

Psychometric Properties of Quality of Life and Health-Related Quality of Life Assessments in People with Multiple Sclerosis

Learmonth, Y. C., Hubbard, E. A., McAuley, E. Motl, R. W.

Department of Kinesiology and Community Health,
University of Illinois at Urbana-Champaign,
Urbana, IL, USA



Quality of life defined

- Quality of life (QOL)
 - Subjective well-being or Satisfaction with life^{1, 2}
- Health related-QOL (HRQOL)
 - Physical & psychological aspects of evaluating one's health status^{3,4}
- Both are lower in MS
 - Compared with healthier population⁵
 - Compared with other disease population⁶⁻⁸

RESEARCH PAPER

Multiple Sclerosis 2008; 14: 129–135

Effect of exercise training on quality of life in multiple sclerosis: a meta-analysis

RW Motl and JL Gosney

Editorial

MULTIPLE
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Does the patient know best? Quality of life assessment in multiple sclerosis trials

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Measurement of QOL & HRQOL

- Generic scales
 - 12-item Short Form Health Survey (SF-12)¹¹
 - Satisfaction With Life Scale (SWLS)^{2,}
- MS scales
 - Leeds Multiple Sclerosis Quality of Life (LMSQOL)¹²
 - 29-item Multiple Sclerosis Impact Scale (MSIS-29)^{13,}

Measurement of Psychometric properties

Reliability

- Test-retest reliability;
 - Temporal stability
 - Phenomenon (i.e., QOL and HRQOL)
 - Measurement (i.e., SF-12 and SWLS)

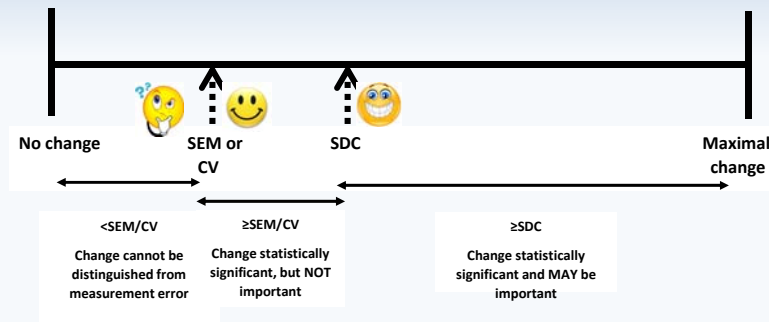
Measurement error

- All measures are vulnerable to error
 - Standard error of measurement (SEM)
 - Coefficient of variation (CV)

Interpretability

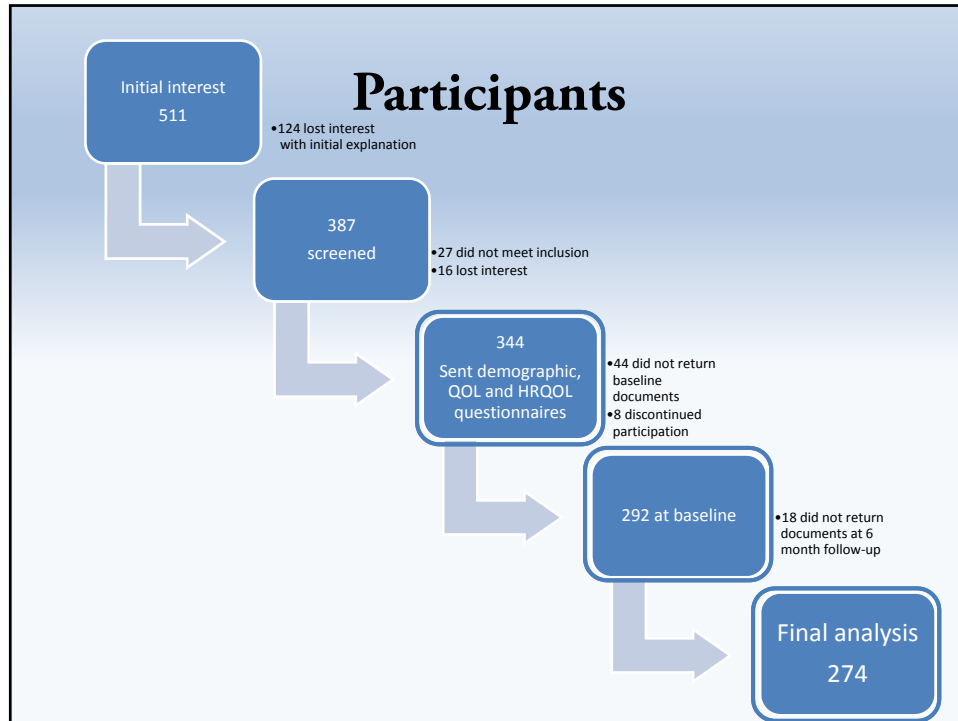
- Smallest detectable change (SDC)

Is the change meaningful?



Study Purpose

- Determine the test-retest reliability, measurement error, and interpretability of QOL (i.e., SWLS and LMSQOL) and HRQOL (i.e., SF-12 and MSIS-29) measures over six months in people with MS.
- Interpret the results of intervention effectiveness



Outcomes

- **SWLS**
 - 5 items, 7-point scale. Higher scores = higher QOL.
- **LMSQOL**
 - 8 items, 4 point scale. Higher scores = worse QOL
- **SF12**
 - 12 items, composite point scale. Physical composite (PCS) & Mental composite (MCS). Higher scores = higher HRQOL
- **MSIS-29**
 - 29 items, 4 point scale. Physical and psychological components. Higher scores = worse HRQOL

Data analysis

- **Reliability**
 - ICC analyses (2,1 mixed model)
 - ≥0.6=moderate reliability
 - ≥0.8=good reliability
- **Measurement error**
 - $SEM = SD_{baseline} \times \sqrt{(1-ICC)}$ (SD-of each outcome)
 - $CV = \text{dividing sample SD of the difference between the two time-points, by the mean difference between the time points} \times 100$
- **Interpretability**
 - $SDC = 1.96 \times \sqrt{(2)} \times SEM$
 - $SDC \% = \% \text{ of baseline mean}$
- **Validity**
 - Spearman correlations
 - ≥0.5=good validity

Results; Sample description (n=274)

Variable		
Sex (N, % female)	229 (84)	
Age (years)	Mean (SD)	48.0 (10.4)
	Range	20-84
Type of MS	Relapsing Remitting N (%)	222(81)
	Secondary Progressive N (%)	33(12)
	Primary Progressive N (%)	12(4)
	Benign	6(2)
Disease duration (years)	Mean (SD)	10.3 (7.8)
	Range	1-37
PDDS score	Median (IQR)	3 (3)
	Range	0-6

Change over time

Measure	Baseline mean (SD, SE)	Six month mean (SD, SE)	Change	p-value
SWLS	21.8 (8.0, 0.5)	22.1 (8.2, 0.5)	1.38	.306
SF-12 PCS	41.9 (9.0, 0.5)	41.3 (9.5, 0.6)	-1.43	.182
SF-12 MCS	41.5 (9.2, 0.6)	43.3 (7.5, 0.5)	4.34	<.001
LMSQOL	19.3 (4.8, 0.3)	19.0 (4.9, 0.3)	1.55	.133
MSIS-29 Physical	39.9 (27.8, 1.7)	39.0 (29.3, 1.8)	2.26	.339
MSIS-29 Mental	43.0 (29.85, 1.8)	39.5 (28.7, 1.7)	8.14	.004

Reliability

Measure	ICC	95% CI ICC
SWLS	.772	.720-.816
SF-12 PCS	.741	.682-.790
SF-12 MCS	.669	.598-.730
LMSQOL	.812	.767-.849
MSIS-29 Physical	.883	.853-.906
MSIS-29 Mental	.768	.715-.813

Moderate (≥ 0.6)
& good (≥ 0.8) reliability

Measurement Error

Measure	SEM	%SEM	CV (%)
SWLS	3.8	17.4	13.4
SF-12 PCS	4.6	11.1	9.3
SF-12 MCS	5.3	12.5	9.7
LMSQOL	2.1	10.9	8.9
MSIS-29 Physical	9.5	24	28.7
MSIS-29 Mental	13.2	30.7	31.2

Accuracy

Interpretability

Measure	SDC ₉₅	% SDC ₉₅
SWLS	10.5	48.1
SF-12 PCS	12.7	30.6
SF-12 MCS	14.7	34.7
LMSQOL	5.8	30.1
MSIS-29 Physical	26.4	67
MSIS-29 Mental	36.7	89

Validity

Measure	SWLS	SF-12 PCS	SF-12 MCS	LMSQOL	MSIS-29 Physical	MSIS-29 Mental	PDDS
SF-12 PCS	.355**						
SF-12 MCS	.410**	.071					
LMSQOL	-.674**	-.411**	-.623**				
MSIS-29 Physical	-.489**	-.671**	-.386**	.571**			
MSIS-29 Mental	-.561**	-.326**	-.581**	.696**	.669**		
PDDS	-.309**	-.681**	-.107	.360**	.704**	.350**	-

**Convergent
Validity**

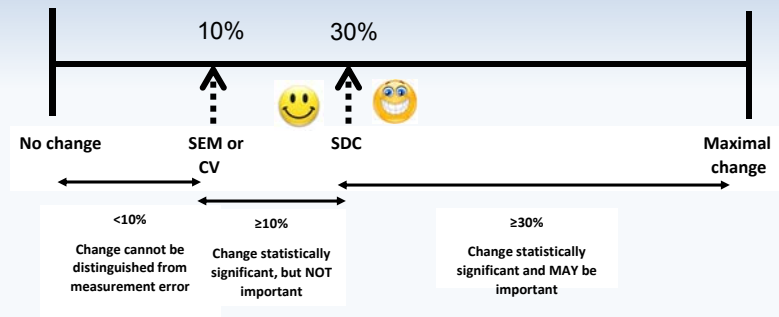
**Construct
Validity**

≥0.5 good

In summary

- Moderate (to good) reliability
- Support past findings for LMSQOL & MSIS-29^{12,13}.
- Novel reliability results for SWLS & SF-12 in MS
- Stability over six months is important

Interpreting change (LMSQOL)



Validity

- First study reporting relationships between QOL and HRQOL in MS
- Good validity of all four measures
 - Construct
 - Convergent

Discussion

- Overall, our data suggest that the phenomenon (HRQOL & QOL) & all four measures have acceptable measurement stability, as indicated through the reliability estimates.
 - Power calculations
 - Interpret clinical scores
- Limitations
 - Distribution & criterion method recommended.

Recommendations

- Research recommendation
 - Consider all psychometric properties
- QOL recommendation
 - LMSQOL
- HRQOL recommendation
 - SF-12

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