



Wheelchair Use Confidence Scale (WheelCon)

Manual

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1. Executive Summary

Wheelchair confidence refers to an individual's belief in his/her ability to perform wheelchair related tasks. This manual provides a description of a new outcome measure, the Wheelchair Use Confidence Scale for Manual Wheelchair Users (WheelCon-M). Specifically, this document explains the theoretical background, its development and evolution, how to administer, score, and interpret the scores, as well as information about its measurement properties, alternate formats, and availability. This manual is a 'living' document and will be updated as new information is available, such as revised versions, translated versions, or measurement property information.

2. Theoretical Background

The construct of self-efficacy, or confidence, is the core component of Albert Bandura's Social Cognitive Theory.¹ It refers to one's judgment of his/her capabilities to organize and execute the courses of action required to produce given attainments. According to Bandura, self-efficacy is a better predictor of future behavior than skill itself.

Self-efficacy is not a personality characteristic. It may vary depending on the particular situation and the behaviors necessary to respond to that situation. It influences the courses of action people choose to pursue, how much effort they put forth in given endeavors, how long they will persevere in the face of obstacles and failures, their resilience to adversity, whether their thought patterns are self-hindering or self-aiding, how much stress and depression they experience in coping with taxing environmental demands, and the level of accomplishments they realize.

Self-efficacy has been identified in a variety of rehabilitation areas as an important construct to measure. It has been shown to be modifiable using confidence-based interventions demonstrating better treatment outcomes than standard interventions in arthritis,²⁻⁴ cardiac disease,^{5,6} end-stage renal disease,⁷ cancer,^{8,9} exercise,^{10,11} and anxiety.¹²

Prior to the development of the WheelCon-M, confidence with wheelchair use had received little attention in the literature. It was, however, identified as a construct to consider in the

wheelchair provision process,¹³ in wheelchair skills training,^{14,15} and in the abandonment of assistive technology.¹⁶

Bandura's premise that self-efficacy is the most important predictor of future behavior despite skill level, the demonstrated importance of self-efficacy in other areas of rehabilitation, and the identification of self-efficacy as a construct to consider in the wheeled mobility literature led to the development of the WheelCon-M. This subjective measure of an individual's belief in his or her ability to use a wheelchair is a useful addition to objective observer-based scales of wheelchair use. It will enable clinicians to make informed decisions when prescribing and training clients to use a manual wheelchair. It will also provide researchers with an important and relevant area of study in future research.

3. Description of the WheelCon-M

The WheelCon-M, version 3.0 is a 65-item self-report questionnaire designed to measure confidence with manual wheelchair use. Confidence is defined the individual's belief in his/her ability to perform each item independently. The WheelCon-M evaluates confidence in six areas: negotiating the physical environment (34 items), performing activities in the manual wheelchair (11 items), knowledge and problem solving (8 items), advocacy (4 items), managing social situations (7 items), and managing emotions (1 item). The stem for each item is: "As of now, how confident are you ...".and it uses a 100-point response scale from 0 (not confident) to 100 (completely confident). The WheelCon-M is intended for adults who have any physical diagnosis and who use a manual wheelchair across the continuum of care from initial rehabilitation to community reintegration. Clinically, the WheelCon-M may be used soon after an individual receives a manual wheelchair in order to determine areas of low confidence so that confidence-enhancing intervention may be provided. By administering the WheelCon-M after intervention, it can be used as an outcome measure. Please refer to Appendix A for a copy of the WheelCon-M, version 3.0.

4. Evolution of the WheelCon-M

The development and evolution of the WheelCon-M is described in Figure 1.

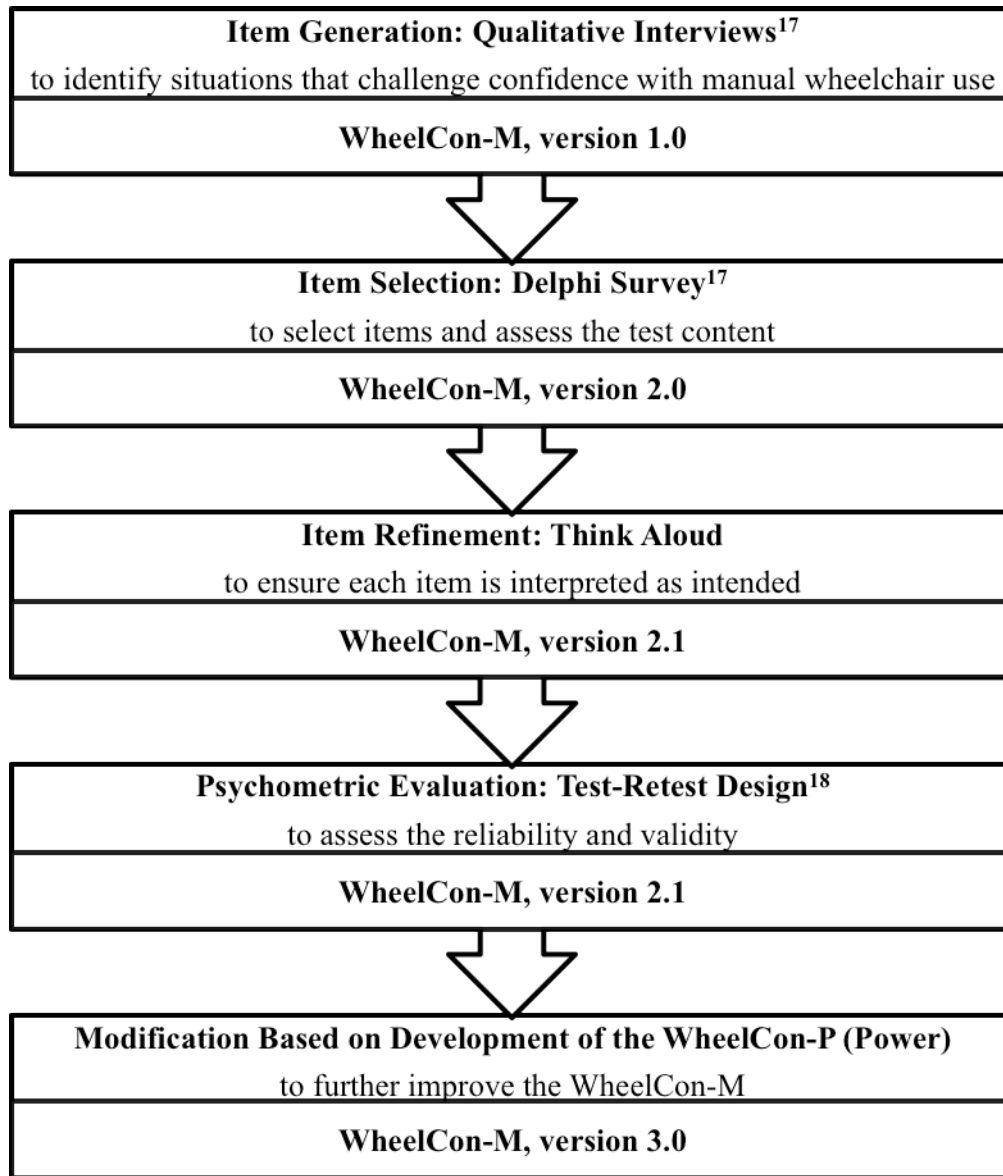


Figure 1. Development of the WheelCon-M.

5. Administration of the WheelCon-M

5.1 Type of Administration

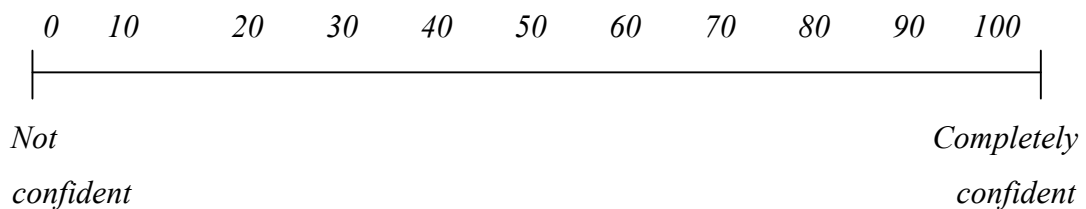
The WheelCon-M was designed to be self-administered. In situations where the respondent has poor vision, the tester may read the items to the respondent and record their answers. In

situations where the respondent has writing difficulties, the respondent should independently read the items, inform the tester of their confidence level, and the tester assists by recording the answers.

5.2 Instructions

We recommend that the tester read the following written instructions to the respondent.

A number of situations are described below that can challenge confidence when using a manual wheelchair. Please rate how confident you are as of now for each of the situations described using the following scale:



For example, a person may be 82% confident they can memorize a grocery list of 5 items, but only 63% confident they can memorize a grocery list with 10 items.

For items requiring physical ability, rate your confidence in performing the activity in a safe manner. For this assessment, confidence refers to your belief in your ability to perform each item independently.

Answer all items even if it is not a situation you would normally experience. If you have never experienced the situation, please rate your confidence as if you had to safely attempt it today.

Some questions include measurement, such as 5cm. Please refer to the ruler on the last page of this assessment if you are uncertain about these measurements.

Additional verbal instructions may also be required. We have learned from our experience thus far in administering the WheelCon-M that respondents sometimes switch from rating their confidence level to rating their skill level. If it appears that this is the case, it is necessary to remind the respondent that we are evaluating their confidence not skill level.

5.3 Visual Aids

A visual aid for the 0 (not confident) -100 (completely confident) response scale is a helpful reminder of the scale for the respondent (Appendix B).

5.4 Minimizing Response Biases

Confidence can be a private and sensitive topic. To safeguard against a social desirability response bias it is important to provide the respondent with a degree of privacy to complete the measure, while staying close enough to answer any questions he/she may have.

5.5 Time to Administer

It takes a mean of 21.7 minutes (standard deviation ± 7.3) to complete the WheelCon-M.

6. Scoring the WheelCon-M

The WheelCon-M is scored by summing the ratings for each item and dividing by the total number of items (65). The total score for the scale ranges from 0 to 100, with higher scores representing higher confidence with manual wheelchair use.

7. Comparative Scores

Initial comparative scores for the WheelCon-M, version 2.1 are from a sample of 83 Canadian community dwelling individuals who used a manual wheelchair as their primary means of mobility.

Demographics	Values	WheelCon-M Scores Median (IQR)
Age, median (IQR) years < 50 (n=40) ≥ 50 (n=43)	50.0 (31.0–60.0)	84.6 (71.3-92.0)
Sex Male % Female %	69.9 30.1	85.6 (75.9-91.3) 80.7 (56.3-93.2)
Diagnosis % Spinal cord injury (paraplegia) Spinal cord injury (tetraplegia) Lower extremity amputation Multiple sclerosis Other	43.4 16.9 10.8 9.6 19.3	87.2 (75.7-94.8) 86.5 (74.9-91.5) 63.7 (43.9-92.3) 78.5 (53.4-86.0) 83.8 (71.6-92.0)
Years using wheelchair, median (IQR) < 6 (n=27) 6-20.5 (n=28) > 20.5 (n=28)	13.0 (4.0-28.0)	84.6 (71.3-92.0)

SD=standard deviation

Table 1. Comparative Scores for the WheelCon-M, version 2.1.

8. Psychometric Properties

The reliability and validity of the WheelCon-M, version 2.1 were tested with the sample described above in the Comparative Scores section.¹⁸

8.1 Reliability

The WheelCon-M items had a high degree of internal consistency with a Cronbach's alpha of 0.92. Stepwise deletion of each item suggested that all of the WheelCon-M items made an important contribution to the scale. The WheelCon-M was reliable with respect to one-week test-retest with an ICC of 0.84. The standard error of measurement (SEM) was 5.9 and the smallest real difference (SRD) was 16.4, which represent the minimal change in WheelCon-M score that reflects a meaningful change beyond measurement error for a group and an individual respectively. These values are small given the 0-100 response scale allowing for important statistical changes to occur post intervention. A ceiling effect was identified which is explained by the fact that the sample was an experienced group of manual wheelchair users and therefore it stands to reason that they would have high confidence.

8.2 Validity

As hypothesized, the WheelCon-M had a statistically significant ($p < .01$) relationship with wheelchair skill, performance of activities of daily living, anxiety and depression, perceived user function related to seating and mobility, life space travelled, and years of wheelchair experience (Table 2).

Study Measures	Correlation (ρ)with the WheelCon-M
Wheelchair Skills Test (/100)	0.52 *
Wheelchair Skills Test – Questionnaire version (/100)	0.58*
Barthel Index(/100)	0.32 *
Hospital Anxiety and Depression Scale (/21)	-0.43*
Functioning Everyday with a Wheelchair (/60)	0.37*
Life Space Assessment (/120)	0.38*
Years of wheelchair experience	0.33*

* $p < 0.01$

Table 2. Correlations between the WheelCon-M and other measures.

9. Clinical Applications of the WheelCon-M

To date, the WheelCon-M has demonstrated reliability and validity with a community dwelling, adult group of experienced manual wheelchair users who had a variety of diagnoses. The tool can be used pre and post intervention to indicate the extent to which an individual has gain confidence with his or her manual wheelchair.

10. Alternate Formats of the WheelCon-M

The WheelCon-M, version 3.0 has been translated into Canadian French. A power version of the WheelCon has also been developed, the WheelCon-P. It too is being translated into French. The measurement properties of these versions are currently being evaluated and will be added to this manual once validated.

11. Availability

The WheelCon-M outcome measure and manual are available free of charge. However, we ask that if you are using the WheelCon-M, either in clinical practice or research that you provide us with your name and contact information. With this information we can update you on current and future research involving the WheelCon-M. For example, any changes, such as new populations for which the tool has been validated, will be updated in the manual and with your contact information we can alert you to these changes.

12. Suggested Citation

If you are using the WheelCon-M in your research, we ask that you cite references 17 and 18 in any publications. Users of this Manual should cite the date of the version that they use, which can be found in the footer of each page.

13. Limitations

In using the WheelCon-M it is important to recognize that the reliability and validity described above are limited to a sample of individuals who had at least six months of experience in manual wheelchair use. It has not been tested with individuals who are new to using a manual wheelchair. It is also important to note that the sample had a higher than average percentage of males, a high percentage of spinal cord injury diagnosis, and the majority were Caucasian. Therefore, the results of this work cannot be generalized to culturally diverse populations. As well, the sample was restricted to the Canadian context which is a limitation in that culturally diverse perspectives were missed. Finally, despite having a small rural representation included in the sample, the impact of different geographies and climates on wheelchair use outside of Canada was also missed.

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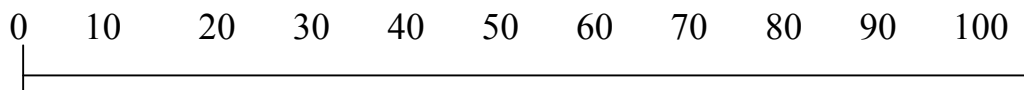
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Appendix A: WheelCon-M, version 3.0

Wheelchair Use Confidence Scale for Manual Wheelchair Users

(WheelCon-M, version 3.0)

Instructions: A number of situations are described below that can challenge confidence when using a manual wheelchair. Please rate how confident you are *as of now* for each of the situations described using the following scale:



Not

confident

Completely

confident

For example, a person may be 82% confident they can memorize a grocery list of 5 items, but only 63% confident they can memorize a grocery list with 10 items.

For items requiring physical ability, rate your confidence in performing the activity in a safe manner. For this assessment, confidence refers to your belief in your ability to perform each item independently.

Answer all items even if it is not a situation you would normally experience. If you have never experienced the situation, please rate your confidence as if you had to safely attempt it today.

Some questions include measurement, such as 5cm. Please refer to the ruler on the last page of this assessment if you are uncertain about these measurements.

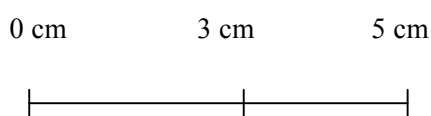
As of now, how confident are you that you:	Confidence (0-100)
1) can move your wheelchair over carpet?	
2) can move your wheelchair around furniture in your own home?	
3) can move your wheelchair over thresholds, such as between rooms?	
4) can manoeuvre your wheelchair in small spaces, such as a bathroom?	
5) can transfer from your wheelchair to your bed?	
6) can transfer from your wheelchair to your toilet?	
7) can transfer from your wheelchair into your bathtub (including use of bathseats) OR using your commode to get into your shower stall?	
8) can transfer from the floor to your wheelchair by yourself?	
9) can transfer from your wheelchair to your vehicle?	
10) can make a light meal while using your wheelchair?	
11) can carry a hot drink while moving in your wheelchair?	
12) can move your wheelchair through a door that opens automatically?	
13) can open, go through, and then close a standard 81cm (32") lightweight door?	
14) can open and go through a spring loaded door, such as a door at your local mall?	
15) can move your wheelchair up a standard ramp, built to code (5° incline)?	
16) can move your wheelchair down a standard ramp, built to code (5° incline)?	
17) can move your wheelchair up a dry steep slope (> 5° incline)?	
18) can move your wheelchair down a dry steep slope (> 5° incline)? ?	

19)	can move your wheelchair down a dry steep slope (> 5° incline) and stopping as soon as you are off the slope?	
20)	can move your wheelchair up a curb cut?	
21)	can move your wheelchair down a curb cut?	
22)	can move your wheelchair over a drainage grate and then up a curb cut?	
23)	can move your wheelchair down a curb cut then over a drainage grate?	
24)	can move your wheelchair through a puddle then up a curb cut?	
25)	can move your wheelchair down a curb cut then through a puddle?	
26)	can move your wheelchair through slush then up a curb cut?	
27)	can move your wheelchair down a curb cut then through slush?	
28)	can move your wheelchair down a curb cut then through 5cm (2") snow?	
29)	can move your wheelchair through 5cm (2") snow then up a curb cut?	
30)	can move your wheelchair up a standard height curb 15cm (6") without a curb cut?	
31)	can move your wheelchair down a standard height curb 15cm (6") without a curb cut?	
32)	can manoeuvre your wheelchair to press the crosswalk button and cross the street before the traffic light changes?	
33)	can cross a street with light traffic at a crosswalk with no traffic lights?	
34)	can move your wheelchair across 3m (10ft) of flat, freshly mowed, dry grass?	
35)	can move your wheelchair through a pothole that is wider than your wheelchair and 5cm (2") deep?	
36)	can move your wheelchair along a paved sidewalk that is cracked and uneven?	
37)	can move your wheelchair along a flat dirt path or trail with some tree roots and rocks?	

38)	can move your wheelchair across 3m (10ft) of flat, unpacked gravel?	
39)	can move your wheelchair along a sidewalk with 5cm (2") of snow?	
40)	can move your wheelchair through a crowd of people without hitting anyone?	
41)	can ask people to move out of your way while moving in your wheelchair?	
42)	can move your wheelchair down a store aisle that has just enough room for your wheelchair without knocking items over?	
43)	can manage all toileting activities while in an accessible public bathroom?	
44)	can use public transportation in your town?	
45)	can do your chosen leisure activities in your manual wheelchair?	
46)	can transport items in a backpack that is on the back of your wheelchair?	
47)	can use strategies, such as humour, that will help people feel comfortable if they are unsure how to act because you use a wheelchair?	
48)	can correct others' mistaken beliefs about people who use wheelchairs?	
49)	can present yourself as you wish to be seen while in your wheelchair around acquaintances, colleagues, or peers?	
50)	can present yourself as you wish to be seen while in your wheelchair when you are in public and feel people are watching you?	
51)	can present yourself as you wish to be seen while in your wheelchair when you want to impress others, such as during a job interview?	
52)	can problem solve how to get to your destination when there is an unexpected situation, such as construction detours on a sidewalk?	
53)	can figure out how to negotiate a challenging, and unusual physical obstacle?	

54)	can continue to move your wheelchair in a situation that is making you feel anxious or nervous?	
55)	know when your wheelchair is not working properly?	
56)	know what your wheelchair can and can't do, separate from your own abilities? For example, a wheelchair can go down stairs but many individuals do not go down stairs with their wheelchair due to their inability to do so.	
57)	can tell someone how to move your wheelchair if it gets stuck?	
58)	can ask someone for help?	
59)	can tell a cab driver how to fold/unfold your wheelchair, making sure all parts are taken off and put back on properly?	
60)	can tell a stranger how to help you safely get back into your wheelchair if you tip over?	
61)	know what to do if you fall out of your wheelchair?	
62)	can advocate for changes you want made to your wheelchair, such as a different cushion to be more comfortable?	
63)	can advocate for changes you want in your home, such as doorways widened or a ramp installed?	
64)	can advocate for your needs at work or school, such as modifications in the bathroom?	
65)	can advocate for changes in your community, such as having a curb cut added in your neighborhood to improve your accessibility?	
TOTAL SCORE		

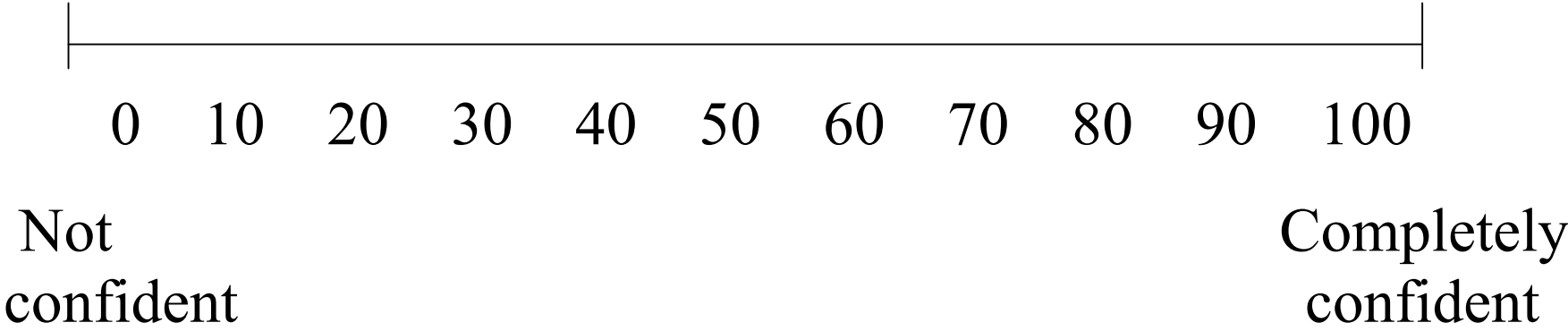
Measurement Scale 0-5cm



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Appendix B: WheelCon-M, version 3.0 Response Scale Visual Aid

WheelCon-M Response Scale



Notes
