# Generation and Content Validation of Mobility Domains and Item Pool for Community-dwelling Individuals

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## *ABSTRACT*

*Mobility disability can affect a wide range of activities, from difficulty in turning in bed to problems of riding a vehicle. The existing scales do not include all the relevant items for mobility within the community. There is therefore a strong need to develop a scale with items which are comprehensive and culturally relevant to community-dwelling individuals.*

***Purpose:*** *This study was conducted to generate the mobility domains and item pool for community-dwelling individuals, and to validate the content.*

***Method:*** *The method includedextensive research into literature on existing mobility scales, and direct interviews with 20 persons with chronic mobility disability who livewithin their community. The generated items were grouped under the relevant domains and subjected to content validation by 10 experts. Items were judged on the basis of relevance, and acceptance of the item or domain was conditional on a 70% minimum level of agreement between the experts.*

***Results:*** *Ninety-nine items and 14 domains were generated by the literature search and direct interviews. The items were grouped under the 14 domains, according to their relevance and purpose. Content validation resulted in the elimination of 44 items and 5 domains as per the criteria for agreement. Items and domains were also modified to improve relevance and reduce ambiguity.*

***Conclusion:*** *A comprehensive mobility item pool for community-dwelling individuals, with items ranging from simple to the most challenging tasks under the proposed domains, has been generated and content validated. The development of a new mobility disability scale which uses these items, and evaluation of its psychometric properties is recommended.*

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***Limitation:*** *Confirmatory factor analysis could not be done to evaluate the fit of items under proposed domains.*

***Keywords:*** *mobility disability, domains, dimensions, psychometric properties.*

## INTRODUCTION

Mobility is defined as "the individuals' ability to move about effectively in their surroundings" (WHO, 1980). Mobility of individuals is essential for the basic activities of daily living (ADL) like self-care, and the instrumental activities of daily living (IADL) such as gardening, writing, cooking, and for community access like using transport, going to the market or place of worship and other social gatherings. Impairments in mobility restrict the ability of individuals to perform these activities, a condition referred to as mobility disability (Patla and Shumway-Cook, 1999). Incidence of mobility disability increases dramatically as people age, from 1% in the general population to over 35% among individuals over 80 years old(Weiss et al, 2007). The World Health Survey (WHS) undertaken by WHO in 70 countries reported that the prevalence of mobility limitations is higher in developing countries than in developed countries. For instance, in India 47% reported having some difficulties in moving around, compared to 26% in Denmark. The severity of mobility limitations which is also found to be higher in developing countries, is considered as a huge public health burden (Yong, 2012). Apart from this survey, there is a lack of evidence to rate mobility disability across countries because of the different measures used for assessment.

Mobility disabilities are currently viewed from a person-environment perspective where the outcome of disability is often seen as a result of dynamic interplay between the individuals' capabilities and the demands of the environments in which they negotiate (Verbrugge and Jette, 1994; Brandt and Pope, 1997; Altman, 2001). Existing mobility measures have overlooked this perspective, which may under or overestimate the disability and lead to planning for treatment that is not needed.

Existing mobility measures can be broadly classified into performance-based measures and self-reported measures. Performance-based measures include clinical assessments of levels and different aspects of mobility ability, which range from simple scales of timed tests to ambulatory activity monitors (Yong, 2012). These measures are useful for obtaining mobility disability outcomes on a basic function level but possess many limitations when used for community-

dwelling individuals. Individuals with mild mobility disability, as assessed by performance-based measures, may actually face major hurdles in the community after discharge from the hospital, suggesting that these measures underestimate the individuals' mobility level requirements in the community.

Mobility disability covers a wide range of activities, from difficulty in turning in bed to climbing stairs or riding a vehicle. Hence, assessment of this disability requires measures with a comprehensive set of items which range from simple to complex activities. Self-reported measures include survey questionnaires and regular diary entrieswith common questions on a wide range of mobility limitations. Compared to performance-based measures, self-reported measures have the advantage of obtaining information about a wider range of activities but there is an element of subjectivity. In addition, a majority of these measures are disease or population specific and cannot be generalised to all community-dwelling individuals.

For the assessment of mobility in community-dwelling individuals, it is important to screen them in their usual environments to determine their level of mobility disability, to plan specific treatment goals and to document the effect of treatment (Stanko, 2001). This assessment will also enable the public to become aware of mobility problems in the community and may encourage them to bring about changes in the environment. This in turn will assist the policy-makers to target future investments in community planning.

Recent studies (Corrigan and McBurney, 2008) have shown that mobility disability in the community should be measured under certain dimensions which are considered vital. The assessment of mobility from a dimensional perspective means determining the range of an individual's ability to move about safely and independently with respect to each dimension (Patla and Shumway-Cook, 1999). However, to date there are no tools available to measure mobility disability in community-dwelling individuals under these dimensions.

Hence, there is a need to develop a scale that specifically measures mobility disability for community-dwelling individuals. This scale should be comprehensive and include personal and environmental demands associated with community mobility. It also needs to be valid for its purpose and for the intended population. The requirement therefore is a scientific method of generating items and domains for the scale, and content validation by experts involved in rehabilitation of persons with mobility disability.

### Objectives of the Study

To generate the mobility domains and item pool forcommunity-living individuals with mobility disability, and to validate thecontent.

## METHOD

The study protocol was submitted to the Institutional Ethical Committee and approval to conduct the study was obtained. The study consisted of 2 phases: (i) Generation of mobility domains and item pool, and (ii) Content validation.

### Phase I: Generation of Mobility Domains and Item Pool

The mobility domains and item pool were generated in 2 steps - first, by reviewing the existing scales and questionnaires related to mobility disability, and second, by interviewing persons with chronic mobility disability.

### Review of Existing Scales

A thorough literature search was conducted to identify different mobility assessment scales and questionnaires related to mobility disability. From January 1980 up to December 2012,the authors researched English language literature using PubMed, ProQest, MD Consult, Cochrane Library and EbscoHost databases. The key words used were: community mobility, mobility disability, items of mobility, domains of mobility, dimensions of mobility, mobility disability scales and mobility disability questionnaire. Age filters were used so as to restrict the scales and questionnairesto people above 19 years. Critical evaluation of the obtained scales and questionnaireshelped to identify the items and domains of mobility relevant to community-dwelling individuals.

The scales and questionnaires from which the majority of items were identified were: Rivermead Mobility Index (Collen et al, 1991), Barthel Index(Shah et al, 1989), Functional Independence Measure (Haigh et al, 2001), Stroke Rehabilitation Assessment of Movement (Ahmed et al, 2003), Spinal cord Independence Measure (Catz et al, 1997), Elderly Mobility Scale(Smith, 1994), Clinical Mobility scale(Ware Jr, 1987), Environmental status scale (Stewart et al, 1995), Short form 36(Ware Jr and Sherbourne, 1992), Community Balance and Mobility scale (Howe et al, 2006) and Environmental Analysis of Mobility Questionnaire (Shumway-Cook et al, 2003). In addition to these scales, items were also extracted from certain ambulation profiles including functional ambulation categories (Kollen

et al, 2005), Hauser Ambulation Index (Hauser et al, 1983) and Modified Emory Functional Ambulation Index (Baer and Wolf, 2001).The identified items were compiled and used for the next stage of item generation that included persons with mobility disability.

**Interviews**

A community survey was conducted in the local district to identify persons with chronic mobility disability. The community health workers in the district were told about the type of persons with disabilities who had to be identified. The identifiedpersonswith mobility impairments were then approached individually at home and their medical records were verified. The purpose of the study was explained and their informed consent was obtained before participation in the study. Twenty persons were selected, with a wide range of mobility impairments and with onset duration of more than 6 months. Persons with disabilities were interviewed in person and were motivated to fill as many items related to mobility disability as they feltwere appropriate to their experience.

The items generated from literature and the interviews were pooled and documented, after duplicates had been eliminated. All the items were grouped under the domains identified from the literature. The items which measured similar groups of mobility disabilities were placed under those particular domains.Initially items were grouped together on the basis of the type of activity, and thereafter they were placed under the relevant domains identified.

**Phase II: Content Validation**

The domains and the grouped items were subjected to content validation by a team of expertsthatincluded rehabilitation specialists involved in the treatment of persons with mobility disability. After an explanation about the study, experts were asked to judge each item and domain based on its relevance, simplicity, clarity and ambiguity. Experts judged whether the particular item and domain needed to be included in the scale or excluded. They also provided comments and reasons for their decisions, and for the fit of items under the domains.

The experts' feedback regarding the attributes were compiled and analysed. The items were accepted, modified or deleted based on the level of agreement between experts, with 70% fixed as the minimum percentage level of agreement. After further individual meetings to clarify issues that were raised, the experts provided explanations, discussed feedbackand incorporatedthe suggestions.

## RESULTS and DISCUSSION

From the 252 articles which were found during the initial literature search, 37 articles were identified which consisted of scales or questionnaires related to mobility disability. Among these, the authors identified 14 domains, 8 of which had been proposed by Patla and Shumway-Cook. These domains included distance, time, ambient conditions, terrain characteristics, physical load, attentional demands, postural transitions and density. These domains, also called dimensions, provided the framework for assessing the impact of the environment in community mobility (Patla and Shumway-Cook, 1999). This is supported by earlier studies in which distance, time constraints and terrain were the most commonly assessed mobility dimensions to determine the impact of environment on community mobility (Corrigan and McBurney, 2008).

The other 6 domains that were included from literature were self-care, ambulation, instrumental activities of daily living (IADL), transport, job and psychosocial domains. Though very few scales in literature measure the psychosocial domain which includes personal factors,the authors considered it to be importantwhen measuring the impact of mobility, especially for persons with chronic disability. Assessments of all these domains are important as mobility disability may not be associated with uniform decrease in abilities across all domains (Patla and Shumway-Cook, 1999). Based on each individual's impairments,certain domains and their related items could be more difficult for some than for others living in a community.

### Generation of Mobility Item Pool

When there was overlap of identified items,they were either combined or modified to be clearly represented. Literature search yielded 30 items related to community mobility, which ranged from rolling in bed, to the ability to use transport, which primarily represented the self-care and ambulation-related items. There were few items which considered environmental demands such as narrow space, uneven surfaces, obstacles, etc. Earlier scales had also taken upper limb mobility into consideration, as denoted by the inclusion of items such as writing, reaching, picking up objects, etc. However, items which comprehensively measured the mobility disability in the community were lacking. This suggests that the existing mobility scales and questionnaires did not possess many items which the individuals considered important; hence, there was a need to generate items from the persons with mobility disability themselves.

## Generation of Items by Client Interviews

Direct client interviews resulted in the generation of some more items relevant to mobility disability assessment in the community. There were 20 persons with disabilities, most of whom were males (60%). The mean age was 52 years (SD 13.1) and the duration of conditions ranged from 6 -120 months. The variations in condition and duration helped in the inclusion of items representing different types and phases of mobility impairments. This also led to generation of diverse items, based on the individuals' condition and environmental demands for mobility, which was the primary objective of this phase of the study. On an average, each person with disability listed 20 items which, when corrected for duplicates, yielded 69 new items apart from the items generated from literature.

Majority of the items generated by persons with disabilities reflected their need to be independent at home and in the community. Their responses explained the need for cultural- specific scales with items such as visiting temple, sitting on the floor; climate-related issues such as going out in the rain, and psychosocial factors involving motivation to perform activities, socialisation and the family's role. Importance has been given to postural transitions along with the attention demands in items such as crossing roads, reacting to traffic lights, etc. Persons with disabilities considered pain and fatigue to be important factors which could negatively influence their mobility.

Modernisation has led people to become increasingly dependent on electronic gadgets like mobile phones and computers. When their impairmentsaffectthe use of these devices, peopleexperience both physical and social disability. Some peoplefelt that recreational items and personal interests or hobbies needed to be evaluated for mobility disability. Some of the items included represented the primary impairments and secondary complications like deformity, which may significantly affect mobility. Personal experiences were given importance, as evidenced by the inclusion of items such as 'usage of assistive devices' by the persons with disabilities in the sample.

## Grouping of Items under Domains

The items generated by literature and client interviews were grouped according to the domains proposed by the earlier studies of Patla and Shumway-Cook(1999). Their definitions for domainswere helpful in identifying the commonalities of items and in grouping them under the relevant domains. The function of items was given more importance whilegrouping them. For example, the item 'squatting'

involves postural transition; however,the primary function of squatting is related to toileting which is a self-care activity and hence it was grouped along with eating, combing, dressing, etc. Similarly, all the items which require instruments to perform mobility activity were included under the domain titled Instrumental Activities of Daily Living (IADL). Items which could have an influence on the mobility of an individual, like pain, tiredness and personal factors such as feelings of depression or decreased interest, were included under the psychosocial domain. Thus, there were 14 domains under which the generated 99 items were grouped in such a way that each item represented the corresponding domain under which it was included. The items and domains generated, along with the source, are given in Table 1.

**Table 1: List of Domains, Items, Source and Percentage Level of Agreement by Experts**

| Domain and Items | Source | Level of Agreement (%) |
|---|---|---|
| **Self-care** | | |
| Wearing your footwear | Interview | 90 |
| Eating on your own | Literature | 100 |
| Dressing yourself | Literature | 100 |
| Buttoning | Literature | 80 |
| Shaving yourself | Interview | 70 |
| Wearing your shoe and lace* | Interview | 60 |
| Combing yourself | Literature | 100 |
| Going to or reaching toilet | Literature | 100 |
| Using toilet on your own* | Literature | 60 |
| Bathing yourself | Literature | 100 |
| Brushing your teeth | Interview | 100 |
| Squatting | Interview | 100 |
| Getting up from squatting | Interview | 90 |
| **Ambulation** | | |
| Walking independently | Literature | 100 |
| Walking without assistive aid* | Literature | 50 |
| Propelling the wheelchair oneself | Interview | 80 |
| Wheelchair use in community | Literature | 80 |
| Walking in community | Literature | 100 |
| Using tricycle | Interview | 90 |

| Domain and Items | Source | Level of Agreement (%) |
|---|---|---|
| **Distance and Time*** | | |
| Walking for long distances* | Interview | 60 |
| Walking faster* | Interview | 50 |
| Need of assistive devices for mobility* | Interview | 50 |
| Running* | Literature | 40 |
| Reaching your work place on time* | Interview | 40 |
| **Terrain characteristics** | | |
| Walking on uneven surface | Literature | 90 |
| Climbing stairs | Literature | 100 |
| Climbing stairs without railings* | Literature | 20 |
| Crossing or avoiding the obstacle | Literature | 100 |
| Using escalator* | Interview | 40 |
| **Ambient conditions** | | |
| Walking or moving around in toilet | Interview | 100 |
| Going out during rainy days | Interview | 70 |
| Walking during night time | Interview | 90 |
| Going to smaller rooms | Interview | 70 |
| Going to crowded places | Interview | 100 |
| **Postural transitions** | | |
| Rolling in the bed | Literature | 100 |
| Getting up from bed | Literature | 100 |
| Stand up from sitting position | Literature | 90 |
| Maintain standing | Literature | 100 |
| Deformity preventing transition* | Interview | 50 |
| Sitting on a chair or toilet seat | Literature | 100 |
| Turning while walking | Literature | 90 |
| Maintain balance in changing position* | Interview | 50 |
| Maintaining a position for long time* | Interview | 50 |
| Ability to stop suddenly while walking * | Interview | 30 |
| Reaching forward* | Literature | 50 |
| Pick up objects from floor | Literature | 80 |
| Sitting on floor | Interview | 90 |
| **Attentional demands** | | |
| Balance while crossing roads | Interview | 100 |
| Balance when someone calls / speaks | Interview | 100 |
| Concentration during walking * | Interview | 50 |

| Domain and Items | Source | Level of Agreement (%) |
|---|---|---|
| Reacting to traffic lights | Interview | 70 |
| Fear of crossing roads* | Interview | 30 |
| **Transport** | | |
| Using two or four wheeler vehicle | Interview | 90 |
| Using the public transport (Bus/ train) | Literature | 100 |
| Using private transport(Auto or taxi) | Interview | 100 |
| Avoid crowded places during travel * | Interview | 50 |
| Moving in and out of vehicle* | Interview | 40 |
| Avoid travel and prefer to stay indoors* | Interview | 50 |
| **Physical load*** | | |
| Feel tired | Interview | 100 |
| Strength in lower limb for mobility* | Interview | 40 |
| Lifting objects* | Literature | 20 |
| Holding/carrying object while walking | Interview | 70 |
| Drop objects frequently from hand* | Interview | 60 |
| Feeling of weakness* | Interview | 60 |
| Feel the need to take rest often* | Interview | 50 |
| Getting up from fallen position* | Interview | 40 |
| Manipulating objects in hand | Interview | 100 |
| **IADL** | | |
| Writing or signing | Literature | 90 |
| Play games* | Interview | 50 |
| Roam around in vehicle* | Interview | 50 |
| Swimming or jogging* | Interview | 60 |
| Exercises for fitness* | Interview | 60 |
| Gardening | Interview | 70 |
| Shopping* | Interview | 40 |
| Cooking activities | Interview | 70 |
| Using mobile or telephone | Interview | 100 |
| Using computer | Interview | 80 |
| **Density*** | | |
| Going to temple * | Interview | 40 |
| Going to market* | Interview | 60 |
| **Job*** | | |
| Reaching work place on time* | Interview | 60 |
| Longer time to do the work * | Interview | 40 |

| Domain and Items | Source | Level of Agreement (%) |
|---|---|---|
| Working for required number of hours* | Literature | 50 |
| **Psychosocial** | | |
| Feel fear of falling while walking | Interview | 100 |
| Feel not interested in activities* | Interview | 50 |
| Feel depressed about mobility problems | Interview | 100 |
| Feel irritated if others feel sympathy * | Interview | 60 |
| Feel for disturbance in family role | Interview | 90 |
| Feel for inability to socialise* | Literature | 60 |
| Feel overprotected by the family* | Interview | 60 |
| Feel isolated from your family* | Interview | 60 |
| Feel cannot participate in functions | Interview | 70 |
| Feel like not going out due to fear of falling* | Interview | 60 |
| Feel cannot help family members* | Interview | 60 |
| Feel could not continue the job | Interview | 100 |
| Feel less motivation in doing activities | Interview | 80 |
| Feel dependent on others | Interview | 70 |
| Feel pain during your activity | Interview | 100 |
| Feel pain at rest* | Interview | 40 |
| Feel like changing the house or room * | Literature | 50 |

* Items and domains eliminated due to lower percentage level of agreement

## Phase II: Content Validation

The expert panel method was employed to determine content validity, as it is the most commonly used and convincing approach (Downe-Wamboldt, 1992). The list of experts included physiotherapists, occupational therapists, social workers, a community physician, a general physician, a community health nurse and a psychologist. The mean age of the expert group was 40 years, with a mean experience of 19.3 years in the rehabilitation of persons with mobility disability. The experience and diverse speciality of experts, which are important prerequisites for content validation, were ensured.

There was 70% and above level of agreement on 55 of the 99 items, so those items were included while the remaining items were eliminated. Most of the items on which there was a high level of agreement were in the domains of self-care and postural transition, indicating that the consensus of the rehabilitation specialists was that self-care and balance components are important aspects of any mobility

assessment tool. This is supported by earlier studies which consider independence in self-care and the ability to sit or stand as the criteria for discharge of clients from the hospital (Granger et al, 1990).

The majority of the excluded items were from the psychosocial domain.The reason given was the difficulty in assessing or scoring such attributes in the client population. Alsoexcluded were those items which were not routine for most of the people, like wearing shoes and socks, playing games, running, swimming, jogging, using escalators, roaming on bikes, etc. Items like strength and deformities were excluded because they are related to body structure and functions, while all the other items are related to activity or participation. Experts felt that some of the other items -like climbing stairs without railings, walking faster, avoiding travel,etc -were suitable as scoring options rather than as separate items, and hence they were marked as irrelevant.

The domains ofdistance and time, physical load, traffic level, density and job were eliminated as the experts showed less than the required 70% level of agreement. Items in the distance and time domain overlapped with items in the ambulation domain, sothey were considered functionally appropriate to be grouped under the ambulation domain. Physical load domain was eliminated as only a few items remained after content validation, and those items (feeling tired and manipulating objects in hand) did not represent the respective domain. The density and job domain were also removed as there were too few items for consideration. Items from the excluded domains were grouped under the functionally relevant domains. The experts also gave their comments about the fit of items and, with their approval,items were rearranged under the domains. Thus, the content validation by experts resulted in 54 items being grouped under the 9 domains. The percentage level of agreement for each item and domain are given in Table 1.

## Implications and Limitations

The findings of the current study provide some preliminary information about the range of items required in a scale representing mobility disability in the community. The identified domains highlight the important role of the environment in defining mobility disability and further emphasise the importance of the social model of disability. The current model takes into account both the environment and individual factors, and the way in which their interaction affects the level of activity limitations and participation in society.The strength of this study lies in the qualitative development of items from direct client interviews,

and the validation of these items by experts who represent various disciplines of community rehabilitation. The process of using different methods of item generation yielded both overlapping and unique data, which can be consideredan additional strength.

Confirmatory factor analysis to judge the fit of items under the domains was not conducted, which could be a limitation of this study. Future studies could utilise this statistical method and follow it up by the development of a mobility disability scale exclusively for community- dwelling individuals. The developed scale should be tested for psychometric properties like reliability and sensitivity, for its effective use in the community.

## CONCLUSION

A comprehensive mobility item pool for community-dwelling individuals, with items ranging from simple to the most challenging tasks under the proposed domains, has been generated and content validated. The authors recommend the inclusion of these items in the development of a new mobility disability scale, and the evaluation of its psychometric properties.

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