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VALIDITY OF THE ASSESSMENT OF LIFE HABITS IN OLDER ADULTS

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Objective: **To study the construct validity of a participation scale, the Assessment of Life Habits, with older adults having functional limitations. More specifically, the study aimed to verify the ability of the Assessment of Life Habits to discriminate between clienteles in 3 living environments, and to compare participation scores to functional independence scores obtained with the Functional Autonomy Measurement System (Système de mesure de l'autonomie fonctionnelle).**

Design: **Participants were evaluated once with the Assessment of Life Habits and the Functional Autonomy Measurement System.**

Subjects: **Eighty-seven older adults (mean age 78.0 years (8.2)) living in 3 types of environment: own home, private nursing home or long-term care centre.**

Results: **Results suggest that the Assessment of Life Habits scores discriminate between different levels of participation according to the living environments of the participants. The Assessment of Life Habits measures some similar aspects to the Functional Autonomy Measurement System scale but also additional concepts not included in the Functional Autonomy Measurement System.**

Conclusion: **This study supports the validity of the Assessment of Life Habits as a participation measure. It suggests the importance of going beyond disability measures to evaluate the overall functioning of older adults correctly.**

Key words: participation, functional independence, construct validity, discriminant validity, convergent validity.

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INTRODUCTION

After any clinical rehabilitation or research intervention, it is important to estimate the changes that may be associated with it and how effective it is. Imprecise and unvalidated measures can lead to incorrect clinical interpretations or research results. Specific measuring instruments are designed systematically to collect the desired information and to report individual characteristics in the form of scores that can be discussed clinically or analysed statistically. However, no measure is perfect, even in the best controlled situations, since a measure is often an abstraction of reality, especially when the variable of interest cannot be observed directly (1). To be used with confidence, measurement tools should have good psychometric properties. One of the most important properties is validity.

The validity of an instrument refers to its ability to measure the general and specific characteristics for which it was designed (2). An instrument is valid if it actually measures what it purports to measure. Different types of validity can be demonstrated, including face validity and content validity, which are established during the process of developing the instrument, often with the help of experts, and are not necessarily subjected to empirical analyses. Criterion and construct validity are 2 other main categories which require empirical experimentation and statistical analyses. Criterion validity is verified by comparing the instrument with a benchmark measure (clinical judgement, evolution of the subject, instrument recognized as a "gold standard"). However, often there are no benchmark measures to validate an evaluation instrument. In such cases, construct validity is examined. This evaluates an instrument's ability to confirm a hypothesis or theoretical construct related to the variable measured. Several types of construct validity can be studied, including discriminant validity and convergent validity. Discriminant validity evaluates an instrument's ability to distinguish between groups of people who have different characteristics, while convergent validity refers to the relationship with another instrument, itself reliable and valid, that measures a similar concept.

Different measuring instruments are available to clinicians and researchers who wish to evaluate various functional domains of elderly people during rehabilitation. Nearly a decade ago, Duckworth (3) said that among the important needs for measuring specific aspects of disability, measuring handicap should be a first priority since its reduction is the ultimate goal of health and rehabilitation services. Since then, advances in conceptualization of the disablement process (4, 5) have put the concept of social participation at the forefront of the main concerns related to measurement issues in rehabilitation. This is one area that deserves much more attention as it is increasingly

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considered a pivotal outcome of a successful rehabilitation. Its belated recognition might be partly due to the lack of a consensus regarding the construct of participation and its operationalization. Until recently, the concept was imprecise and there was some disagreement regarding what life domains should be considered as participation elements.

Over the last 2 decades, theoretical work has led to a better understanding of the construct related to social participation, and recent versions of conceptual models of disablement have reached a certain degree of consensus about participation. The Disability Creation Process (DCP), an explanatory model of the consequences of disease, trauma and other disorders, has operationalized social participation via the concept of life habits grouped into 12 categories (nutrition, fitness, personal care, communication, housing, mobility, responsibility, interpersonal relationships, community, education, employment and recreation) (4). A life habit refers to "*daily activities and social roles that ensure the survival and development of a person in society throughout his or her life*". The final version of the International Classification of Functioning, Disability and Health (ICF) (5) defined *participation* as the person's involvement in a life situation and presented a list of 9 activity and participation domains (learning and applying knowledge, general tasks and demands, communication, mobility, self-care, domestic life, interpersonal interactions and relationships, major life areas, and community, social and civil life) that now have similarities with the categories of life habits presented in the DCP. Disagreements remain as to whether activity and participation should be distinct dimensions (6) but recent studies tend to support the 2 "dimensionalities" of the concept (7). Therefore, recent conceptual developments have highlighted social participation but existing instruments must be looked at carefully to ensure that they really measure the concept of participation.

The Assessment of Life Habits (LIFE-H) was developed to evaluate social participation of people with disabilities, regardless of the type of underlying impairment (8). Conceptually based on the DCP, the LIFE-H documents the extent to which life habits are carried out (4). Despite its primary conceptualization from the DCP, similarities between the nomenclatures of participation domains makes the LIFE-H one of the current instruments that may fit more in the ICF participation domains.

The validity of the LIFE-H was previously studied by comparing the LIFE-H with other instruments measuring the concept of handicap based on the ICIDH–1 model of disablement (9): the Craig Handicap Assessment & Reporting Technique (CHART) and the Community Integration Questionnaire (CIQ). Two studies, one with people with spinal cord injury (SCI) (10) and the other with people having traumatic brain injury (TBI) (11), showed that the correlations of the LIFE-H with the CHART varied: 0.76 (physical independence), 0.36 (occupation), 0.33 (mobility) and 0.14 (social integration), but were more homogeneous with the CIQ (0.43–0.83). Until now, no validity study of the LIFE-H has been carried out with older adults having functional limitations. Since the CHART and CIQ are specific to SCI or TBI, they cannot be used with older adults. To our knowledge, there is no "gold standard" instrument to measure participation that can be used to study criterion validity.

The purpose of this study was therefore to document the construct validity of the LIFE-H in older people with functional limitations. More specifically, the objectives of this study were: to verify the ability of the LIFE-H to discriminate between clienteles according to 3 living environments (discriminant validity) and to compare participation scores obtained with the LIFE-H with functional independence scores obtained with a functional autonomy measure, the Functional Autonomy Measurement System (Système de mesure de l'autonomie fonctionnelle; SMAF) (convergent validity). Our hypotheses were that: the score of the LIFE-H would differ from one living environment to the other; and the scores obtained with the LIFE-H would correlate with those obtained with the SMAF.

METHODS

Participants

People aged 60 years or over who had functional limitations in activities of daily living (ADL), instrumental activities of daily living (IADL) or mobility activities participated in this study. They lived in 3 types of environment: own home, private nursing home or long-term care centre in 2 cities in Quebec: Sherbrooke and Quebec City. Individuals unable to give consent and those with severe aphasia or cognitive deficits were excluded.

The research protocol was approved by the Research Ethics Committee of the Sherbrooke Geriatric University Institute and Centre hospitalier affilié universitaire de Québec (Pavillon Enfant-Jésus). Participants had to sign an informed consent form.

Recruitment and data collection procedures

The recruitment and data collection were carried out by university rehabilitation and medical students who all received group and individual training on the LIFE-H and SMAF instruments. People living at home were recruited from lists of a day hospital and a community service centre (CLSC). Those living in private nursing homes were contacted via the institution staff after authorization from the administration. Finally, head nurses selected people living in 2 long-term care centres. Each participant was evaluated once in his/her own environment with both measurement instruments.

Measurement instruments

The shortened version of LIFE-H 3.0 was used for this study. It comprises 69 life habits covering the 12 categories of the DCP nomenclature (8). These categories (number of items) are: nutrition (3), fitness (3), personal care (7), communication (7), housing (7), mobility (6), responsibilities (6), interpersonal relationships (7), community life (7), education (3), employment (7) and recreation (6). The first 6 categories refer to daily activities while the others are associated with social roles. In the present study, because of their irrelevance for the majority of older adults, the categories "employment" and "education" were removed from analysis, leaving 10 different categories and 59 items. The measure is based on 2 specific elements: (i) the degree of difficulty in carrying out life habits in a person's actual environment (accomplished with no difficulty, with difficulty, or with substitution, or not accomplished); and (ii) the type of assistance required to carry out the habits (no help, technical assistance or adaptation, human assistance). The question is phrased as follows: "For each of the following life habits, indicate (1) How the person generally accomplishes it, and (2) the type of assistance required to accomplish it".

The LIFE-H produces a continuous score ranging from 0 to 9, developed combining the results of the sub-score related to the degree of difficulty and type of assistance, where 0 indicates total handicap (meaning that the activity or social role is not accomplished or achieved) and 9 indicates optimal social participation (meaning the activity is

Table I. *The accomplishment scale of the LIFE-H*

Score	Level of accomplishment	Type of assistance required
9	Accomplished with no difficulty	No help
8	Accomplished with no difficulty	Technical aid or adaptation
7	Accomplished with difficulty	No help
6	Accomplished with difficulty	Technical aid or adaptation
5	Accomplished with no difficulty	Human assistance
4	Accomplished with no difficulty	Human assistance and technical aid or adaptation
3	Accomplished with difficulty	Human assistance
2	Accomplished with difficulty	Human assistance and technical aid or adaptation
1	Accomplished with substitution	
0	Not accomplished	
N/A	Not applicable	

performed without difficulty and without help) (see Table I). A score may be obtained for each item, each category (mean of items), the mean of the daily activities categories, the mean of the social roles categories and, finally, the mean of all items or categories (total score). The reliability coefficients of the global score of the LIFE-H recently studied with the same sample of older adults having disabilities are excellent (ICC and 95% confidence intervals: 0.95 (0.91–0.98) for test-retest, and 0.89 (0.80–0.93) for interrater) (12).The instrument also has a separate satisfaction scale evaluating the individual's assessment regarding the accomplishment of life habits (5-point Likert scale), but this was not used in this study.

The SMAF (13) is a 29-item scale based on the WHO classification of disabilities (9). The SMAF measures functional ability in 5 categories: activities of daily living (ADL) (7 items); mobility (6 items); communication (3 items); mental functions (5 items); and instrumental activities of daily living (IADL) (8 items). The disability for each item is scored on a 5-point scale: 0 (independent), 0.5 (difficulty), 1 (needs supervision), 2 (needs help), 3 (dependent). A higher score indicates a higher level of dependence. The SMAF must be administered by a health professional who scores the subject after obtaining information either by questioning the subject and proxies, or by observing and even testing the subject. Subjects are evaluated according to what they do and not what they think they could do if the circumstances or environment were different. An interrater reliability study on each item showed a mean Cohen's weighted kappa of 0.75 (13). Another reliability study showed that the intraclass correlation coefficient for total SMAF scores was 0.95 (95% confidence interval (CI): 0.90–0.97) for test-retest, and 0.96 (95% CI: 0.93–0.98) for interrater reliability (14). The validity of the SMAF has been tested by comparing SMAF scores with the nursing time required for care ($r = 0.88$) (15). Discriminant validity has also been verified by distinguishing disabilities between residents living in settings with different levels of care (14).

Statistical analyses

Based on a 5% alpha error and a statistical power of 90%, a sample size of 80 participants was required in order to be able to detect a correlation of 0.35 or over as statistically significant (bilateral test) (16).

An analysis of variance between the scores on the LIFE-H in the 3 living environments was used to verify discriminant validity. Two-by-two comparison tests were then carried out in order to locate the differences, with Bonferroni corrections (0.05/3: 0.016). Finally, for convergent validity, since all the data were normally distributed, Pearson's correlation coefficient was used. Since the SMAF and LIFE-H both have inverted scales, negative signs were removed to simplify the presentation of the correlations.

RESULTS

Eighty-seven older adults (71% female) with functional limitations related to ADL, IADL or mobility activities participated in the study. Their mean age (SD) was 78.0 years (8.2). A similar proportion of participants lived at home (33.3%), in private nursing homes for older adults (34.5%) and in long-term care centres (32.2%). Participants living in private nursing homes had a lower SMAF score (14.9 (9.5)) than those living at home who received home care or day hospital services (19.6 (9.1)) ($p < 0.001$). In addition, those living in long-term care units had more functional limitations (higher SMAF scores) than the other 2 groups (49.2 (8.8)).

Discriminant validity

The 2 sub-scales and the total scores generated for the LIFE-H statistically differ according to the living environment (Table II). The two-by-two tests indicated that the scores obtained are statistically different between environments, with the exception of the social roles sub-scores for the own home and long-term care environments, which are equivalent. Participants living in private nursing homes obtained higher scores, followed by those living at home and finally by those living in long-term care units. These variations in scores between the living environments, which are supported by differences in disability levels (SMAF scores), indicate a good level of discriminant validity for the LIFE-H, particularly in the daily activities.

Convergent validity

The SMAF and LIFE-H total scores are moderately correlated (0.70) (Table III). Due to the SMAF's construct, we expected to observe a high correlation between the SMAF total score and the

Table II. *Mean scores (SD) obtained on the LIFE-H according to living environment (*n = *87) (discriminant validity)*

LIFE-H	Private nursing home ($n = 30$)	Own home (health services)† ($n = 29$)		Long-term care unit ($n = 28$)	p value*
Daily activities sub-score (/9)	7.6 (1.0)	6.8 (0.9)	n.s.	5.7 (1.2)	<0.001
Social roles sub-score (/9)	7.6 (1.1)	6.7 (0.9)		6.8 (1.0)	0.002
Total score (/9)	7.6 (1.0)	6.8 (0.8)		6.1 (1.0)	<0.001

* p value associated with ANOVA.
† People living at home but receiving health services.
n.s. not significant.

Table III. *Pearson's correlations between the Système de mesure de l'autonomie fonctionnelle (SMAF) and LIFE-H (*n = *87) (convergent validity)*

SMAF LIFE-H	ADL	Mobility	Communication	Mental functions	IADL	Total
Daily activities (# items)						
Personal care (6)	0.94***	0.87***	0.25*	0.35***	0.72***	0.90***
Nutrition (3)	0.65***	0.59***	0.25*	0.24*	0.62***	0.67***
Communication (7)	0.39***	0.35***	0.40***	0.30**	0.33**	0.41***
Mobility (5)	0.29**	0.44***	0.27*	0.12	0.39***	0.40***
Housing (8)	0.29**	0.25*	0.08	0.01	0.06	0.20
Fitness (3)	0.02	0.04	0.05	0.02	0.09	0.05
Daily activities sub-score	*0.79***	*0.74***	*0.30***	*0.30***	*0.59***	*0.76***
Social roles						
Responsibility (6)	0.37***	0.33**	0.28**	0.43***	0.49***	0.47***
Community life (7)	0.50***	0.49***	0.27*	0.23	0.44***	0.52***
Recreation (6)	0.16	0.20	0.11	0.10	0.02	0.12
Interpersonal relations (7)	0.03	0.02	0.11	0.13	0.12	0.03
Social roles sub-score	*0.41***	*0.43***	*0.36***	*0.18*	*0.34***	*0.43***
Total score	*0.71***	*0.68***	*0.34***	*0.29***	*0.55***	*0.70***

p values: * <0.05; ** <0.01; *** <0.001.
ADL: Activities of daily living.
IADL: Instrumental activities of daily living.

LIFE-H daily activities sub-score (0.76). Moreover, the association with the SMAF categories is consistent with the constructs of both instruments. The higher associations seen with the ADL, mobility and IADL domains of the SMAF, and the low associations with the communication and mental functions, are not surprising. Regarding the LIFE-H social roles domain, its association with the SMAF total score is moderate (0.43) and quite consistent across the SMAF sub-domains except for mental functions (0.18) (Table III).

When analysed by categories of life habits (*n* = 10), "Personal Care" showed its strongest associations with the ADL, Mobility, IADL as well as the total SMAF scores (0.72–0.94), which suggests high similarities in the construct. "Nutrition" showed fair correlations with the same SMAF domains and the total score. "Communication" had moderate associations with all the SMAF dimensions, although a stronger association was expected with the SMAF communication and mental functions domains (0.40 and 0.30). LIFE-H "Mobility" was also moderately associated with most SMAF domains, but its association with SMAF mobility was lower than expected (0.44). "Housing" had a variable but poor level of association, while "Fitness" showed no associations with any of the SMAF domains.

In terms of social roles, LIFE-H "Responsibility" showed its strongest association with the SMAF mental functions and IADL (0.43 and 0.49). For the "Community life" domain, similar levels of association were observed with SMAF ADL and mobility (0.50 and 0.49). The 2 other categories of social roles ("Recreation" and "Interpersonal relationships") showed no significant associations with the SMAF domains.

DISCUSSION

Recent conceptualizations of participation based on the involvement of a person in society accentuated the necessity to develop instruments addressing this concept in a proper manner. The LIFE-H is one of these new tools that document the concept of participation through a person-perceived approach. The scale is based on one's perception of the difficulty and assistance required to carry out usual life habits, and it has some similarities to other instruments such as the Impact on Participation and Autonomy Questionnaire (IPAQ) (17–19), which documents the possibility ("chance") of carrying out current activities or achieving social roles, as well as the Late-Life Function Disability Instrument (Late-Life FDI) (20, 21), which assesses the perceived difficulty related to the accomplishment of particular activities.

Unlike some instruments, the LIFE-H does not establish a particular context related to health or disability problems in the wording of the general question. In its construct, participation is independent of the person's intrinsic or personal factors. Therefore, the wording of a generic questionnaire should not include a systematic relationship with a specific factor (e.g. health condition, disability status) but should be written in a neutral form to avoid positive or negative bias in the evaluation of participation.

The main objective of this research was to study 2 types of construct validity of the LIFE-H with older adults having functional limitations and living in 3 types of environment. The content validity of the LIFE-H was previously demonstrated by its development process. After the first version (1.0) of the instrument was developed, it was submitted to a group of experts who were chosen for their knowledge in the field of rehabilitation and social integration as clinicians (occupational therapy, nursing, social services, psychology), researchers or consumers. Relevant aspects of information and internal consistency were documented. The research team proposed some modifications to this first version. The LIFE-H 2.0 version was the result of this content validation study. In 1998, a revision process led to

version 3.0 of the instrument, the version used in this study. The latest version, 3.1, of the LIFE-H was not available at the time of data collection.

In order to improve the representativeness of the participants, this study was carried out in 2 cities of different sizes and socio-economical levels. Results suggest that the LIFE-H scores can discriminate between different levels of participation according to the living environments of the participants. The first hypothesis was therefore confirmed. It was found that the participants living in long-term care units are most disrupted in participation, as indicated mainly in the daily activities sub-score, and the participants living at home are more disrupted than those living in private nursing homes. Theoretically, a higher level of participation could have been expected in the group living at home. However, the selection strategy used (from day hospital and CLSC lists) resulted with people having more functional limitations receiving home care services. Conversely, those living in private nursing homes did not receive services related to personal care since their functional limitations are mainly in the IADL domain, such as meal preparation and housework.

Our second hypothesis was also confirmed: the LIFE-H scores were correlated to the SMAF scores but with different magnitudes depending on their categories. The correlations suggest that the LIFE-H measures some aspects similar to the SMAF scale but that it also measures other concepts not included in the SMAF. Indeed, all categories of the SMAF are significantly related with the LIFE-H total score, but 3 categories ("Fitness", "Recreation" and "Interpersonal relationships") show no associations with any SMAF category or total score. In addition, "Housing" is related only to the ADL and Mobility categories of the SMAF and not to its total score.

In a previous study carried out with people who had had a stroke, we also found an absence of association between functional independence and participation in leisure and interpersonal relationships (22). Regardless of the scores obtained on the independence scale, recreation and interpersonal relationships scores were not associated with the SMAF scores. This suggests that performance in ADL, mobility and other spheres of functional independence is probably not a factor that influences social roles, such as recreation and interpersonal relationships.

The correlation between the communication categories of both instruments ($r = 0.40$) was lower than expected, as was the correlation between SMAF mobility and LIFE-H mobility ($r = 0.44$). However, despite identical labels, the content of the categories is quite different. The communication category of the SMAF includes only 3 disability items (vision, hearing and speaking) whereas the communication category of the LIFE-H is a larger concept that includes 8 life habits such as reading, writing a letter and using a computer. Similarly, the SMAF mobility items are mainly aptitudes in transfers, walking inside and outside, propelling a wheelchair and negotiating stairs. The items in the mobility category of the LIFE-H refer, among other things, to walking outside on different surfaces, driving a car and riding a bicycle, which are quite different from the disability items of the SMAF.

These results suggest that the LIFE-H estimates the concept of participation well as defined in 2 conceptual models, the Disability Creation Process (DCP) and the International Classification of Functioning, Disability and Health (ICF). However, since correlations are usually lower in construct validity studies than those found in criterion validity studies, many construct validity studies must be carried out before concluding that an instrument is valid (2). In terms of validity, another important issue is the ability of a questionnaire to cover the domain that it is supposed to measure. Regarding participation, the LIFE-H covers the 12 categories of participation proposed by the DCP (23). In a thorough review of the instruments focusing on social outcomes (24), 16 published tools were compared regarding their abilities to cover the participation domains of the ICIDH-2. The LIFE-H was the only instrument that covered all 9 dimensions of this classification and only 5 items (less than 10%) were not classified in one of the participation dimensions, suggesting a high level of content validity for this version of the WHO classification. Despite late changes at the end of the revision process (2001), the LIFE-H still covers most categories of participation of the ICF, except for certain sub-domains that conceptually may not be considered participation items but rather factors intrinsic to the person.

Despite interesting results supporting the use of the LIFE-H, the present study remains a first step in its validation with older adults. Future research should compare the LIFE-H with new measures of participation, such as the IPAQ, that also take into account the perceptions of people with disability.

In conclusion, this study indicates that the LIFE-H score is able to discriminate between people according to their living environment. In addition, it suggests that functional independence elements partially overlap participation, but that the latter is a concept embracing other components. This study supports the importance of going beyond disability measures to evaluate correctly the overall functioning of older adults.

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