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Validade e Consistência Interna da escala "LIFE" - Avaliação Funcional Independente da Linguagem

Face and content validity of the of the Language Independent Functional Evaluation (L.I.F.E.)

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Abstract

Purpose: Given the global scope of disability, it is important that tools used to measure disability are not biased by the language or literacy of the respondents. Yet it is impossible to accurately translate tools into the world's 7000 languages. The Language Independent Functional Evaluation (L.I.F.E.) is a video animated functional assessment that bypasses language and literacy. This study assesses the face validity and content validity of the L.I.F.E.

Methods: Rehabilitation professionals and non-rehabilitation students wrote descriptions of the 30 graphic animations representing functional stages for 11 activities portrayed in the L.I.F.E. The relationship between descriptions and the principle L.I.F.E. designer's description was rated by consensus of three reviewers on a 4-point agreement scale.

Results: Exact agreement was obtained for 82% of 600 responses provided by 12 rehabilitation professionals and 8 students. Complete misunderstanding of the concept occurred in only 6% of cases. Most of these were in the realms of bowel, bladder, and mobility. There was no difference in understanding between the professionals (content validity) and students (face validity).

Conclusions: The face and content validity of the L.I.F.E. are good enough for users to trust that the test portrays intended functions. This paves the way for easier measurement of functional ability regardless of language or literacy.

Key Words: Disability Evaluation, Language Tests, Physical Therapy Modalities.

Introduction

Measurement of disability is critical in modern rehabilitation medicine. Until recently tools used to measure disability were dependent on translation into the language of the user and often required that the user be able to read. The disadvantages of these tools are many, including exclusion of subjects and clinicians who do not speak the language of the test, exclusion of less literate persons, questions of the accuracy of translations, and the validity of comparison between different dialects within a language. Given over 7000 languages in the world and high levels of illiteracy in certain populations, this is not a trivial issue.[1,2]

The Language Independent Functional Evaluation (L.I.F.E.) is a potential solution.[3] This computer animated graphic representation of physical function bypasses issues of language and literacy. It is modeled after the ten functional concepts described in the Barthel Index, which is the most widely translated functional assessment to date.[4]

In order to build a L.I.F.E. that is practical and understandable, a preliminary version was designed and tested in the United States and Ghana, a developing West African country with 75 indigenous languages.[3] After analysis of the relationships between this 'Pre-L.I.F.E.' and the Barthel Index, and after review of qualitative information regarding the test, the Pre-L.I.F.E. was redesigned substantially to the current L.I.F.E. instrument.

Numerous steps must be taken to ensure that the L.I.F.E. is a valid instrument. Among them is the assessment of face validity (whether a common person agrees that the test items are understood as intended), and content validity (whether an expert in the field

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agrees that the test items are understood as intended). Both face and content validity are important steps in assuring that a test will be useful. For example, de Morton et al.,[5] considered both of these as important criteria in their most recent review of mobility instruments. In regard to the L.I.F.E., one cannot simply assume that the actions portrayed in the L.I.F.E. are understood to represent the actions that the authors intended. The current study assesses the face and content validity of the L.I.F.E.

Methods

The L.I.F.E. and the Barthel Index are both comprised of 10 questions or picture sets that are intended to represent feeding, bathing, grooming, dressing, bowel continence, bladder continence, toileting, transfers, mobility and stair negotiation. Ability to perform each function is displayed as three or four animations, ranging from fully independent to complete inability. For each animation set the subject first sees an animation of the function performed independently by a blue figure (self). Then animations of less independence are portrayed, often with a red figure providing assistance. Finally the animation of complete dependence shows the red figure performing the task for the blue figure. Figure 1 is a still picture from one animation set.

The L.I.F.E. follows the general pattern of the Barthel, but as a result of feedback during the design phase, some specific constructs are not intended to exactly follow the meaning of the Barthel. Prior to the trial the principle designer of L.I.F.E., author AJH, wrote down a sentence describing the functional activity intended by each animation. These are listed in Table 1.

In an Institutional Review Board exempt survey, the L.I.F.E. program was shown to people of different occupations who work with disability and rehabilitation and also to students who do not have professional experience with disability. Each participant went through the L.I.F.E. program and was shown all of the L.I.F.E. scenarios. Each participant was asked to provide a brief description of what each picture in L.I.F.E. was depicting. The obtained descriptions were compared to the written intention for each picture. The standard for comparison used to match the responses to the designer's intended description was as follows:

0 = Different functional task
1 = Same functional task (e.g., walking, not bowling), but different meaning
2 = Similar meaning, no contradictions
3 = Exact or nearly exact match with the L.I.F.E. designers description

Matching to standards for comparison was done by three undergraduate university students who acted as judges. Each judge was given a copy of the responses and was asked to compare them to the intended description. Agreement of two or more of the judges was the standard for determining the level of matching between the subject and the written definition.

Statistical Analysis

Data were entered into an Excel spreadsheet and checked for clarity and errors. SPSS version 15 (Chicago) was used for data analysis. Subjects' responses to a total of 30 animated pictures were assigned to the category as defined above. Statistical analysis included descriptive statistics which gave the number of matches and the Chi-square test
which was used to examine the relationship between categories of responses and groups.

Results

Twenty volunteers completed the study. As noted in Table 2, they included a physiatrist, occupational therapists, nurses, medical students who were in pre-clinical years, and undergraduate students. Possible numbers for each matching category ranged from 0 to 30 for each subject. Of 600 responses, 82% were in complete agreement with the intended function, while only 6% were thought to portray a function or task completely different from that intended. The data were then examined by grouping subjects into rehabilitation professionals and students. The result of the Chi-square test (Table 3) showed that the students understood the concepts equally as well as the rehabilitation professionals (Chi-square=3.283, df=3, p=0.350). The rehabilitation professionals had 83% exact matches out of 360 total matches and the students had 81% out of 240 matches. We also combined the two pre-clinical medical

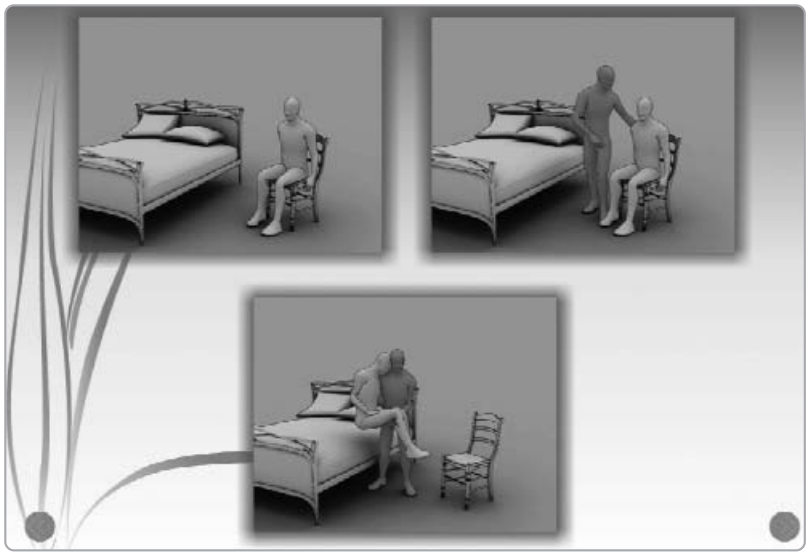

Figure 1

In this black-and-white reproduction for print, the figure red appears darker and blue appears lighter

Table 1 - Agreement between the inventor's definitions of intended L.I.F.E. functional animations and written descriptions of the subjects.

Inventor's definition	Exact Matches	Similar Matches	Same Function	Different Function
Feeding				
Eats independently	20	0	0	0
Uses some assistance with eating	20	0	0	0
Must be fed by someone else	20	0	0	0
Bathing				
Can bathe independently	19	1	0	0
Uses at least some assistance with bathing	19	1	0	0
Grooming				
Can brush hair independently	20	0	0	0
Uses at least some assistance with brushing hair	20	0	0	0
Dressing				
Can dress lower body independently	20	0	0	0
Uses some assistance for dressing lower body	20	0	0	0
Must be dressed on lower body by someone else	20	0	0	0
Bowel continence				
Continent of bowel	20	0	0	0
Has bowel accidents in bed	7	5	5	3
Has bowel accidents in public	4	3	8	5
Bladder continence				
Continent of bladder	19	0	0	1
Has bladder accidents in bed	14	1	4	1
Has bladder accidents in public	7	1	9	3
Toilet use: Sitting				
Can sit on toilet without assistance	11	9	0	0
Uses at least some assistance to sit on toilet	11	9	0	0
Toilet use: Hygeine				
Can clean independently after toileting	17	0	0	3
Uses at least some assistance to clean after toileting	17	0	0	3
Transfers bed to chair				
Able to transfer bed to chair without help	19	0	0	1
Uses some assistance to transfer from bed to chair	20	0	0	0
Must be transferred from bed to chair by someone else.	20	0	0	0
Mobility on a level surface				
Able to walk independently	10	1	5	4
Uses some assistance to walk	13	0	3	4
Able to propel a wheelchair independently	12	0	4	4
Completely dependent for mobility	15	1	1	3
Stair ascending				
Can go up stairs independently	20	0	0	0
Uses some assistance to move up stairs	19	1	0	0
Completely dependent for climbing stairs	20	0	0	0
Totals	**493**	**33**	**39**	**35**

Table 2 - Agreement between intended and perceived meaning of L.I.F.E. figures by persons with different backgrounds.

Profession	Number of People	Exact Match	Similar Match	Same Function	Different Function
Physiatrist	1	25	0	2	3
Physical/ Occupational Therapist	6	143	14	15	8
Nurse	5	131	7	7	5
Medical Student	2	53	4	0	3
Undergraduate Student	6	141	8	15	16
All	20	493	33	39	35

students with the rehabilitation professionals and examined the response between this group and that of the six undergraduate students. The former group had a slightly higher percentage in complete agreement with the intended function than the students 84% vs. 78%). However, the difference was of marginal significance (Chi-square=6.43, df=3, p=0.0925).

Table 3 illustrates that almost of the disagreement dealt with issues of elimination and mobility. For bowel and bladder the mismatch may not be as severe as the data suggests. The observers scored a few responses as 'Different functional task' because the subjects confused bowel incontinence with bladder incontinence. Some subjects interpreted the two series of pictures as being equivalent ('problems with toileting') and did not notice that there was a color change representing bladder versus bowel incontinence. Some of the participants did not interpret the second and third picture of the series of soiling of self in public versus in bed as intended. Some of the participants viewed the 'in bed' versus 'in public' incontinence of bladder and bowel as nocturnal versus ambulatory incontinence, nocturnal versus daytime incontinence, or unconscious versus conscious incontinence. As Table 3 indicates, the subjects always properly interpreted the first picture as bowel or bladder continent.

Three of 17 subjects appeared to completely misinterpret the toilet hygiene question. One of the participants thought the question was actually referring to checking for bowel movement, rather than for hygiene. This was the case for another participant, who interpreted the question as a general toileting question rather than a toileting hygiene question. The third participant could not come up with an idea of what the question was asking.

Mobility skills of ambulation, walking with assistance, and propelling wheelchairs were misunderstood by a minority of subjects. Some participants perceived the person in the picture to be maneuvering around something rather than just being able to ambulate independently or needing assistance of some sort. Some subjects viewed the platform in the picture as either an obstacle or corner. One subject responded that the question was asking about upper and lower motor control rather than mobility.

When toileting and elimination were removed there was 92% complete agreement between the subjects and the intended meaning. In general, reviewers understood the concepts relating to complete

Table 3 - Content validity (rehabilitation professionals) and face validity (students) of the L.I.F.E.

	Number of People	Exact Match	Similar Match	Same Function	Different Function	Total Matches	Chi-square-test	Sig
Rehabilitation professionals	12	299 (83%)	21 (6%)	24 (7%)	16 (4%)	360 (100%)	3.283	0.350
Students	8	194 (81%)	12 (5%)	15 (6%)	19 (8%)	240 (100%)		
Total	20	493 (82%)	33 (5%)	39 (7%)	35 (6%)	600 (100%)		

( ) = % of total matches

independence (86% complete agreement) better than 'assistance required' (82%), and least understood 'complete dependence (76%).

Discussion

The L.I.F.E. attempts to bypass language and literacy by using computer animation to represent function. Its development process strove for optimal accuracy, but the final product must be validated. Face validity and content validity are two important and similar concepts studied in this report.

Eachus defines these terms:
"Face validity is concerned with the extent to which the contents of a test or procedure look like they are measuring what they are supposed to measure…
Content validity is the extent to which the content of the test or procedure adequately represents all that is required for validity."[6]
Face validity is typically established by asking naïve or untrained persons to interpret the test scales, while content validity is typically established by asking experts. By using healthcare professionals and naïve students, the current study assessed both face and content validity. We found that L.I.F.E. has excellent face validity and content validity in many realms, and fairly good validity in others. The results should be reviewed in some detail and more studies under different circumstances might confirm our results. Clinical and scientific consequences of the study will be discussed.
The study strengths include masked consensus of three reviewers as a standard for agreement, and a reasonable sized population of subjects, including both professionals and students. Arguably the study could have been done in different languages and different cultural settings. Indeed our preliminary work showed that, among persons with disability, the Pre-L.I.F.E. scores agreed better with the Barthel Index scores among Americans than it did among Ghanaians. A study to assess face and content validity of the L.I.F.E. outside of the United States might be interesting, but it would also involve difficulties in cultural or language translation of the original wording as written in American English.
It is possible that persons with disability might have different observations, however, the non-professionals likely represent the understanding of the public at large. The non-professionals agreed with intended meanings as often as the rehabilitation professionals.
It is reasonable for one to ask, 'How much face validity or content validity is enough'? One would expect that many of the students and professionals in this study would be dumbfounded by presentation of the German phrase: 'Konnen Sie gehen su Fuss'?, and essentially all Americans would fail to make a connection between function and phrases clearly understood by people who speak Fante or Swahili. Since there are currently no other translingual functional assessment, any level of agreement is an improvement over the status quo.
The study results show much more than minimal agreement, however. There was perfect or almost perfect agreement between the intended and understood concepts for most of the functions portrayed. Certain functions, mostly related to elimination, were less well understood. Results presented elsewhere show that the elimination questions for the Pre-L.I.F.E. did not correlate as well with Barthel scores in the US or Ghana.[3] This is understandable, as elimination is often a private function and social norms require that explicit graphic depiction be avoided. However, even in these functions the majority of responses agreed or nearly agreed with the intended meaning.
After addressing the issue of elimination in the pre-L.I.F.E. trials as well as the current study, we do not think that further refinement of the graphics will result in more accuracy without compromising social norms. However, it is possible that the introduction of the test can be worded optimally to improve understanding. For the current study a terse few sentences are used. The new L.I.F.E. software allows for recording of more lengthy introductions to the test in whatever languages are required. This may help subjects to understand the construct of the test, while still keeping the portrayal of specific functions language-free.
Other work to establish the L.I.F.E. as a useful tool must be presented. We have completed a trial in Mongolia that establishes its usefulness in that language and culture and establishes construct validity with the Barthel Index.[7] Test-retest reliability, sensitivity to change, and other work will further establish its utility. The current work regarding face and content validity is one important step in establishing the utility of this tool.
Modern society has many needs to understand the functional ability of its members. Rehabilitation practitioners must understand the deficits they are treating. Scientists in many fields need to understand the impact of their interventions at a level beyond simple mortality. Governments, policymakers, and healthcare leaders need to understand the societal cost of suboptimal performance and the benefits of investing in rehabilitation.
Modern society also is increasingly diverse and global. The 7000 languages in the world pose an imposing barrier to assessment of function. In areas such as sub-Saharan Africa, this barrier to measuring disability may be an important reason for the absolute absence of Physical Medicine and Rehabilitation. In industrialized countries the use of surveys that require knowledge of the dominant language, or worse, require literacy, can result in elimination of immigrants, subcultures, and less educated persons. Persons with disability may be disproportionately excluded from measurement.

Conclusions

The Language Independent Functional Evaluation (L.I.F.E.) has good face and content validity. Along with other research this helps establish the L.I.F.E. as a useful tool for epidemiological, research, and clinical evaluation of function regardless of language or literacy. Such information is needed if society is to understand the impact of disability and rehabilitation on its economy and wellbeing.

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Figures captions:

Figure 1. Still pictures from animated L.I.F.E. portraying the concept of transfers. In the upper left corner the person has gone from bed to chair independently. In the upper right the task has been accomplished with visible assistance from the person in red, and in the lower picture the person in red lifts and carries the person to the chair.