

MANUAL

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL)

1. General instructions

This instrument is a semi-structured interview that aims to assess the use of a wheelchair during mobility activities in a real environment. It was developed specifically to evaluate this construct in individuals with spinal cord injuries who use a manual wheelchair as their primary means of mobility.

The items that make up the WC-MAL comprise daily wheelchair mobility activities. For each item, individuals are asked standardized questions about the frequency, performance and assistance needed in carrying out the activity using the wheelchair in their real environment. The WC-MAL measures the self-reported actual use of the wheelchair during the previous week, that is, the individual's "lived experience" while using a wheelchair in the usual context in which they live.

The differential features of this instrument are: it considers mobility activities in a real environment; presents items linked to the codification of the International Classification of Functioning, Disability and Health (ICF) (1–4); and, followed the recommendations of the CONsensus-based Standards for the selection of health *Measurement Instruments (COSMIN) for the development of self-report instruments* (5,6).

2. Description of the items

The WC-MAL is composed of twenty-three items designed to assess the use of a wheelchair in a real environment based on the Mobility Category (d4) of the ICF Activity and Participation Component (Table 1).

Table 1. Description of the WC-MAL items and their coding at the ICF mobility domain (d4) levels.

Item	Description	ICF code		ICF title
		Second level	Third level	
1	Remain seated for long periods	Remain seated in a wheelchair for more than 2 hours and relieve the weight on your buttocks (any method).	d410	Changing basic body position
			d4106	Shifting the body's centre of gravity
		d415	Maintaining a body position	
			d4153	Maintaining a sitting position
2	Transfer to and from surfaces of the similar height	Self transfer from a sitting position in the wheelchair to another seat at the same or approximate height. Including transfers to sofa, standard chair, bed, ...	d420	Transferring oneself
			d4200	Transferring oneself while sitting
3	Transfer to and from the toilet	Self transfer from sitting position in wheelchair to toilet.	d420	Transferring oneself
			d4200	Transferring oneself while sitting

4	Transfer to the bath or shower	Self transfer from a sitting position in the wheelchair to and from the bath chair, bathtub, or other seats (e.g., plastic stool or chair).	d420	Transferring oneself
			d4200	Transferring oneself while sitting
5	Transfer to and from the floor/ground	Self-transfer from a sitting position in the wheelchair to the floor/ground and return from the floor/ground to the wheelchair.	d420	Transferring oneself
			d4200	Transferring oneself while sitting
6	Transfer to and from the car	Self transfer from a sitting position in the wheelchair to the car seat as well as from the car seat to the wheelchair.	d420	Transferring oneself
			d4200	Transferring oneself while sitting
7	Transport large objects while pushing the wheelchair	Carry large objects in your hands or arms, or on your thighs while pushing the wheelchair from one room to another (e.g., shopping bag, boxes, suitcase, a child).	d430	Lifting and carrying objects
			d4301	Carrying in the hands
			d4302	Carrying in the arms
			d4303	Carrying on shoulders, hip and back
			d465	Moving around using equipment
8	Pick up small objects from the floor	Grab and lift a small object (e.g. shoes, socks, ...) from the floor to a higher level (a table, drawer, chair, ...) while sitting in the wheelchair.	d410	Changing basic body position
			d4105	Bending
			d430	Lifting and carrying objects
			4300	Lifting
9	Pick up large objects from the floor	Grab and lift a large object (which usually requires the participation of both upper limbs; e.g. laundry basket) from the floor to a higher level (a table, chair, ...) while sitting in the wheelchair.	d410	Changing basic body position
			d4105	Bending
			d430	Lifting and carrying objects
			d4300	Lifting
10	Carry a large item on the back of the wheelchair	Carry large objects (e.g. backpack, bags, ...) on the back of the wheelchair. Including placing and removing the object.	d430	Lifting and carrying objects
			d4303	Carrying on shoulders, hip and back
			d465	Moving around using equipment
11	Reach for objects in front of you at shoulder height	Reach for objects that are in front of you and approximately shoulder height (eg. pot on stove, elevator button, light switch, ...) while sitting in the wheelchair.	d410	Changing basic body position
			d4106	Shifting the body's centre of gravity
			d445	Hand and arm use
			d4452	Reaching
12			d410	Changing basic body position

	Reach for objects above shoulder height	Reach for objects that are above shoulder height (eg. hanger, towel rack, book on shelf, objects on high shelves, ...) while sitting in a wheelchair.	d4106	Shifting the body's centre of gravity
			d445	Hand and arm use
			d4452	Reaching
13	Open and close doors	Open and close different types of doors (e.g. refrigerator, cabinet, cupboard, ...) while sitting in a wheelchair.	d410	Changing basic body position
			d4106	Shifting the body's centre of gravity
			d445	Hand and arm use
			d4452	Reaching
14	Open and go through doorways	Open and pass through doorways of different types (e.g. hinged, folding, sliding doors, ...) while seated in the wheelchair.	d410	Changing basic body position
			d4106	Shifting the body's centre of gravity
			d445	Hand and arm use
			d4452	Reaching
			d460	Deslocar-se por diferentes locais
			d4600	Deslocar-se dentro de casa
			d465	Moving around using equipment
15	Go up and down sloped surfaces () gentle slope () steep	Go up or down inclined surfaces using the wheelchair (eg. ramp, slope, hill, ...). Mark whether the individual considers the slope to be light or steep.	d455	Moving around
			d4551	Climbing
			d465	Moving around using equipment
16	Go up and down a step	Move up or down on surfaces of different levels using the wheelchair (eg. climbing a curb, pavement, ...).	d455	Moving around
			d4551	Climbing
			d465	Moving around using equipment
17	Go up and down a flight of stairs	Move up or down a flight of steps (at least 3 steps) using the wheelchair	d455	Moving around
			d4551	Climbing
			d465	Moving around using equipment
18	Navigate narrow places	Move using a wheelchair through narrow places that require maneuvers such as turning on your own axis and even avoiding colliding with walls (e.g. narrow corridors, inside elevators, bathrooms, shower stalls, ...).	d460	Moving around in different locations
			d4600	Moving around within the home
			d4601	Moving around within buildings other than home
			d465	Moving around using equipment
19	Move indoors		d460	Moving around in different locations

	() within 1 room	Move around using a wheelchair in indoor environments (e.g., at home, at school, at work, or other buildings). Including moving between rooms and avoiding objects such as furniture.	d4600	Moving around within the home
	() between 2 to 3 adjacent rooms		d4601	Moving around within buildings other than home
	() for more than 3 rooms		d465	Moving around using equipment
20	Move through busy environments	Move using a wheelchair through busy environments outside your home (e.g. shopping malls, squares, sidewalks, ...) that require you to deviate from moving targets (e.g. people, animals, cyclists, ...).	d460	Moving around in different locations
			d4601	Moving around within buildings other than home
			d4602	Moving around outside the home and other buildings
			d465	Moving around using equipment
21	Navigate uneven surfaces	Use the wheelchair in outdoor environments with uneven surfaces (e.g. grass, sand, cobblestone, gravel, snow, holes...).	d460	Moving around in different locations
			d4602	Moving around outside the home and other buildings
			d465	Moving around using equipment
22	Travel long distances	Move around using a wheelchair outside your home and other buildings without the use of automated transportation (e.g., car, bus, train - moving to places more than 1 km away - e.g. moving through the streets of your neighbourhood, village, district, ...).	d460	Moving around in different locations
			d4602	Moving around outside the home and other buildings
			d465	Moving around using equipment
23	Use transportation as a passenger	Use transportation to travel as a passenger, whether by land, water or air (e.g., car, bus, animal or human-drawn vehicle, taxi, train, boat, plane, ...). Consider all the handling necessary to use the transport with the use of a wheelchair.	d470	Using transportation
			d4700	Using human-powered vehicles
			d4701	Using private motorized transportation
			d4702	Using public motorized transportation

3. Scoring scales

To measure how often, how and the assistance used by the individual to carry out activities with their wheelchair, the Frequency Scale (FS), the Performance Scale (PS) and the Assistance Scale (AS) are used, respectively. Each scale has 6 response levels (scores from 0 to 5), with the higher scores representing a more frequent use, better performance and less need for assistance when using a wheelchair in the assessed tasks.

Frequency Scale (FS)

SCORE	DESCRIPTION
0	I have not performed this activity in my wheelchair
1	I have very rarely performed this activity with my wheelchair
2	I have rarely performed this activity with my wheelchair
3	I have sometimes performed this activity in my wheelchair
4	I have frequently performed this activity in my wheelchair
5	I have performed this activity with my wheelchair very often

Performance scale (PS)

SCORE	DESCRIPTION
0	I have not performed this activity in my wheelchair
1	I have done this activity with my wheelchair, but the performance was very poor
2	I have done this activity with my wheelchair, but the performance was poor
3	I have done this activity with my wheelchair, but the performance was fair
4	I have done this activity with my wheelchair and the performance was good
5	I have done this activity with my wheelchair and the performance was very good

Assistance Scale (AS)

SCORE	DESCRIPTION
0	I have not performed this activity in my wheelchair
1	I have performed this activity with my wheelchair with a lot of help from one or two people
2	I have performed this activity with my wheelchair with a little help from one person
3	I have performed this activity with my wheelchair with just supervision from someone else
4	I have performed this activity with my wheelchair alone, but I needed additional space or some equipment
5	I have performed this activity with my wheelchair alone and I did not need additional space or any equipment

4. Reference standards

When answering the questions, the interviewees should have the following reference standards clearly in mind:

Reference standard 1 – recall time frame

The individuals should answer questions about wheelchair mobility activities that have been performed (experienced) in their real environment in the **previous week** or since the last time the interview was conducted.

Reference standard 2 – frequency

When the Frequency Scale (FS) is being applied, the individuals will be asked how often they performed mobility activities using a wheelchair. For the WC-MAL, the frequency rating varies among the activities included in the instrument and depends on the routine experienced by each evaluated individual. For this reason, no additional external references should be made explicit by the evaluator.

Reference standard 3 - performance

When the Performance Scale (PS) is being applied, the individuals will be asked about their performance while doing wheelchair mobility activities in their real environment. The evaluator must explain to the individuals what they must consider regarding each activity, namely:

- The effort required
- The time spent
- The way it was performed

Reference standard 4 - assistance

When the Assistance Scale (AS) is being applied, the individuals will be asked how much assistance was used during the execution of mobility activities in a wheelchair. The evaluator must explain to the individuals what they must consider regarding each activity:

- The help of others
- The use of devices other than the wheelchair
- Changes made to the environment to enable the execution of the activity

5. Applying the WC-MAL

Step 1: Read the WC-MAL instructions to the individual and explain the scale scores (see instructions – item 7 in this manual) and reference standards 3 and 4. Answer any questions they may have. The examiner should remind the individual the questions in the WC-MAL refer to the actual use of the wheelchair in the questioned time frame, i.e. what they **actually do – not what they think they are capable of doing** (reference standard 1).

Step 2: The evaluator should ask about the use of the wheelchair in each activity using the following questions:

1st application of the scale: “Considering your activities in the previous week, did you use your wheelchair to... (cite the activity - item)?”.

Further applications: “Considering your activities since the last time I asked you these questions, did you use your wheelchair to... (cite the activity - item)?”.

- If the answer is “**I didn't use it**”, then ask why the wheelchair was not used and direct the individual to the list of possible reasons why the activity was not carried out.
- If the answer is “yes”, go to step 3.

Step 3: Using the Frequency (FS), Performance (PS) and Assistance (AS) Scales

The Frequency (FS), Performance (PS) and Assistance (AS) Scales must be digitized or printed on separate sheets to remain visually available to the individual during their application, which facilitates the choice of response throughout the administration of the instrument. To score on the answer form, use the Scoring Scale points to categorize an individuals' responses from 0 to 5 for each activity (WC-MAL item). Ideally, these scales should be digitized or printed on separate sheets to remain visually available to the individual during their application, which facilitates response selection.

The scales are used each time the WC-MAL is applied and must follow this order, first the EF, then the PS and then the AS, for each of the items. For PS and AS, reference standards 3 and 4 must be explained at the time of application of the respective scale.

a) **Frequency Scale (FS):** ask the individual, “Using the FS, tell me how often you... (cite the activity - item)... with your wheelchair”. Once the individual selects the score, check the answer by repeating the score like this: “So you're telling me that (speak the description of the point chosen by the individual) ... Is that correct?”. Once he/she agrees, mark the answer in the space reserved for this question on the answer form. Once complete, proceed to the application of the Performance Scale (PS).

b) **Performance Scale (PS)*:** ask the individual, “Using the PS, tell me how you used your wheelchair to... (cite the activity - item) considering... (cite the reference standard 3)”. Once the individual selects the score, check the answer by repeating the score like this: “So you are telling me that... (speak the description of the point chosen by the individual). Is that correct?”. Once he/she agrees, mark the answer in the space reserved for this question on the answer form. Once complete, move on to apply the AS.

c) **Assistance Scale (AS):** ask the individual: “Using the AS, tell me how much assistance you needed to... (cite the activity - item) considering... (cite the reference standard 4)”. Once the individual selects the score, check the answer by repeating the score like this: “So, you

are telling me that (read the description of the score chosen by the individual). Is that correct?". Once he/she agrees, mark the answer in the space reserved for this question on the answer form.

IMPORTANT: the evaluator must always remember to present the scales and cite the reference standards for each scale (PS and AS). This recommendation must be followed at least in the first items of the instrument to ensure the interviewee understands. However, whenever necessary the standards can be re-presented during the application of the scales.

Step 4: Checking the answer

Checking the answer: each score on the scale chosen by the individual must be checked by reformulating the verbal description of the score in the form of a question. All the answers for each item on each of the scales must be checked (see comment 4).

*Common Frame of Reference: If, even with the initial explanation of the PS reference standard, there is a noticeable discrepancy between what is observed/expected and the chosen score, the evaluator should discuss the score with the individual to develop the reference score (For example: "You scored this activity a 5. However, you may have put a lot of effort into using your chair for this activity, which represents a lower grade. Do you agree? If yes, please choose the score in the scale that best reflects your reality"). The final score is always determined by the individual (see comment 3).

Notes

- The first administration of WC-MAL is very important and an hour or more should be set aside for this to ensure the proper score is determined.
- An application and scoring flowchart for each task to be questioned has been developed and is shown in Figure 1.

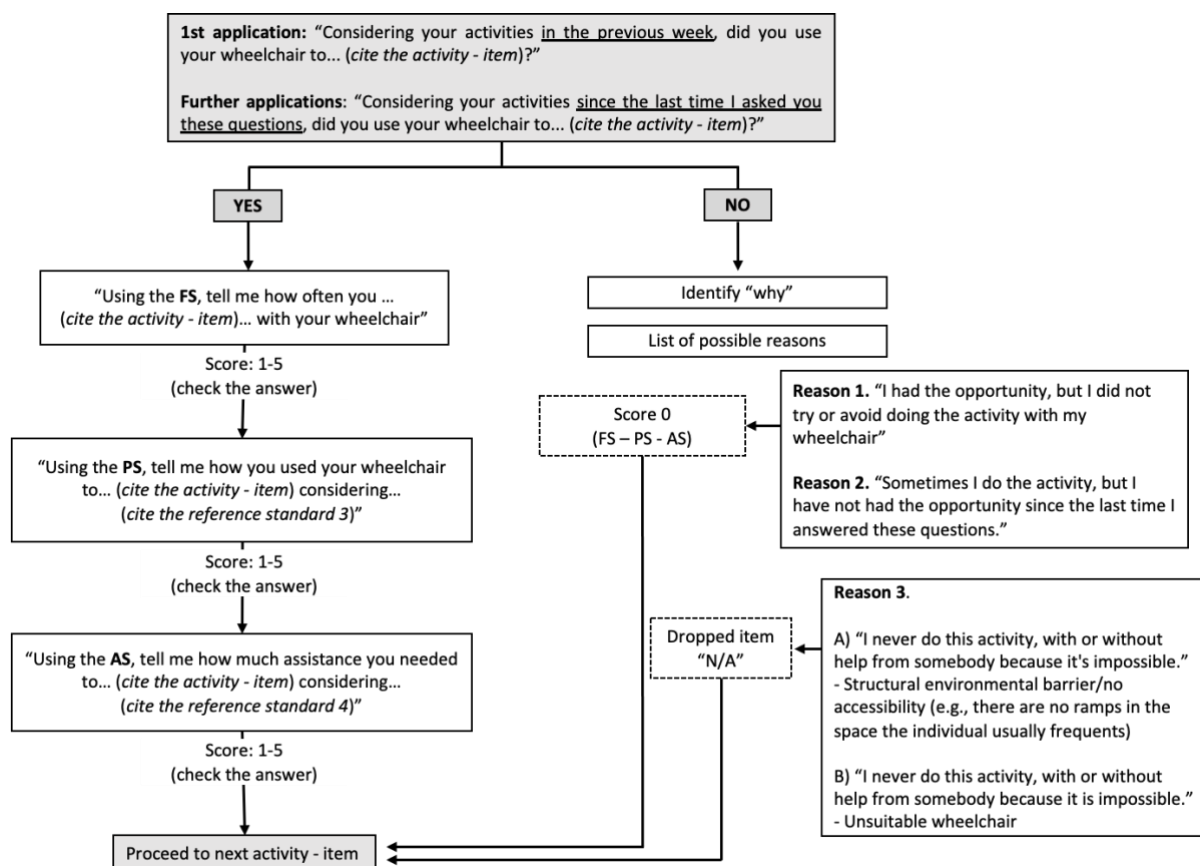


Figure 1. Application and scoring flowchart for each questioned task.

6. Scoring

After administration of the WC-MAL, the mean of the WC-MAL score is calculated for all scales by the sum of the points of each scale divided by the number of answered (valid) questions. As mentioned above, if the individual answers "no" in the scale (he/she did not perform the task), try to determine why he/she did not do it. Use the codes from the list of reasons at the end of this document to specify the reason. If it is impossible for the individual to perform the task (for example: he/she cannot go up or down ramps in a wheelchair because he does not have ramps in his house or any other place he/she frequents), the question is disregarded from the instrument (for this and the other application on this individual) and the average score for the scale is calculated using only the remaining items answered (for example: divide by 22 instead of 23, when one of the items is considered impossible, that is, not applicable - "N/A"). For further remarks regarding N/A scores see comment 2.

Formula for calculating the average score for each scale (1):

$$(1) \text{ Scale} = \frac{\sum \text{score of the scale}}{\sum \text{recorded items}}$$

The WC-MAL composite score is calculated by summing the scores from the scales separately, divided by three, according to formula (2):

$$(2) \text{ WC MAL} = \frac{FS + PS + AS}{3}$$

If, when you begin to apply the WC-MAL, the individual reports they cannot use the wheelchair for any task, do not accept that statement as a stated value. Instead, go through the first 10 items. If the answer to all of them is 0 (zero) then you can accept that the initial answer is substantial, and you can score 0 (zero) for the remaining items.

7. Comments

Comment 1: Using the scoring scales

For each item on the scale, the FS, the PS and then the AS should be asked.

Comment 2: Using the “N/A” code

When a task is impossible, such as going up or down ramps in a wheelchair because there are no ramps in the house or anywhere else he/she frequents, the “N/A” code should be used. However, often the activity is actually not impossible, it is just not being performed because the individual considers it too difficult, unsafe or requires an increase in time to be completed. In this case, the individual must determine the real reason for not performing the activity using their wheelchair. Thus, an item receives the code “N/A” only when this activity is truly impossible to be performed; this item is then dropped from the scale and the average score is calculated with only the remaining items (e.g. divide by 22 instead of 23).

Comment 3: Establishing a context or common-sense scoring reference for the PS:

In the context of the ICF, the performance is the execution of a motor action in a real environment. In this context, excellent performance can be defined as performing the action consistently and effectively, that is, a performance of the task that consistent with the objective of the action and without unnecessary effort (standard reference 3). When a clear discrepancy is perceived between the individual's chosen score on the PS and what the examiner observes in relation to the individual's motor skill, the examiner must again explain the PS score reference pattern for the task in question. To aid in this process, examples can be given for each step, especially for those that focus on scoring the scale (for example: “You scored this activity a “5”. However, you seem to use your wheelchair very slowly and with a lot of effort. So this would be more like a lower score to describe your performance. Do you agree?”). The individual will always be influenced by the examiner's explanation. If they are not influenced or continue to reiterate the original estimate, the examiner should politely continue the discussion until the individual affirms their scale score, whether or not they accept the evaluator's reference. The final decision is always up to the individual. Thus, the WC-MAL has aspects of both instruments: self-reported and semi-structured interviews. Again, this process must be carried out as a matter of priority from the first application.

Comment 4: Checking the answers

The individual's answer to each item must be checked. Each score the individual selects must be checked by verbally repeating the score back to the individual in question form.

8. Introducing the WC-MAL: instructions

This is a script with general instructions to be given when beginning to apply the WC-MAL. It can be read in its entirety, or adapted for better understanding by the individual. It is essential that the individual understands what is being evaluated and the logistics of applying the instrument. At the end, clarify any doubts.

"This interview aims to examine how often, how and with what assistance you use your wheelchair when you are in a real environment, that is, in the spaces you use in your daily life. You will use 3 separate scales to score each activity. If for some reason you have not done any of these activities, we will try to determine the reason for this. We will first discuss how often you use them, then your performance for doing these activities, and then we will discuss how much assistance you needed when performing these activities. It is important that you consider that these questions are related to what you actually do in a real environment, not what you think you can accomplish with your wheelchair. There are no right or wrong answers, choose the scores you believe best reflect what you do. Please understand that I must follow a script when applying this scale. Do you have any questions?" [Stop and answer questions]

"Let's get started."

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL) SCORE SHEET

Name: _____ Date: ___/___/___

Introducing the WC-MAL

"This interview aims to examine how often, how and with what assistance you use your wheelchair when you are in a real environment, that is, in the spaces you use in your daily life. You will use 3 separate scales to score each activity. If for some reason you have not done any of these activities, we will try to determine the reason for this. We will first discuss how often you use them, then your performance for doing these activities, and then we will discuss how much assistance you needed when performing these activities. It is important that you consider that these questions are related to what you actually do in a real environment, not what you think you can accomplish with your wheelchair. There are no right or wrong answers, choose the scores you believe best reflect what you do. Please understand that I must follow a script when applying this scale. Do you have any questions?" [Stop and answer questions] "Let's get started."

"Using the FS, tell me how often you... (cite the activity - item)... with your wheelchair".

"Using the PS, tell me how you used your wheelchair to... (cite the activity - item) considering... (cite the reference standard 3)".

"Using the AS, tell me how much assistance you needed to... (cite the activity - item) considering... (cite the reference standard 4)".

Items of the instrument	Notes	FS	PS	AS	If not, why?
1. Remain seated for long periods					
2. Transfer to and from surfaces of the similar height					
3. Transfer to and from the toilet					
4. Transfer to the bath or shower					
5. Transfer to and from the floor/ground					
6. Transfer to and from the car					
7. Transport large objects while pushing the wheelchair					
8. Pick up small objects from the floor					
9. Pick up large objects from the floor (using both hands)					
10. Carry a large item on the back of the wheelchair					
11. Reach for objects in front of you at shoulder height					

12. Reach for objects above shoulder height					
13. Open and close doors					
14. Open and go through doorways					
15. Go up and down sloped surfaces () gentle slope () steep					
16. Go up and down a step					
17. Go up and down a flight of stairs					
18. Navigate narrow places					
19. Move indoors () within 1 room () between 2 to 3 adjacent rooms () for more than 3 rooms					
20. Move through busy environments					
21. Navigate uneven surfaces					
22. Travel long distances					
23. Use transportation as a passenger					
TOTAL SUM OF SCALES					
NUMBER OF ITEMS CONSIDERED VALID					
AVERAGE SCORE OF THE SCALES					
COMPOSITE SCORE: WC-MAL					
Managed by:					

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL)

Frequency Scale - FS

- 0** I have **not performed** this activity in my wheelchair
- 1** I have **very rarely** performed this activity with my wheelchair
- 2** I have **rarely** performed this activity with my wheelchair
- 3** I have **sometimes** performed this activity in my wheelchair
- 4** I have **frequently** performed this activity in my wheelchair
- 5** I have performed this activity with my wheelchair **very often**

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL)

Performance Scale – PS

- 0** I have not performed this activity in my wheelchair
- 1** I have done this activity with my wheelchair, but the performance was very poor
- 2** I have done this activity with my wheelchair, but the performance was poor
- 3** I have done this activity with my wheelchair, but the performance was fair
- 4** I have done this activity with my wheelchair and the performance was good
- 5** I have done this activity with my wheelchair and the performance was very good

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL)

Assistance Scale – AS

- 0** I have not performed this activity in my wheelchair
- 1** I have performed this activity with my wheelchair with a lot of help from one or two people
- 2** I have performed this activity with my wheelchair with a little help from one person
- 3** I have performed this activity with my wheelchair with just supervision from someone else
- 4** I have performed this activity with my wheelchair alone, but I needed additional space or some equipment
- 5** I have performed this activity with my wheelchair alone and I did not need additional space or any equipment

WHEELCHAIR MOBILITY ACTIVITY LOG (WC-MAL)

Possible Reasons for Not Carrying Out the Activity Using a Wheelchair

Reason 1. “I had the opportunity, but I did not try or avoid doing the activity with my wheelchair.”

Reason 2. “Sometimes I do the activity, but I have not had the opportunity since the last time I answered these questions.”

Reason 3.

A) “I never do this activity, with or without help from somebody because it's impossible.” - Structural environmental barrier/no accessibility (e.g., there are no ramps in the space the individual usually frequents) – N/A

B) “I never do this activity, with or without help from somebody because it is impossible.” - Unsuitable wheelchair – N/A

References

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