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Comparison between EQ-5D-5L and PROMIS-10 to evaluate health-related quality of life 3 months after stroke: A cross-sectional multicenter study

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Abstract

Background: Although the use of patient-reported outcome measures to assess Health-Related Quality of Life (HRQoL) has been advocated, it is still open to debate which patient-reported outcome measure should be preferred to evaluate HRQoL after stroke.

Aim: To compare the measurement properties (including concurrent validity and discriminant ability) between the 5-dimensional 5-level EuroQol (EQ-5D-5L) and the Patient-Reported Outcomes Measurement Information System 10-Question Global Health Short Form (PROMIS-10) to evaluate HRQoL 3 months after stroke.

Design: Cross-sectional study.

Setting: Neurology outpatient clinics in 6 Dutch hospitals.

Population: 360 consecutive individuals with stroke. The median age of the participants was 71 years, 143 (39.7%) were female and 335 (93.0%) had suffered an ischemic stroke.

Methods: The EQ-5D-5L, PROMIS-10, modified Rankin Scale and two items on experienced decrease in health and activities post-stroke were administered by a stroke nurse or nurse practitioner through a telephone interview 3 months after stroke. The internal consistency, distribution, floor/ceiling effects, inter-correlations and discriminant ability (using the modified Rankin Scale and experienced decrease in health and in activities post-stroke as external anchors) were calculated for both the EQ-5D-5L and PROMIS-10.

Results: Ninety-six percent of the participants were living at home and 50.9% experienced minimal or no disabilities (modified Rankin Scale 0-1) 3 months after

stroke. A ceiling effect and a non-normal left skewed distribution were observed in the EQ-5D-5L. The PROMIS-10 showed higher internal consistency (α=0.90) compared to the EQ-5D-5L (α=0.75). Both the EQ-5D-5L and the PROMIS-10 were strongly correlated with the modified Rankin Scale (*r*=0.62 and 0.60 respectively). The PROMIS-10 showed better discriminant ability in less affected individuals with stroke, whereas the EQ-5D-5L showed slightly better discriminant ability in more affected individuals with stroke.

Conclusions: Both EQ-5D-5L and PROMIS-10 prove to be useful instruments to evaluate HRQoL in patients who are living at home 3 months after stroke.

Clinical Rehabilitation Impact: It depends on the setting and underlying goal which patient-reported outcome measure is preferred to evaluate HRQoL 3 months after stroke. The PROMIS-10 should be preferred to detect differences in less affected stroke patients, whereas the EQ-5D-5L provides slightly more information in more affected stroke patients.

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Introduction

Stroke is the second most common cause of death and the third most common cause of disability in the world.[1] The aging population and improvements in acute treatment such as intravenous thrombolysis and intra-arterial thrombectomy lead to a growing number of stroke survivors. Consequently, the number of stroke patients that have to cope with long-term sequelae of stroke is also increasing, which puts a strain on their health-related quality of life (HRQoL) and raises health care expenditures.[2] Clinical stroke audits can provide valuable information to evaluate stroke treatments, quality of stroke care and HRQoL of stroke patients.[3] However, current stroke audits are mainly focused on the acute stroke care and measurement of long-term outcome measures are scarce.[4]

A variety in quality indicators in clinical stroke audits has been observed across Europe.[4] In most countries the mortality rate during hospital stay is the only outcome measure included in the stroke audit, in some countries (including The Netherlands) accompanied with the modified Ranking Scale (mRS) measured 3 months after stroke.[5] The mRS is also the most commonly used outcome measure in clinical stroke trials.[6] It measures disability due to stroke on a single seven-point scale, incorporating body functions, activity and participation.[7] Even though the mRS is widely used, relevant shortcomings of this instrument are its lack of specificity[7] and a large interobserver variability.[8] Furthermore, the mRS measures mainly independence in the domains of mobility and self-care, and hardly takes cognitive, social or emotional functioning into account. Moreover, the mRS is a clinician-reported outcome measure. Therefore, it may not capture all the aspects of outcome that are important for the patients themselves.[9]

A recent study showed that almost half of stroke patients, who have mild limitations (median mRS score 1) as assessed by the clinician, experienced poor HRQoL as assessed by the Patient-Reported Outcomes Measurement Information System computer adaptive testing scales about physical function, satisfaction with social roles, pain and fatigue.[10] These findings emphasize the importance of a patient-reported outcome measure (PROM) to evaluate HRQoL after stroke. Moreover, the use of PROMs to evaluate HRQoL after stroke may lead to improving shared-decision making and facilitation of personalized care[11] and is in agreement with the contemporary concept of value-based health care (VBHC).[12] Compared with the growing use of PROMs in clinical practice and as performance indicator in stroke care,[9] the use of PROMs in current stroke trials is still lagging behind.[13] Moreover, to date no consensus has been reached on the preferred PROM to evaluate HRQoL post-stroke.[14] The huge heterogeneity in PROMs employed in clinical stroke trials limits the comparability of study results.[13]

The EuroQol 5-dimensional 5-level questionnaire (EQ-5D-5L) and the Patient Reported Outcomes Measurement Information System 10-Question Global Health Short Form (PROMIS-10) are among the most widely used and most promising PROMs in current stroke research.[9] The EQ-5D-5L has shown validity and reliability in stroke populations and is often used in cost-effectiveness analyses.[15] The use of the PROMIS-10 as part of the standard set of outcome measures after stroke has been recommended by an international expert panel (International Consortium for Health Outcomes Measurement [ICHOM]), since it covers the majority of the domains of HRQoL considered most important by the expert panel (representing patients, advocates, and clinical specialists in stroke outcomes, stroke registers, global health, epidemiology, and rehabilitation).[16,17] However, the clinical and research experience

with the PROMIS-10 after stroke is limited and concerns have been raised about its practical implementation.[18,19] Besides, the PROMIS-10 is twice the length compared to the EQ-5D-5L (10 items versus 5 items respectively), but in contrast to the EQ-5D-5L also covers the domains of general quality of life, fatigue and social roles.[20] "No problems" indicate the maximum item score in the EQ-5D-5L, whereas individuals should score their health as "excellent" to achieve the maximum item score in the PROMIS-10.

In summary, although the use of PROMs have been advocated from a VBHC perspective,[14] it is still open to debate which PROM should be preferred after stroke. Therefore, the aim of this study was to compare the measurement properties (floor- and ceiling effects, internal consistency, concurrent validity and discriminant ability) between the EQ-5D-5L and PROMIS-10 to evaluate HRQoL 3 months after stroke.

Materials and methods

Study design

In this cross-sectional study data were collected in individuals with stroke 3 months after stroke onset. Inclusion took place in 6 Dutch hospitals between September 2017 and September 2018. Individuals who had suffered a stroke and were admitted to one of the stroke units of the six participating hospitals were eligible for inclusion. All individuals with stroke received a letter informing them about this study, after which informed consent was acquired. The EQ-5D-5L, PROMIS-10, mRS, self-reported decrease in health post-stroke and self-reported decrease in activities post-stroke were administered by a stroke nurse or nurse practitioner at the outpatient clinic through a telephone interview 3 months after stroke.[21] The stroke

nurses and nurse practitioners were already trained to perform telephone interviews as part of regular follow-up assessments after stroke. Before the start of the study, all stroke nurses and nurse practitioners were provided with the same instructions about the use of the extra questionnaires to screen for the consequences of stroke, including information on possibilities to elucidate certain questions to the patients. An interview took on average 30 minutes. Demographic (sex, age, marital status, residency and level of education) and stroke-related information (type and localization of stroke, severity of stroke, ADL-dependency) were obtained from medical records by the stroke nurse. The Medical Ethics Committee of the University Medical Center Utrecht declared that the study did not need formal approval under Dutch law (2017-441C). All participating hospitals approved the study.

Clinician-reported measures

Stroke severity was assessed with the National Institutes of Health Stroke Scale (NIHSS) at hospital admission. Scores range from 0–42 and higher scores indicate more severe stroke.[22] ADL-dependency was assessed with the Collin and Wade version of the Barthel Index (BI) four days after stroke and at discharge from the hospital.[23] Scores range from 0–20 and were dichotomized into “ADL dependent” (BI ≤ 17) and “ADL independent” (BI > 17). BI is a validated measure often used in stroke.[24]

Modified Rankin Scale

The Rankin score was introduced in 1957 to assess clinical outcomes in stroke patients and was modified to its present version in the UK-TIA study in the late 1980s.[7] Its validity and reliability has been examined thoroughly and have been

confirmed.[25] The mRS is a single ordinal seven-point scale (ranging from 0 to 6) aiming to categorize level of disability after stroke.[26] The categories are “no symptoms” (mRS 0), “no significant disability, despite symptoms” (mRS 1), “slight disability” (mRS 2), “moderate disability: requires some help, able to walk” (mRS 3), “moderately severe disability: unable to walk, ADL dependent” (mRS 4), “severe disability: bedridden, requires constant nursing care” (mRS 5) and “death” (mRS 6).

Patient-reported measures

EQ-5D-5L

The EQ-5D-5L consists of 5 items, each covering a HRQoL domain, namely mobility, self-care, usual activities, pain or discomfort and anxiety or depression and each item is scored on a 5-point scale: “no problems”, “slight problems”, “moderate problems”, “severe problems” and “extreme problems/unable”.[27] This version has proven to be valid with enhanced discriminatory power over the 3-level version (EQ-5D-3L).[28,29] The scores of the EQ-5D-5L items were converted into a total value score, using the EuroQol crosswalk index value calculator, in which a perfect health score is valued as a score of 100 and a health state worse than death is valued as a negative score, anchoring death at a score of 0.[30]

PROMIS-10

The PROMIS-10 is a HRQoL measure reporting 10 items on physical, mental and social health (e.g. “In general, how would you rate your satisfaction with your social activities and relationships?“) and has been developed as a global health short-form from the comprehensive PROMIS item banks.[31] Most items are scored on a 5-point scale, ranging from “excellent” to “poor” (items 1-6 about mental/physical

quality of life and social activities), “not at all” to “completely” (item 7 about fatigue), “never” to “always” (item 8 about emotional problems) and “none” to “very severe” (item 9 about fatigue). The last item (“How would you rate your pain on average?”) is scored on a 10-point scale ranging from “no pain” to “the worst imaginable pain”. The scores of the PROMIS-10 items were used to compute total scores ranging from 0-100 (higher scores indicate better outcome). The content of the PROMIS-10 incorporates important components of the World Health Organization's International Classification of Functioning, Disability and Health (ICF), including body functions, activity and participation.[32] The PROMIS-10 has acceptable measurement properties in the stroke population, showing moderate internal reliability and convergent validity, and excellent discriminant validity across mRS levels.[20]

Patient-reported decrease in HRQoL post-stroke

Two items were used to evaluate participants’ experienced decrease in HRQoL associated with the onset of stroke. The first item asked participants to rate the decrease in their health they experienced associated with the onset of stroke. The second item asked participants to rate the decrease in their activities associated with the onset of stroke. The experienced decrease was measured on a 4-point response scale (“none”, “a little”, “strong” and “very strong”) in both items.

Statistical analysis

All analyses were conducted with IBM SPSS version 25 (IBM, Armonk, NY). Descriptive statistics were used to describe participant characteristics and all measures. Floor and ceiling effects were considered present if >15% of participants achieved the worst score (floor effect) or the best score (ceiling effect). The internal

consistency was examined by calculating Cronbach's alpha, which was considered acceptable at an $\alpha > 0.70$.[33]

Bivariate associations between the EQ-5D-5L, PROMIS-10 and mRS were tested using Spearman correlations. Correlation coefficients were interpreted as weak (0.10), moderate (0.30) or strong (0.50).[34] A strong correlation was interpreted as a positive finding (concurrent validity). The distribution of the EQ-5D-5L and PROMIS-10 across the mRS levels and reported decrease in health and activities since stroke were graphically displayed with boxplots. High variance within mRS levels was interpreted as a positive finding (showing potentially relevant information to evaluate HRQoL after stroke). We explored the discriminant ability of the EQ-5D-5L and PROMIS-10 with patient-reported (levels of experienced decrease in health and in activities post-stroke) and clinician-reported (mRS levels) external anchors. Effect sizes were calculated (Hedges' *g*) and interpreted as weak (0.20), moderate (0.50) or strong (0.80). Statistical significance was established in the event of an alpha-level smaller than 0.05.

Results

Participant characteristics are presented in Table 1. A total of 360 participants were included in this study, of whom 39.7% were female. Nearly all participants lived at home 3 months post-stroke. In concordance with national incidence rates, a majority of participants suffered an ischemic stroke, most strokes were mild and most participants were ADL independent after the event. The majority of participants had no significant (mRS 1) or slight disability (mRS 2), whereas only 12% of participants suffered moderate to severe disability (mRS 3-5) 3 months after stroke (Table 2). In

this study, the mRS scores of 3, 4 and 5 were clustered because of insufficient numbers of participants in these categories. Approximately one-third of the participants did not report any decrease in health (36.7%) or in activities (33.1%) post-stroke (Table 2). Because of insufficient numbers of participants reporting very strong decrease in health and activities, the responses “strong” and “very strong” were clustered in both items.

Internal consistency

The PROMIS-10 showed greater internal consistency (α=0.90) compared to the EQ-5D-5L (α=0.75), although both Cronbach's alphas were considered acceptable (Table 2).

Distribution

The EQ-5D-5L showed a non-normal left-skewed distribution with a ceiling effect (21.4% maximum score), whereas the PROMIS-10 had a normal distribution and showed no sign of floor or ceiling effects (Figure 1). The observed ceiling effect in the EQ-5D-5L mainly occurred in participants with no or no significant disabilities (mRS 0-1) 3 months after stroke (Figure 2) and in participants who did not report any decrease in health and in activities post-stroke (Figure 3). Participants with slight to severe disability (mRS 2-5) and participants who reported strong decrease in health and in activities showed higher variation in EQ-5D-5L scores compared to participants with no or no significant disability (mRS 0-1) and participants who did not

report any decrease in health or in activities post-stroke (Figure 2 and 3). A high variation in PROMIS-10 scores was observed across all mRS levels and all levels of reported decrease in health and in activities post-stroke, even in participants with no disabilities (mRS 0) or participants who did not report any decrease in health or in activities 3 months after stroke (Figure 2 and 3).

Concurrent validity

Both the EQ-5D-5L (r=-0.62) and PROMIS-10 (r=-0.60) showed strong and significant negative correlations with the mRS. A strong and significant positive correlation (r=0.74) was observed between the EQ-5D-5L and PROMIS-10.

Discriminant ability

The EQ-5D-5L showed strong ability to detect differences between participants with no significant versus slight (mRS 1 vs. 2) and slight versus moderate to severe disabilities (mRS 2 vs. 3-5), whereas its ability to detect differences between participants with no versus no significant disabilities (mRS 0 vs. 1) was moderate (Table 3). The PROMIS-10 showed strong ability to detect differences across all mRS levels, especially between participants with no versus no significant disabilities (mRS 0 vs. 1) 3 months after stroke (Table 3).

The EQ-5D-5L showed strong ability to detect differences between participants who reported a little versus strong decrease in health and in activities, whereas its ability to detect differences between participants who did not report any decrease versus participants who reported a little decrease in health and in activities

was moderate (Table 3). The PROMIS-10 showed strong ability to detect differences between all levels of patient-reported decrease in health and in activities post-stroke (Table 3).

Discussion

The aim of this study was to compare the measurement properties (floor- and ceiling effects, internal consistency, concurrent validity and discriminant ability) between the EQ-5D-5L and PROMIS-10 to evaluate HRQoL 3 months after stroke. The EQ-5D-5L appeared to have a non-normal left-skewed distribution with a ceiling effect, whereas the PROMIS-10 showed no ceiling effect and a normal distribution. The PROMIS-10 showed greater internal consistency (although both Cronbach's Alphas were considered acceptable) and both PROMs achieved adequate concurrent validity (showing strong correlations with the mRS). The PROMIS-10 showed better discriminant ability in less affected individuals with stroke, whereas the EQ-5D-5L showed slightly better discriminant ability in more affected individuals with stroke. Overall, the PROMIS-10 had slightly better measurement properties than the EQ-5D-5L.

EQ-5D-5L

The EuroQol is a feasible and commonly used PROM to evaluate HRQoL in stroke research and clinical stroke audits, and has been proven reliable, responsive and valid in the stroke population.[15,29,35] One retrospective cohort study did also find a ceiling effect (17.2% maximum scores) at the first ambulatory visit after hospital admission of 3283 individuals with stroke treated in a stroke unit in the United

States,[14] whereas one prospective cohort study with 112 participants on a stroke ward in a Polish hospital did not find a ceiling effect (7.1% maximum scores) of the EQ-5D-5L at follow-up 4 months after stroke.[35] Differences in study design and follow-up duration may partially explain these diverging results. The observed ceiling effect of the EQ-5D-5L may have caused loss of relevant information in our study, as many participants with maximum EQ-5D-5L scores 3 months after stroke had minor (51.9% mRS 1) to slight disabilities (7.8% mRS 2) and often experienced deterioration in health (24.7%) and in activities (32.5%) post-stroke.

In this study, the EQ-5D-5L showed slightly stronger associations with the mRS as compared to previous studies.[14,35] Furthermore, the discriminant ability between the EQ-5D-5L across different mRS levels has not been explored in current stroke literature to our knowledge. One American prospective cohort study found similar HRQoL scores in patients with mRS 2 and mRS 3 outcomes using the EQ-5D-3L 3 months after stroke, whereas good discriminant ability was observed between all other mRS levels. However, the EQ-5D-3L has worse discriminant ability compared to the EQ-5D-5L.[28]

PROMIS-10

In contrast to the EQ-5D-5L, the PROMIS-10 showed no ceiling effect in patients who did not experience any decrease in health or activities post-stroke or scored mRS 0 (no symptoms) in our study. This could be explained by the response categories of both PROMs, as maximum scores on the PROMIS-10 items indicate “excellent” HRQoL, whereas maximum scores on the EQ-5D-5L items indicate the “no problems”. A validation study of the PROMIS-10 in the stroke population showed

similar internal consistency (α =0.82-0.88) and discriminant ability across mRS scores as our study.[20] Furthermore, only moderate correlations between PROMIS-10 items and mRS were observed, whereas a strong association was found in our study.[20]

Implementation of PROMs

Both EQ-5D-5L and PROMIS-10 provided potentially relevant additional information to evaluate HRQoL 3 months after stroke, as a high variation of EQ-5D-5L and PROMIS-10 scores among participants within each mRS score was found. This finding confirms previous literature showing the potentially valuable information PROMs could add to the mRS after stroke.[14] Although concerns have been raised about practical challenges in the implementation of PROMs in clinical practices,[19,36] the implementation of PROMs (including the EQ-5D-5L) as outcome measure in stroke patients recently proved to be feasible in a Dutch outpatient rehabilitation clinic.[18] Besides, the addition of a PROM to the clinical stroke audits could also provide potential benefits for stroke research, as patient-relevant outcome could be assessed using a continuous scale (potentially improving the power to detect change) and across different domains affected by the stroke.[37]

Future research

In this study, we chose to use the generic PROMIS-10 (as recommended by the ICHOM) and the EQ-5D-5L. Several other PROMIS scales from the comprehensive PROMIS item banks have proven to be potentially useful as outcome measure after stroke, such as the computer-adaptive scales on physical health and

fatigue.[14,20,38,39] A recent systematic review in patients with aneurysmal subarachnoid hemorrhage recommended the use of a disease-specific PROM to fully capture disease-specific long-term consequences (for example cognitive deficits or communication problems).[40] Therefore, we recently validated the addition of an item on cognitive problems to the EQ-5D-5L (EQ-5D-5L+C),[41] as cognitive problems are highly prevalent after stroke and are strongly associated with decreased quality of life.[42] Comparing measurement properties between generic PROMs (such as PROMIS-10 and EQ-5D-5L+C) and disease-specific PROMs (such as the Neuro-QoL, Stroke Impact Scale and the Stroke Specific Quality Of Life scale) to evaluate HRQoL after stroke would be an interesting direction for future research.

Study limitations

The study population consisted mainly of patients with relatively mild ischemic strokes who were living at home. Consequently, mRS scores 3 to 5 were grouped because of small numbers of high mRS scores in the study population. One explanation could be that stroke nurses had more difficulties to contact patients who were living in nursery homes or inpatient rehabilitation facilities 3 months after stroke, which may have caused selection bias. This could negatively affect the generalizability of the results to severely affected stroke patient (mRS 3-5). However, current epidemiological studies show that most people have relatively mild ischemic strokes.[5] Furthermore, no information was obtained on the rehabilitation interventions that participants could have received in the first 3 months after stroke.

Conclusions

Our study confirms the importance of using PROMs to evaluate HRQoL in patients who are living at home 3 months after stroke. Both EQ-5D-5L and PROMIS-10 prove to be useful instruments to evaluate HRQoL 3 months after stroke. It depends on the setting and underlying goal which PROM is preferred. The PROMIS-10 should be preferred to detect differences in less affected stroke patients, whereas the EQ-5D-5L provides slightly more information in more affected stroke patients 3 months after stroke. One might argue that the EQ-5D-5L is suitable if detecting "problems" post-stroke is the main goal, whereas the PROMIS-10 is more appropriate if one is interested in screening on "general health" post-stroke. Practically speaking, the EQ-5D-5L is notably shorter, easier to understand and to administer, but also less comprehensive as important domains post-stroke such as fatigue, cognitive functioning and social roles are lacking. As both EQ-5D-5L and PROMIS-10 are useful PROMs in clinical practice to evaluate HRQoL during follow-up assessment after stroke, our results may provide clinicians with valuable clues to select and implement the PROM that will best suit their needs depending on the underlying goal, clinical setting and stroke population.

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Notes

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Tables

Table 1. Patients characteristics (*n* = 360)

Demographic factors (3 months after stroke)	
Sex (% male)	60.3
Age in years (at time of stroke)	71.0 (17.0)[a]
Marital status (% living together)	72.2
Residency (% living at home)	96.9
Stroke-related factors	
Ischemic stroke (%)	93.0
Hemorrhagic stroke (%)	7.0
Left hemisphere (%)	46.1
Severity of stroke (NIHSS) at hospital admission (n = 242)	3.0 (3.0)[a]
No or minor stroke symptoms (% NIHSS ≤ 4)	68.2
Moderate to severe stroke symptoms (% NIHSS > 4)	31.8
ADL dependency (BI) 4 days after stroke (n = 275)	20.0 (2.0)[a]
% ADL-dependent (BI ≤17)	37.1
ADL dependency (BI) at discharge (n = 264)	20.0 (2.0)[a]
% ADL-dependent (BI ≤17)	23.5

Abbreviations: ADL, activities of daily living; BI, Barthel Index; NIHSS, National Institutes of Health Stroke Scale.

[a] Median (IQR, interquartile range)

Table 2: Frequencies and descriptive statistics of the EQ-5D-5L, PROMIS-10, mRS and patient-reported decrease in health and in activities 3 months after stroke.

	Mean	± SD	Median	IQR	% maximum	α
EQ-5D-5L	78.0	± 19.6	80.8	69.4 – 91.7	21.4	0.75
PROMIS-10	54.3	± 18.5	55.0	42.5 – 65.0	1.9	0.90
mRS itemscores:					*n*	%
0: No symptoms					47	13.1
1: No significant disability, despite symptoms					136	37.8
2: Slight disability					134	37.2
3: Moderate disability: requires some help, able to walk					30	8.3
4: Moderately severe disability: unable to walk, ADL dependent					11	3.1
5: Severe disability: bedridden, requires constant nursing care					2	0.6
Patient-reported decrease in health and in activities post-stroke:					*n*	%
No decrease in health					132	36.7
A little decrease in health					164	45.6
Strong decrease in health					64	17.8
No decrease in activities					119	33.1
A little decrease in activities					155	43.1
Strong decrease in activities					86	23.9

Abbreviations: α, Chronbach's alpha; EQ-5D-5L, EuroQol 5-dimensional 5-level value score; IQR, interquartile range; mRS, Modified Rankin Scale; PROMIS-10, Patient Reported Outcomes Measurement Information System 10-Question Short Form.

Table 3: Ability of the EQ-5D-5L and PROMIS-10 to discriminate between adjacent mRS levels (mRS 0 vs. mRS 1, mRS 1 vs. mRS 2 en mRS 2 vs. mRS 3-5) and different levels of patient-reported decrease in health and in activities post-stroke.

		Mean Δ	SE Δ	P-value	95% CI Δ	Hedges' *g*
EQ-5D-5L	mRS 0 vs. mRS 1	7.56	2.57	0.018*	0.94-14.19	0.71
	mRS 1 vs. mRS 2	14.45	1.85	<0.001*	9.69-19.22	1.04
	mRS 2 vs. mRS 3-5	20.12	2.66	<0.001*	13.26-26.98	1.07
	No vs. a little decrease in health	10.59	1.93	<0.001*	6.05-15.12	0.71
	A little vs. strong decrease in health	20.17	2.43	<0.001*	14.46-25.89	1.13
	No vs. a little decrease in activities	8.57	2.00	<0.001*	3.86-13.27	0.60
	A little vs. strong decrease in activities	20.01	2.20	<0.001*	14.82-25.20	1.14
PROMIS-10	mRS 0 vs. mRS 1	14.11	2.47	<0.001*	7.72-20.49	0.96
	mRS 1 vs. mRS 2	12.61	1.78	<0.001*	8.02-17.20	0.89
	mRS 2 vs. mRS 3-5	13.06	2.56	<0.001*	6.45-19.67	0.87
	No vs. a little decrease in health	12.36	1.75	<0.001*	8.25-16.48	0.81
	A little vs. strong decrease in health	18.89	2.20	<0.001*	13.70-24.08	1.04
	No vs. a little decrease in activities	12.95	1.84	<0.001*	8.62-17.29	0.85
	A little vs. strong decrease in activities	15.59	2.03	<0.001*	10.80-20.37	1.04

Abbreviations: Δ, difference; CI, confidence interval; EQ-5D-5L, EuroQol 5-dimensional 5-level value score; mRS, Modified Rankin Scale; PROMIS-10, Patient Reported Outcomes Measurement Information System 10-Question Short Form; SE, standard error.

[b] Higher mRS scores indicate worse disability.

* $p < 0.05$

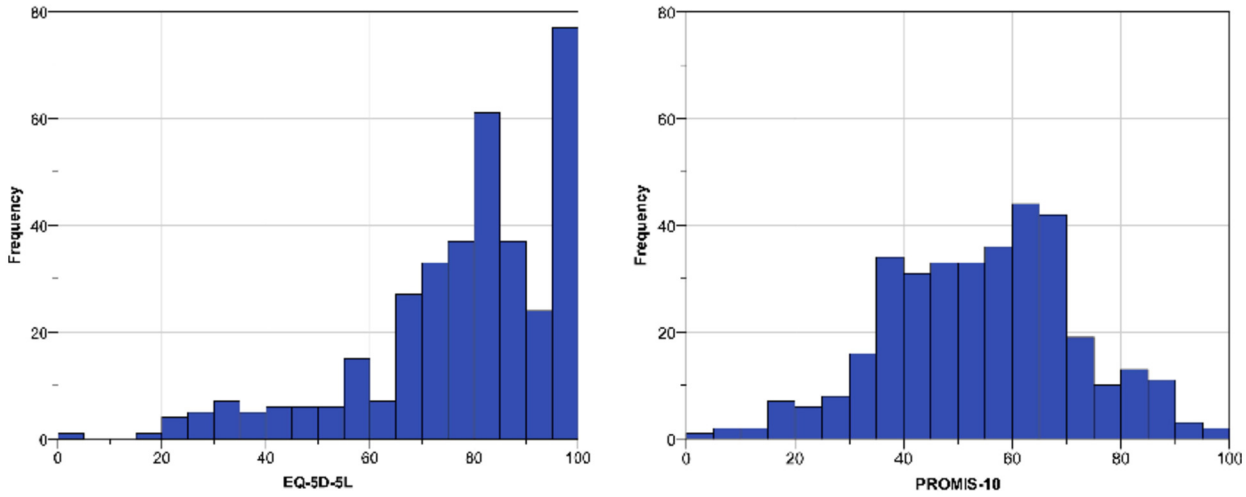
Titles of figures

Figure 1: Frequency distribution of the EQ-5D-5L and PROMIS-10.

Figure 2: Distribution of the EQ-5D-5L and PROMIS-10 across mRS scores 3 months after stroke.

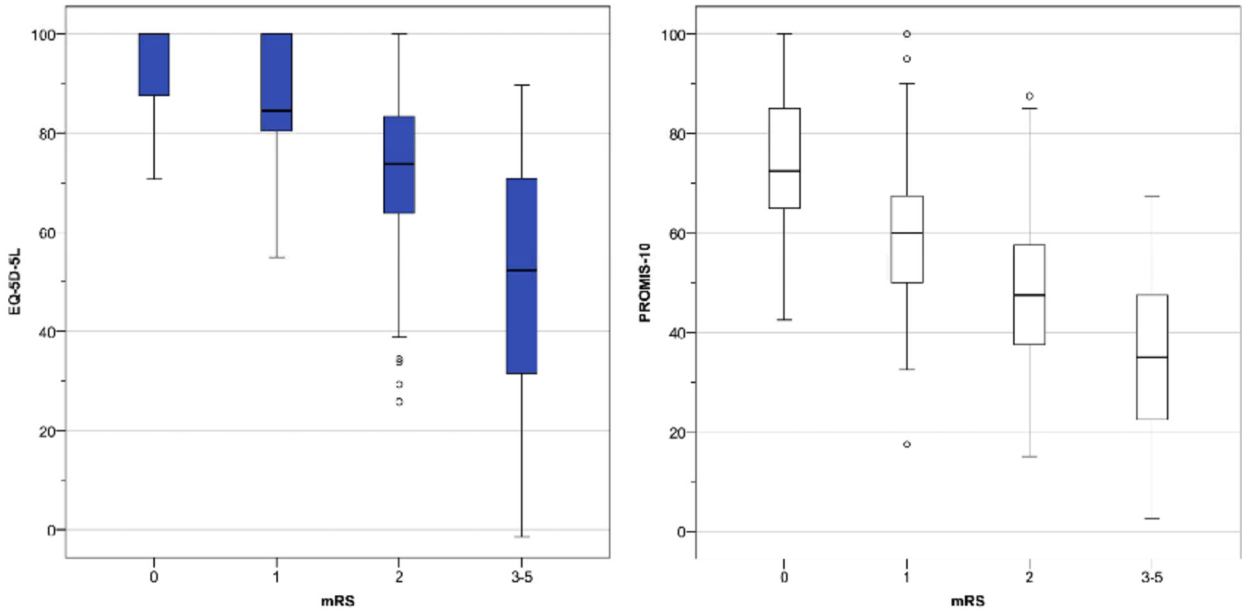
Figure 3: Distribution of the EQ-5D-5L and PROMIS-10 across different levels of patient-reported decrease in health (blue) and in daily activities (white).

Figure 1: Frequency distribution of the EQ-5D-5L and PROMIS-10.



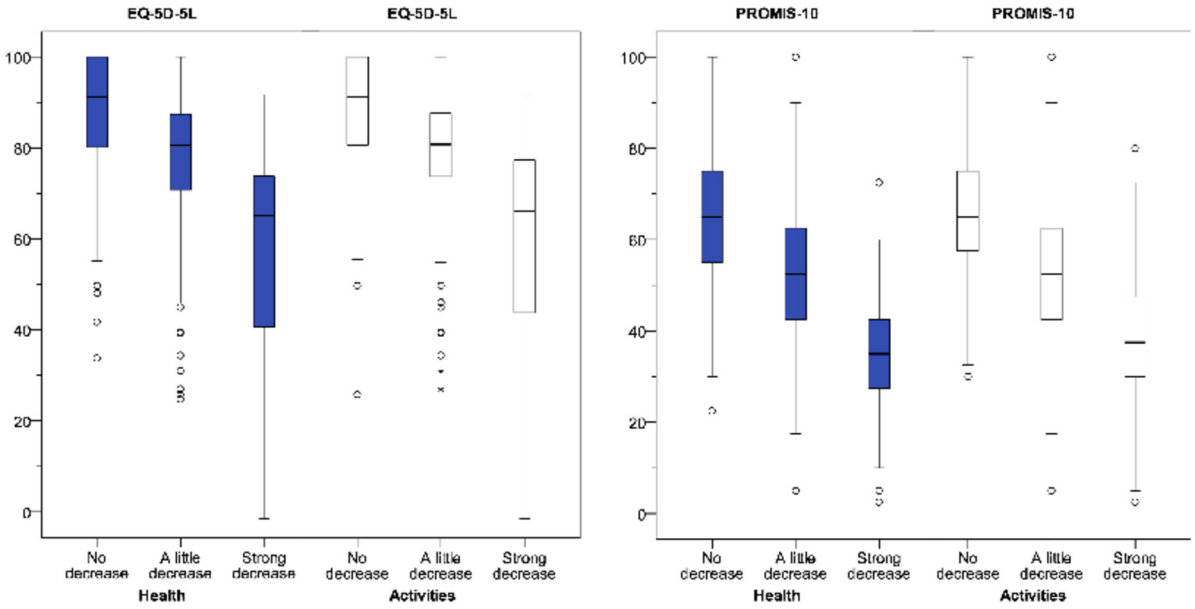
Abbreviations: EQ-5D-5L, EuroQol 5-dimensional 5-level value score; PROMIS-10, Patient Reported Outcomes Measurement Information System 10-Question Short Form.
Note: Higher EQ-5D-5L and PROMIS-10 scores indicate better function.

Figure 2: Distribution of the EQ-5D-5L and PROMIS-10 across mRS scores 3 months after stroke.



Abbreviations: EQ-5D-5L, EuroQol 5-dimensional 5-level value score; mRS, Modified Rankin Scale; PROMIS-10, Patient Reported Outcomes Measurement Information System 10-Question Short Form.
Note: the thick horizontal bar in the boxes represents the median for each mRS level. The ends of the boxes represent the first and third quartiles. The vertical line represents the minimum and maximum score (inside 1.5 IQR). The open dots represent outliers (outside 1.5 IQR). Higher mRS scores indicate worse disability, higher EQ-5D-5L and PROMIS-10 scores indicate better function.

Figure 3: Distribution of the EQ-5D-5L and PROMIS-10 across different levels of patient-reported decrease in health (blue) and in daily activities (white).



Abbreviations: EQ-5D-5L, EuroQol 5-dimensional 5-level value score; PROMIS-10, Patient Reported Outcomes Measurement Information System 10-Question Short Form.
Note: The thick horizontal bar in the boxes represents the median for the EQ-5D-5L and PROMIS-10. The ends of the boxes represent the first and third quartiles. The vertical line represents the minimum and maximum score (inside 1.5 IQR). The open dots represent outliers (outside 1.5 IQR). Higher EQ-5D-5L and PROMIS-10 scores indicate better function.