

# Validation of the “Life Space Assessment - LSA” Questionnaire in a group of hemiplegic patients

Ana Eduarda Marques Seixas Estima<sup>1</sup>, Bruna Motta Taulois Dutra<sup>1</sup>, José Vicente Pereira Martins<sup>2</sup>, Ana Cristina Oliveira Bruno Franzoi<sup>3</sup>

## ABSTRACT

The mobility of a hemiplegic patient is an interaction between their functional ability and external factors. The “Life Space Assessment” (LSA) questionnaire is a tool that assesses their mobility on 5 levels. **Objective:** To validate the LSA in a population of stroke survivors in physical therapy at a rehabilitation center, correlating it with measures of physical performance. **Method:** Instruments used in concurrent validation: Timed Up and Go Test (TUG), Postural Assessment Scale (PASS), Rivermead Mobility Index. Statistics: Descriptive, Spearman Index and Intra Class Correlation (ICC). **Results:** Thirty hemiplegic patients were assessed (73% male, mean age 58.6 years, mean time since injury 1.9 years). The LSA correlated significantly ( $p < 0.01$ ) with age, TUG, PASS, and Rivermead. Inter-rater agreement: ICC 0.941 Intra-rater agreement 0.981. **Conclusion:** The LSA was valid in a population of chronic stroke survivors, with excellent intra and inter-rater correlation measures, correlating significantly with measurements of body structure, function, and motor activities (TUG, PASS, and Rivermead).

**Keywords:** Hemiplegia, Locomotion, Validation Studies

<sup>1</sup> Physiotherapist, Associação Brasileira Beneficente de Reabilitação - ABBR.

<sup>2</sup> Assistant Professor at Faculdade de Medicina da Universidade Federal do Rio de Janeiro - UFRJ.

<sup>3</sup> Associate Professor at Faculdade de Medicina da Universidade Federal do Rio de Janeiro - UFRJ.

### Mailing address:

ABBR - Associação Brasileira Beneficente de Reabilitação

Ana Cristina Oliveira Bruno Franzoi

Rua Jardim Botânico, 660

Rio de Janeiro - RJ

CEP 22461-000

E-mail: anacristinafranzoi@gmail.com

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## INTRODUCTION

Strokes are one of the main causes of hospitalization and death in Brazil, causing some type of disability in most patients.<sup>1,2</sup> Disabilities after a stroke can severely affect the social participation and quality of life of these individuals.<sup>3</sup> Despite the advances in therapeutic interventions, many patients remain dependent on their community mobility,<sup>4</sup> however, the majority (75%) consider going out to the street either essential or very important for their daily activities.<sup>5</sup>

The ability to come and go within the community goes beyond the capacity to walk outside one's residence, thus, the distance and means used by the patients to move around near their residences or to more distant places must be included in the evaluation.<sup>6</sup> This mobility should be considered as an interaction between functional ability (activities and participation) and external factors (socioeconomic and environmental).<sup>7</sup>

The Life-Space Assessment (LSA) from the University of Alabama at Birmingham Study of Aging is a tool that evaluates the mobility of individuals on five levels (from inside their residences to outside of the city), based on the distance traveled, weekly frequency, and independence on locomotion,<sup>8</sup> regardless of how the locomotion is performed. Correlations were found between the LSA scores and age, state of health, environmental factors, social factors, cognition, physical performance, and mortality.<sup>9-12</sup> In Brazil, the LSA was initially validated in an elderly population in the city of Natal, and was considered a good mobility instrument that reflects the interaction between functionality and the physical and social environments.<sup>13</sup>

## OBJECTIVE

The objective of this study was to evaluate the LSA in a population of hemiplegic individuals under physiotherapeutic treatment in a rehabilitation center and correlate it with physical performance measurements.

## METHOD

The consecutive convenience sample was selected in a rehabilitation center in the city of Rio de Janeiro, between June and October of 2013. The inclusion criterion was having been diagnosed with hemiplegia by stroke. The exclusion criterion was having been diagnosed

with dementia. All the patients were under physiotherapeutic treatment at the time of data collection.

The sample was characterized by identification data (age, sex, marital status, schooling) and clinical data (type of stroke: hemorrhagic or ischemic, time since stroke, time receiving physiotherapy, Rankin scale,<sup>14</sup> Mini-Mental State Examination,<sup>15</sup> and the presence of aphasia).

### Evaluation of mobility - extent, frequency, and independence

#### *Life Space Assessment (LSA)*

The data was collected from the patients and their caregivers, however, the data from the three aphasic patients was collected exclusively from their caregivers.

The minimum score representing the worst mobility is 0 (zero) and the maximum is 120.

In a previous unpublished study, the LSA (Chart 1) was translated from English into Portuguese by two translators. The two translations were compared and there was a consensus in favor of Translation 1. This translation was then translated into its original language (back translation) and compared to the original English version to correct possible mistakes in the translation process, resulting in Translation 2. This translation was applied to a group of 15 rehabilitation professionals (physiotherapists, occupational therapists, and physical education teachers) to identify those questions that could be difficult to understand. The only doubt to arise was about the definition of the term Neighborhood, whose definition was then discussed and included in the instrument as a footnote.

### Instruments used in the concurrent validation

#### *"Timed Up and Go"*<sup>16</sup>

- This test times how long it takes the patient to get up from a sitting position in an armchair, walk three meters, turn around, return to the chair, and sit again.
- Scale for the postural evaluation of hemiplegic individuals: "Postural Assessment Scale for Stroke Patients" (PASS),<sup>17</sup> which evaluates the maintenance of posture, standing position, unilateral support, and posture change.
- Rivermead Mobility Index:<sup>18</sup> this evaluates turning over in bed, changing posture, sitting balance, standing unsupported, transferring, walking, using stairs, bending down, bathing, and running.

- Time line of evaluations:

- Appointment 1:

Physiotherapist 1 identifies the patient and applies the Mini-mental state examination, Rankin scale, LSA, TUG, Rivermead, and PASS.

- Appointment 2 (maximum time lag of 48 hours):

Physiotherapist 2 fills out the LSA.

- Appointment 3 (maximum time lag of 15 days):

Physiotherapist 1 fills out the LSA.

### Statistical Analysis

Descriptive statistics, correlation measurements (Spearman index), and Intraclass Correlation Index (ICC) for inter- and intra-rater agreement. The significance level considered was 5%.

## RESULTS

The characterization of the sample studied ( $n = 30$ ) is described in Table 1.

The total mean score on the LSA (0 to 120) was 46.5 (SD 16.37), with the lowest score being 14 and the highest being 78. The mobility of the various levels is described in Table 2.

The mean for the results obtained in the TUG, PASS, and Rivermead is described in Table 3.

The LSA presented correlation with statistical significance ( $p < 0.01$ ) with age, the Rankin scale, the TUG (Timed Up and Go), the PASS (Postural Assessment Scale), and with the Rivermead Mobility Index. There was no correlation between the LSA and the time under treatment, nor was there any correlation between the LSA and the MMSE. The values for the Spearman Correlation Test are described in Table 4.

The inter-rater agreement obtained an ICC of 0.941 and intra-rater obtained 0.981.

## DISCUSSION

During the application of the LSA, there were no doubts as to the definition of the five levels of mobility, except for difficulties with frequency definitions. This happened because, some times, there was a variation in the weekly frequency. This problem was solved confirming that the score was an average of the last month, and verifying the score with the caregiver.

When the level of independence varied, for example, sometimes the patient used an assistive device (cane) and other times he was

Chart 1. LSA translated into Portuguese

Life Space Assessment (LSA - Brazil)				
These questions refer only to your activities in the last month:				
Level of Mobility/Locomotion (L)		Frequency (F)	Independence (I)	Score
During the last four weeks you have been to...		How frequently have you been to these places?	Did you use any auxiliary device or equipment? Did you need the help of another person?	L x F x I
Level of Mobility 1: ... other rooms in your house besides the room where you sleep?	<input type="checkbox"/> Yes (1) <input type="checkbox"/> No (0)	<input type="checkbox"/> 1x/wk (1) <input type="checkbox"/> 1-3x (2) <input type="checkbox"/> 4-6x (3) <input type="checkbox"/> Daily (4)	<input type="checkbox"/> Personal assistance (1) <input type="checkbox"/> Only equipment (1.5) <input type="checkbox"/> No equipment nor personal assistance (2)	Level 1
Level of Mobility 2: ... an area outside your house such as your building hallway, playground, garage, or your own garden?	<input type="checkbox"/> Yes (2) <input type="checkbox"/> No (0)	<input type="checkbox"/> 1x/wk (1) <input type="checkbox"/> 1-3x (2) <input type="checkbox"/> 4-6x (3) <input type="checkbox"/> Daily (4)	<input type="checkbox"/> Personal assistance (1) <input type="checkbox"/> Only equipment (1.5) <input type="checkbox"/> No equipment nor personal assistance (2)	Level 2
Level of Mobility 3: ... places in your neighborhood other than your own house, backyard, or building?	<input type="checkbox"/> Yes (3) <input type="checkbox"/> No (0)	<input type="checkbox"/> 1x/wk (1) <input type="checkbox"/> 1-3x (2) <input type="checkbox"/> 4-6x (3) <input type="checkbox"/> Daily (4)	<input type="checkbox"/> Personal assistance (1) <input type="checkbox"/> Only equipment (1.5) <input type="checkbox"/> No equipment nor personal assistance (2)	Level 3
Level of Mobility 4: ... places outside your neighborhood, but within your city?	<input type="checkbox"/> Yes (4) <input type="checkbox"/> No (0)	<input type="checkbox"/> 1x/wk (1) <input type="checkbox"/> 1-3x (2) <input type="checkbox"/> 4-6x (3) <input type="checkbox"/> Daily (4)	<input type="checkbox"/> Personal assistance (1) <input type="checkbox"/> Only equipment (1.5) <input type="checkbox"/> No equipment nor personal assistance (2)	Level 4
Level of Mobility 5: ... places outside the city?	<input type="checkbox"/> Yes (5) <input type="checkbox"/> No (0)	<input type="checkbox"/> 1x/wk (1) <input type="checkbox"/> 1-3x (2) <input type="checkbox"/> 4-6x (3) <input type="checkbox"/> Daily (4)	<input type="checkbox"/> Personal assistance (1) <input type="checkbox"/> Only equipment (1.5) <input type="checkbox"/> No equipment nor personal assistance (2)	Level 5
Observation: consider the neighborhood distances that people usually walk.			Total score = N1 + N2 + N3 + N4 + N5	Total:

Table 1. Characterization of the sample

Sex	Female 8 (26.7%) Male 22 (73.3%)
Age (mean)	58.6 years (SD 15.22)
Age (median)	61.5 years
Minimum-maximum age	25 - 82 years
Time since injury (mean)	1.9 years (SD 1.48)
Time under treatment (mean)	8.2 months (SD 5.98)
Marital Status	10 (33.3%) single 18 (60%) married 1 (3.3%) separated 1 (3.3%) widowed
Schooling	19 (63.3%) < 8 years 11 (36.7%) > 8 years
Type of Stroke	26 (86.7%) ischemic
Rankin	1 (3.3%) - 0 7 (23.3%) - 1 7 (23.3%) - 2 10 (33.3%) - 3 5 (16.7%) - 4
Mini Mental State examination (n = 29)	25 mean
Aphasia diagnosis	3 (10%)

Table 2. Prevalence of mobility in the LSA levels

Level	At least 4 x/week	With no help from others
Level 1 (leave the bedroom)	100%	86.6%
Level 2 (leave the house)	76%	83.4%
Level 3 (staying within the neighborhood)	70%	80%
Level 4 (going outside the neighborhood)	36.7%	80%
Level 5 (going outside the city)	3.3%	13.3%

assisted by other persons, the highest level of dependence was scored.

It should be considered that our sample already had a higher score in the LSA, since the patients were in a physiotherapeutic program with a frequency of two to three times a week. In spite of this, the score of this population was low (46.5). In most cases, the patients were independent, except for level 5 (going outside the city): at least 80% of the individuals went outside with no help from others.

The frequency was related to the distance, only 36.7% of the patients went beyond level 3 (staying within the neighborhood) - even though they did that at least four times per week, two of those trips were to receive treatment

The low score in the greater distance levels may be a reflection of external barriers, since our sample showed good motor condition (medians: Rivermead 13, PASS 32, TUG 19.5).

As expected, there was a significant correlation between the LSA and age, extent of sequelae (Rankin), and motor tests (TUG, PASS, Rivermead).

There was no correlation between the LSA and the time under treatment, which could be due to our population being of chronic hemiplegic individuals already in prolonged treatments (average time with lesion: 1.9 years, average time under treatment: 8 months).

No correlation was found between the LSA and the MMSE, which can be explained by the

**Table 3.** Results of the TUG, PASS, and Rivermead

TUG n = 26	Mean: 34 seconds (SD 34.06)
	Median: 19.5 seconds
	Interval: 7 to 120 seconds
PASS total n = 30	Mean: 29.6 (SD 6.94)
	Median: 32
	Interval: 7 to 36
Rivermead total n = 30	Mean: 11.13
	Median: 13
	Interval: 0 to 15

**Table 4.** LSA Correlation Test (Spearman)

Age	r - 0.593; p < 0.01
Rankin	r - 0.669; p < 0.01
TUG	r - 0.628; p < 0.01
PASS	r - 0.669; p < 0.01
Rivermead	r - 0.649; p < 0.01
Time under treatment	r - 0.102; p = 0.590
MMSE	r - 0.32; p = 0.869

cognitive triage test score for our sample having been high (mean 25).

An excellent correlation was found between the raters (ICC 0.941) as well as time stability (test and re-test: ICC 0.981).

## CONCLUSION

The LSA has been shown to be a valid measurement for a population of chronic hemiplegic individuals, with excellent intra- and inter-rater correlation, having correlated with measurements of bodily function, structure, and motor activities (Rankin, TUG, PASS, and Rivermead).

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