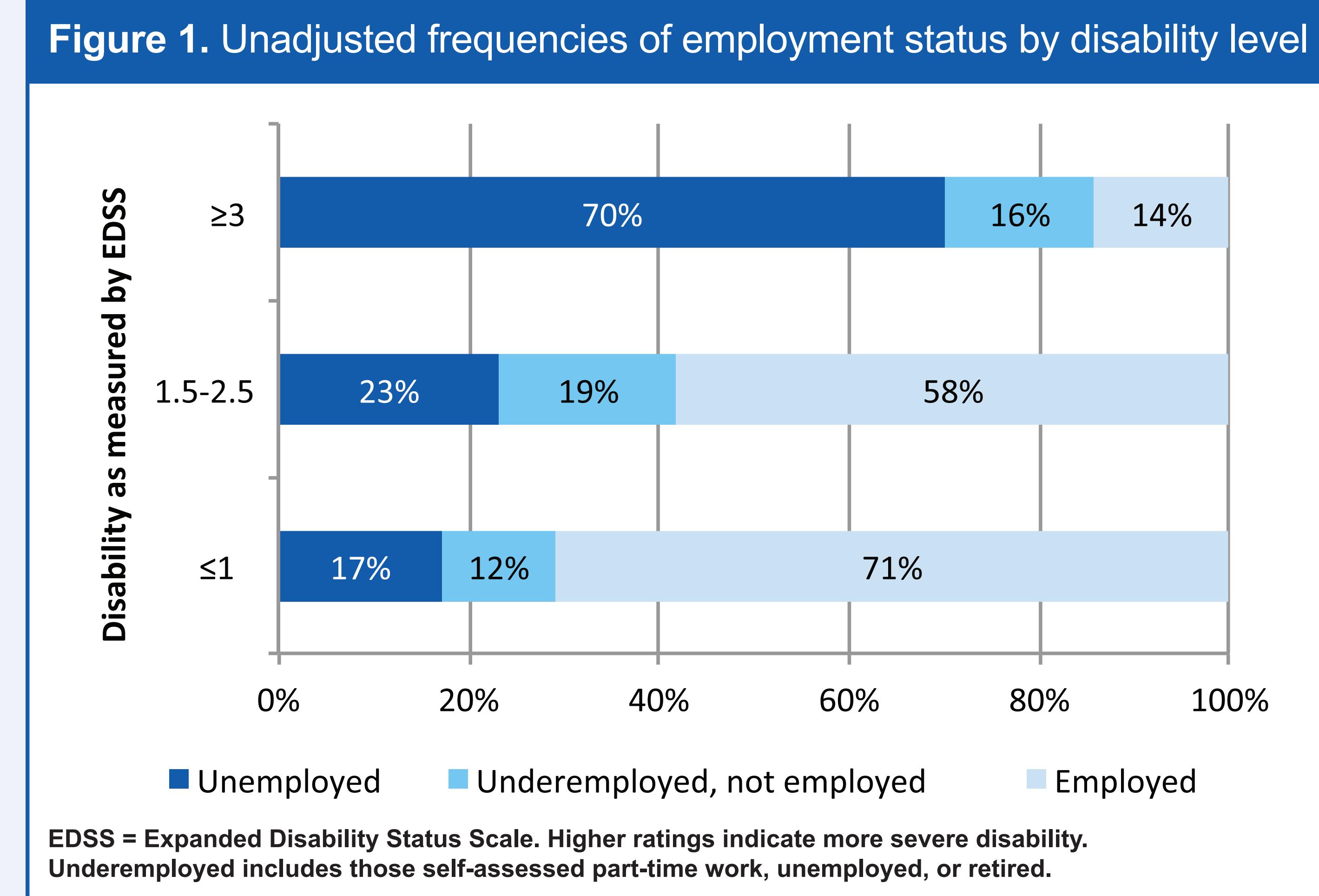
Study Description

- We performed logistic regressions modeling overall ES and MS-related ES outcomes as a function of EDSS, controlling for relapse history and demographics. Statistical significance was tested using Wald Chi-Square tests.
- We excluded patients not using disease modifying therapies for MS. Patients identifying as homemakers or students were excluded due to possible ES misidentification. To overcome small sample sizes at high EDSS levels, we divided the EDSS scale into bins of approximately equal numbers of patients.
- Predicted probabilities of ES by EDSS were calculated from model estimates.

RESULTS

- A total of 1,069 US patients provided both EDSS and ES data and did not identify as homemaker or student. Over half of these individuals had EDSS≤2.5. (Table 1)
- While 471 patients (44.1%) identified as working full-time, over half of patients (55.9%) identified as underemployed. Of those underemployed, 72.9% were unemployed. (Table 1)
- Among underemployed patients, 72.9% were unemployed or retired, and 71.4% attributed their ES to MS. Among unemployed patients, 79.4% attributed their ES to MS. (Table 1)
- The most disabled patients (EDSS≥3) were 56 percentage points more likely to be under-employed (86% versus 29%) and 53 percentage points more likely to be unemployed (70% versus 17%) than the least disabled patients (EDSS≤1). (Figure 1)
- Compared to the least disabled (EDSS≤1), patients with disability between EDSS 1.5-2.5 were more likely to be underemployed in general and due to MS ($p=0.0198$ and $p=0.0841$, respectively), but equally likely to be unemployed. (Table 2)
- Compared to the least disabled patients (EDSS≤1), the most disabled patients (EDSS≥3) were significantly more likely to be under or unemployed in general and due to MS (all $p<0.0001$), with 2.4 and 3.4 times the predicted likelihoods of general under and unemployment, respectively, and 4.3 and 3.8 times the likelihood of under and unemployment due to MS, respectively. (Table 2 & Figure 2)

Figure 1. Unadjusted frequencies of employment status by disability level

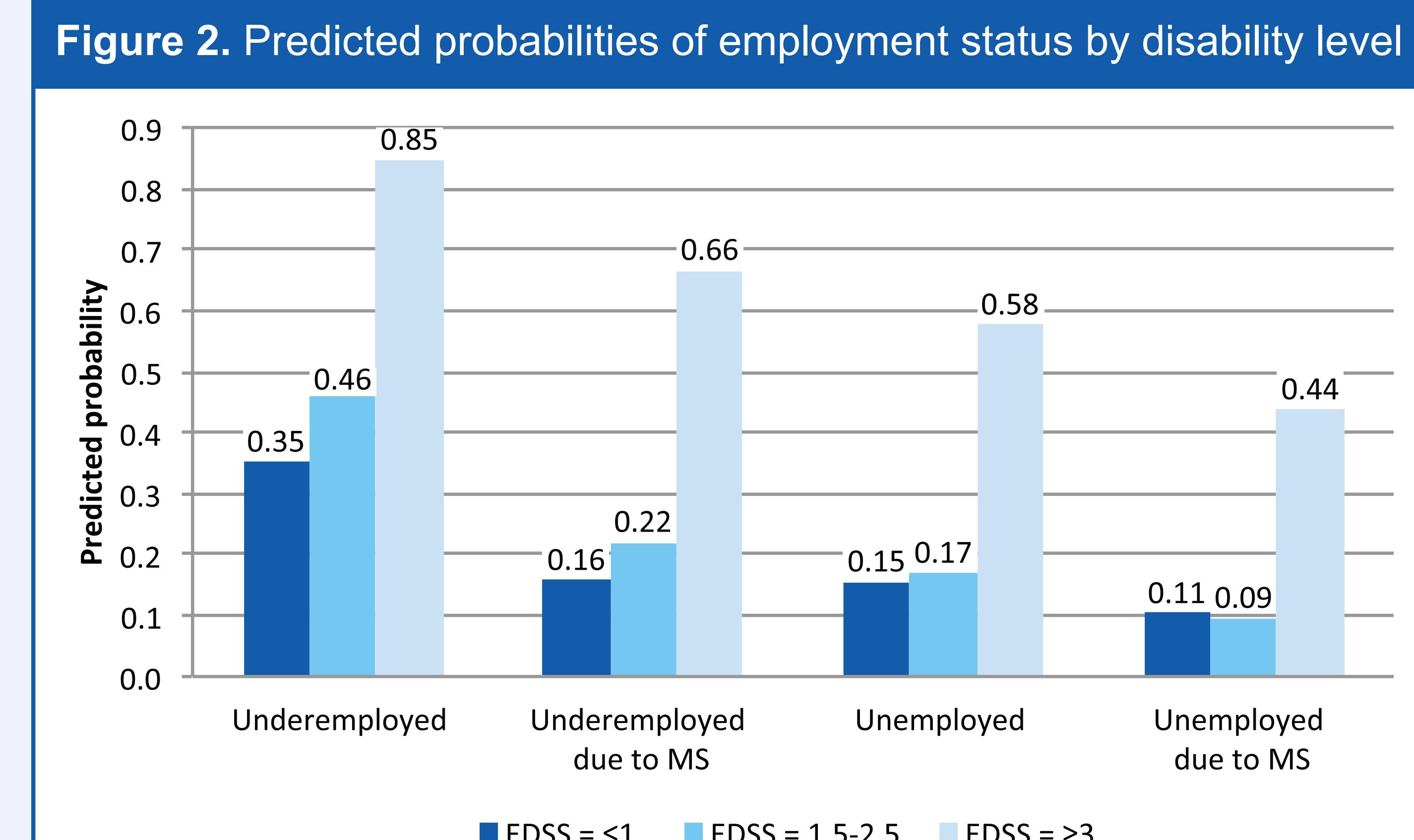


EDSS = Expanded Disability Status Scale. Higher ratings indicate more severe disability.

Underemployed includes those self-assessed part-time work, unemployed, or retired for any reason.

95% confidence intervals too narrow to be displayed.

Figure 2. Predicted probabilities of employment status by disability level



EDSS = Expanded Disability Status Scale. Higher ratings indicate more severe disability.

Underemployed includes those self-assessed part-time work, unemployed, or retired for any reason.

95% confidence intervals too narrow to be displayed.

Table 1. Summary statistics of sample population

Type	All		EDSS score					
	N	%	≤1		1.5-2.5		≥3	
All	1069		347		279		443	
Age in years								
<25	15	1.4	13	3.8	1	0.4	1	0.2
25-44	540	50.5	221	63.7	155	55.6	164	37.0
45-64	469	43.9	107	30.8	116	41.6	246	55.5
≥65	45	4.2	6	1.7	7	2.5	32	7.2
Number of relapses in past 12 months								
0	327	30.6	162	46.7	89	31.9	76	17.2
1	223	20.9	87	25.1	74	26.5	62	14.0
≥2	88	8.2	16	4.6	37	13.3	35	7.9
Unknown	431	40.3	82	23.6	79	28.3	270	61.0
Years since initial diagnosis								
1	116	10.9	55	15.9	41	14.7	20	4.5
2-5	338	31.6	131	37.8	100	35.8	107	24.2
6-10	163	15.3	50	14.4	36	12.9	77	17.4
11-15	94	8.8	28	8.1	20	7.2	46	10.4
≥16	69	6.5	18	5.2	9	3.2	42	9.5
Don't know	289	27.0	65	18.7	73	26.2	151	34.1
What is this patient's current diagnosis?								
Clinically Isolated Syndrome (CIS)	30	2.8	24	6.9	5	1.8	1	0.2
Relapsing/Remitting	723	67.6	293	84.4	235	84.2	195	44.0
Secondary Progressive	94	8.8	10	2.9	9	3.2	75	16.9
Primary Progressive	138	12.9	8	2.3	18	6.5	112	25.3
Progressive Relapsing	84	7.9	12	3.5	12	4.3	60	13.5
Sex								
Female	651	60.9	229	66.0	176	63.1	246	55.5
Male	418	39.1	118	34.0	103	36.9	197	44.5
Race								
Caucasian	792	74.1	258	74.4	210	75.3	324	73.1
Black	200	18.7	59	17.0	47	16.9	94	21.2
Asian	19	1.8	9	2.6	4	1.4	6	1.4
Hispanic	46	4.3	17	4.9	14	5.0	15	3.4
Other	12	1.1	4	1.2	4	1.4	4	0.9
Employment Status								
Fully employed	471	44.1	246	70.9	162	58.1	63	14.2
Underemployed	598	55.9	101	29.1	117	41.9	380	85.8
Unemployed	436	40.8	60	17.3	65	23.3	311	70.2
Underemployed due to MS	427	39.9	50	14.4	62	22.2	315	71.1
Unemployed due to MS	346	32.4	43	12.4	39	14.0	264	59.6

EDSS = Expanded Disability Status Scale. Higher ratings indicate more severe disability.

Table 2. Logistic regression estimates on employment status

Parameter	Underemployed		Underemployed due to MS		Unemployed		Unemployed due to MS	
	Estimate	SE	Estimate	SE	Estimate	SE	Estimate	SE
EDSS (ref 0-1)								
1.5-2.5	0.44*	(0.19)	0.38	(0.22)	0.13	(0.22)	-0.13	(0.25)
≥3	2.32***	(0.20)	2.34***	(0.20)	2.05***	(0.20)	1.90***	(0.21)
No. relapses in past 12 mos. (ref 0)								
1	0.03	(0.21)	0.19	(0.23)	0.01	(0.24)	0.35	(0.25)
≥2	0.01	(0.29)	-0.34	(0.33)	-0.05	(0.33)	-0.16	(0.36)
Don't Know	1.20***	(0.20)	0.98***	(0.20)	0.87***	(0.20)	1.08***	(0.21)
Age in years (ref <45)								
45-64	1.32***	(0.16)	1.04**	(0.16)	1.66***	(0.1753)	1.38***	(0.17)
≥65	1.95***	(0.58)	-0.38	(0.36)	2.97***	(0.53)	0.28	(0.36)
Male	-0.38*	(0.16)	0.36*	(0.16)	-0.27	(0.17)	0.09	(0.16)
Race (ref Caucasian)								
Asian	0.48	(0.56)	-0.33	(0.68)	-0.43	(0.72)	-0.07	(0.73)
Black	0.48*	(0.21)	0.24	(0.20)	0.43*	(0.21)	0.24	(0.21)
Hispanic	0.61	(0.39)	-0.28	(0.41)	0.06	(0.40)	-0.59	(0.44)
Other	0.47	(0.78)	0.17	(0.72)	1.40	(0.75)	0.77	(0.72)