Table S1. Descriptive statistics for all adult patients with either ischemic stroke, transient ischemic attack, intracerebral hemorrhage, or subarachnoid hemorrhage stratified by whether or not they were included in the analysis.

	All Patients	Included in Analysis	Excluded from Analysis	P-value
N	4149	2190	1959	
Age, mean (SD)	62.2 (14.8)	60.7 (14.8)	63.9 (14.7)	< 0.001
Female	2019 (48.7%)	1083 (49.5%)	936 (47.8%)	0.296
Race				
White	3017 (72.7%)	1737 (79.3%)	1280 (65.3%)	< 0.001
Black	875 (21.1%)	336 (15.3%)	539 (27.5%)	
Other	107 (2.6%)	34 (1.6%)	73 (3.7%)	
Missing	150 (3.6%)	83 (3.8%)	67 (3.4%)	
Marital Status				
Married	2321 (55.9%)	1346 (61.5%)	975 (49.8%)	< 0.001
Single	943 (22.7%)	425 (19.4%)	518 (26.4%)	
Divorced	349 (8.4%)	173 (7.9%)	176 (9.0%)	
Widowed	377 (9.1%)	166 (7.6%)	211 (10.8%)	
Missing	159 (3.8%)	80 (3.7%)	79 (4.0%)	
Median Income by Zip Code (x $1,000), mean (SD)	50.7 (17.8)	52.7 (17.9)	48.3 (17.3)	< 0.001
Systolic Blood Pressure (mm Hg), mean (SD)	129.7 (18.7)	129.8 (18.3)	129.7 (19.1)	0.895
Diastolic Blood Pressure (mm Hg), mean (SD)	74.7 (12.6)	76.1 (12.4)	73.2 (12.6)	< 0.001
Pulse Rate (beats per minute), mean (SD)	75.3 (13.4)	75.1 (13.5)	75.6 (13.3)	0.190
BMI (kg/m²), median (IQR)	28 (24, 32)	28 (24, 32)	27 (24, 32)	0.272
Cancer	828 (20.0%)	459 (21.0%)	369 (18.8%)	0.095
Chronic Renal Failure	341 (8.2%)	145 (6.6%)	196 (10.0%)	< 0.001
Diabetes	1055 (25.4%)	500 (22.8%)	555 (28.3%)	< 0.001
Depression	603 (14.5%)	318 (14.5%)	285 (14.5%)	1.000
Coronary Artery Disease	665 (16.0%)	320 (14.6%)	345 (17.6%)	0.010
Hypertension	2055 (49.5%)	1030 (47.0%)	1025 (52.3%)	< 0.001
Atrial Fibrillation	504 (12.1%)	255 (11.6%)	249 (12.7%)	0.316
Active Antidepressant(s) Prescription	979 (23.6%)	529 (24.2%)	450 (23.0%)	0.390
Stroke Type				
Ischemic Stroke	2700 (65.1%)	1396 (63.7%)	1304 (66.6%)	0.083
Transient Ischemic Attack	681 (16.4%)	380 (17.4%)	301 (15.4%)	
Intracerebral Hemorrhage	410 (9.9%)	210 (9.6%)	200 (10.2%)	
Subarachnoid Hemorrhage	358 (8.6%)	204 (9.3%)	154 (7.9%)	
Days Since Stroke, median (IQR)	63 (32, 340)	67 (32, 389)	59 (31, 267)	0.010
NIHSS Score, median (IQR)	0 (0, 1)	0 (0, 1)	0 (0, 2)	< 0.001
NIHSS Score Categorized				
0	2214 (53.4%)	1244 (56.8%)	970 (49.5%)	< 0.001
1-5	1137 (27.4%)	529 (24.2%)	608 (31.0%)	

>5	249 (6.0%)	79 (3.6%)	170 (8.7%)	
Missing	549 (13.2%)	338 (15.4%)	211 (10.8%)	
Modified Rankin Scale Score, median (IQR)	1 (0, 2)	1 (0, 2)	1 (1, 2)	< 0.001

Patients were excluded from the analysis if they did not complete the PROMIS sleep disturbance scale during the study period. SD = standard deviation; BMI = body mass index; IQR = interquartile range; NIHSS= National Institutes of Health Stroke Scale

Table S2. Characteristics of patients in the study cohort according to whether or not they had more than one visit with patient-reported outcome data.

Patient Characteristics	All Patients	Study Cohort	Excluded	P-value
N	2190	476	1714	
Age, mean (SD)	60.7 (14.8)	59.7 (13.6)	61.0 (15.1)	0.065
Female	1083 (49.5%)	253 (53.2%)	830 (48.4%)	0.076
Race				
White	1737 (79.3%)	404 (84.9%)	1333 (77.8%)	0.002
Black	336 (15.3%)	49 (10.3%)	287 (16.7%)	
Other	34 (1.6%)	9 (1.9%)	25 (1.5%)	
Missing	83 (3.8%)	14 (2.9%)	69 (4.0%)	
Marital Status				
Married	1346 (61.5%)	311 (65.3%)	1035 (60.4%)	0.168
Single	425 (19.4%)	90 (18.9%)	335 (19.5%)	
Divorced	173 (7.9%)	37 (7.8%)	136 (7.9%)	
Widowed	166 (7.6%)	26 (5.5%)	140 (8.2%)	
Missing	80 (3.7%)	12 (2.5%)	68 (4.0%)	
Median Income by Zip Code (x $1,000), mean (SD)	52.7 (17.9)	53.9 (17.2)	52.4 (18.1)	0.098
Cancer	480 (21.9%)	88 (18.5%)	392 (22.9%)	0.047
Chronic Renal Failure	164 (7.5%)	20 (4.2%)	144 (8.4%)	0.003
Diabetes	539 (24.6%)	93 (19.5%)	446 (26.0%)	0.004
Depression	343 (15.7%)	66 (13.9%)	277 (16.2%)	0.251
Coronary Artery Disease	336 (15.3%)	57 (12.0%)	279 (16.3%)	0.026
Hypertension	1082 (49.4%)	232 (48.7%)	850 (49.6%)	0.782
Atrial Fibrillation	278 (12.7%)	50 (10.5%)	228 (13.3%)	0.122
Stroke Subtype				
Ischemic	1396 (63.7%)	303 (63.7%)	1093 (63.8%)	< 0.001
Transient Ischemic Attack	380 (17.4%)	58 (12.2%)	322 (18.8%)	
Intracerebral hemorrhage	210 (9.6%)	56 (11.8%)	154 (9.0%)	
Subarachnoid hemorrhage	204 (9.3%)	59 (12.4%)	145 (8.5%)	
Days Since Stroke, median (IQR)	98 (38, 462.5)	76 (32, 332)	105 (41, 527.5)	< 0.001
NIHSS Score, median (IQR)	0 (0, 1)	0 (0, 1)	0 (0, 1)	0.449
Modified Rankin Scale Score, median (IQR)	1 (0, 2)	1 (1, 2)	1 (0, 2)	0.001
Patient-reported outcome measure scores, mean (SD)				
PROMIS Sleep Disturbance	49.8 (10.4)	49.3 (10.6)	50.0 (10.4)	0.183
PHQ-9 on PROMIS Metric	49.8 (10.7)	50.2 (10.0)	49.7 (10.9)	0.347
PROMIS Physical Function[*]	41.6 (10.5)	40.9 (10.2)	41.8 (10.6)	0.111
PROMIS Fatigue	53.3 (10.5)	53.5 (10.4)	53.2 (10.6)	0.500
PROMIS Anxiety	52.8 (10.2)	52.4 (10.0)	52.8 (10.2)	0.422
PROMIS Pain Interference	52.6 (10.6)	52.1 (10.5)	52.8 (10.7)	0.228
PROMIS Satisfaction with Social Roles[*]	45.1 (11.3)	44.5 (10.8)	45.2 (11.5)	0.209
NeuroQol Cognitive Function[*]	46.7 (10.3)	46.1 (9.9)	46.8 (10.4)	0.359

Patients were included in the study cohort if they completed PROMs twice during study period). *Higher scores indicate better functioning. IQR=interquartile range, SD=standard deviation, PHQ-9 =patient health questionnaire-9; NIHSS = National Institutes of Health Stroke Scale; PROMIS = Patient-Reported Outcome Measurement Information System

Table S3. Results of multivariable linear regression models where PROMIS Sleep Disturbance score was the dependent variable for full sample

N = 2,190	Physical Function[†]		Anxiety		Fatigue		Pain Interference		Social Role Satisfaction[†]		Cognitive Function[†]	
	Estimate (95% CI)	P-value	Estimate (95% CI)	P-value	Estimate (95% CI)	P-value	Estimate (95% CI)	P-value	Estimate (95% CI)	P-value	Estimate (95% CI)	P-value
Age (per year)	-0.06 (-0.09, -0.03)	< 0.001	-0.04 (-0.07, -0.02)	0.001	-0.05 (-0.08, -0.03)	< 0.001	-0.05 (-0.08, -0.02)	< 0.001	-0.05 (-0.08, -0.02)	< 0.001	-0.05 (-0.08, -0.03)	< 0.001
Male (vs. Female)	0.00 (-0.75, 0.75)	0.995	0.36 (-0.37, 1.09)	0.333	0.30 (-0.43, 1.03)	0.417	0.11 (-0.62, 0.84)	0.763	-0.04 (-0.79, 0.70)	0.906	0.04 (-0.71, 0.78)	0.923
Race (vs. White)												
Black	-0.18 (-1.27, 0.90)	0.739	-0.20 (-1.26, 0.85)	0.705	-0.11 (-1.17, 0.95)	0.836	-0.52 (-1.57, 0.53)	0.327	-0.28 (-1.36, 0.80)	0.610	-0.14 (-1.22, 0.94)	0.802
Other	1.85 (-1.03, 4.73)	0.208	1.36 (-1.43, 4.16)	0.338	1.71 (-1.10, 4.51)	0.233	2.09 (-0.70, 4.88)	0.142	1.90 (-0.94, 4.74)	0.189	1.63 (-1.24, 4.49)	0.266
Marital Status (vs. Married)												
Single	0.18 (-0.83, 1.18)	0.730	0.00 (-0.98, 0.97)	0.992	0.37 (-0.61, 1.35)	0.455	0.09 (-0.88, 1.07)	0.856	0.23 (-0.77, 1.22)	0.657	0.17 (-0.82, 1.16)	0.734
Divorced	0.82 (-0.55, 2.18)	0.241	0.70 (-0.63, 2.03)	0.304	0.64 (-0.69, 1.97)	0.344	0.53 (-0.81, 1.86)	0.439	0.58 (-0.77, 1.93)	0.398	0.74 (-0.61, 2.09)	0.283
Widowed	1.18 (-0.26, 2.63)	0.108	1.17 (-0.24, 2.57)	0.104	1.27 (-0.14, 2.68)	0.078	1.28 (-0.12, 2.68)	0.073	1.32 (-0.11, 2.76)	0.071	1.24 (-0.20, 2.68)	0.090
Median Income (per $10,000)*	-0.10 (-0.32, 0.12)	0.382	-0.09 (-0.31, 0.12)	0.382	-0.10 (-0.31, 0.12)	0.376	-0.05 (-0.27, 0.16)	0.626	-0.08 (-0.30, 0.14)	0.473	-0.09 (-0.31, 0.13)	0.443
mRS (vs. 0-1)												
2-3	-0.85 (-1.76, 0.06)	0.068	-0.53 (-1.36, 0.31)	0.217	-0.83 (-1.66, 0.01)	0.052	-0.73 (-1.56, 0.10)	0.084	-1.23 (-2.12, -0.35)	0.006	-0.91 (-1.76, -0.07)	0.034
4-5	-3.31 (-5.49, -1.13)	0.003	-2.78 (-4.78, -0.77)	0.007	-3.01 (-4.98, -1.04)	0.003	-2.91 (-4.90, -0.92)	0.004	-3.83 (-5.88, -1.78)	< 0.001	-3.39 (-5.39, -1.39)	< 0.001
Days Since Stroke (vs. < 90 days)												
90-365	1.16 (0.09, 2.23)	0.033	1.18 (0.14, 2.22)	0.026	1.02 (-0.03, 2.07)	0.056	0.89 (-0.15, 1.93)	0.093	1.20 (0.14, 2.27)	0.027	1.04 (-0.04, 2.12)	0.060
> 365	0.54 (-0.40, 1.49)	0.259	0.75 (-0.17, 1.67)	0.111	0.48 (-0.42, 1.38)	0.294	0.15 (-0.80, 1.10)	0.752	0.66 (-0.26, 1.58)	0.161	0.38 (-0.55, 1.31)	0.421
PHQ-9 on PROMIS Metric	0.53 (0.49, 0.57)	< 0.001	0.37 (0.32, 0.42)	< 0.001	0.37 (0.32, 0.42)	< 0.001	0.45 (0.41, 0.49)	< 0.001	0.47 (0.43, 0.51)	< 0.001	0.47 (0.42, 0.52)	< 0.001
PRO Score	-0.06 (-0.11, -0.01)	0.010	0.28 (0.22, 0.33)	< 0.001	0.26 (0.21, 0.31)	< 0.001	0.22 (0.18, 0.26)	< 0.001	-0.15 (-0.19, -0.10)	< 0.001	-0.15 (-0.20, -0.09)	< 0.001

*Median household income estimated from ZIP code. †Higher scores indicate better function.

mRS= modified Rankin Scale; PHQ-9 = Patient Health Questionnaire 9 depression screen; PROMIS = Patient-Reported Outcome Measurement Information System

Table S4. Effect of baseline PROMIS sleep disturbance score on change in PROMIS and NeuroQoL domain scores in multivariable models that include modified version of the PHQ-9 scale with sleep item removed

Dependent Variable	Estimate of PROMIS Sleep Disturbance (95% Confidence Interval)	Holm-Adjusted P-value
PHQ-9 on PROMIS Metric (N=428)	**0.25 (0.17, 0.33)**	**< 0.001**
PROMIS Physical Function (N=468)*	**-0.14 (-0.20, -0.08)**	**< 0.001**
PROMIS Fatigue (N=459)	**0.17 (0.09, 0.24)**	**< 0.001**
PROMIS Anxiety (N=455)	**0.11 (0.03, 0.19)**	**0.016**
PROMIS Pain Interference (N=438)	0.08 (0.00, 0.15)	0.110
PROMIS Satisfaction with Social Roles (N=431) *	**-0.17 (-0.26, -0.08)**	**< 0.001**
NeuroQol Cognitive Function (N=332) *	-0.08 (-0.21, 0.04)	0.186

In each model, the dependent variable is the follow-up PROMIS/NeuroQol domain score, and the independent variable is the baseline PROMIS sleep disturbance score. Covariate includes corresponding baseline PROMIS/NeuroQoL score and the variables: baseline PHQ-8 score (sleep item removed from the PHQ-9 scale), age, sex, race, marital status, median income by ZIP code, baseline modified Rankin Scale score, time since stroke, and interval between PROM measurements. *higher scores indicate better functioning