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ORIGINAL REPORT

DEVELOPMENT OF A NEW SCALE FOR PERCEIVED SELF-EFFICACY IN MANUAL WHEELED MOBILITY: A PILOT STUDY

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Objective: **To study the psychometric qualities of a perceived self-efficacy in wheeled mobility scale.**
Design: **Questionnaires.**
Subjects: **Forty-seven wheelchair users with spinal cord injury (elite athletes $n = 25$, recreational $n = 22$, from 6 different countries).**
Method: **Based on the literature, and expert's and wheelchair user's comments, a new Self-Efficacy in Wheeled Mobility Scale (SEWM[1]) was developed. Internal consistency (split-half and Cronbach's alpha) and concurrent validity (correlating the Self-Efficacy in Wheeled Mobility Scale with the Generalized Perceived Self-efficacy Scale (GSE) and the spinal cord injury Exercise Self-Efficacy Scale (ESES)) were assessed. To evaluate the construct validity, age, lesion level and completeness and time since injury between groups of participants and their total scores were compared statistically.**
Results: **Cronbach's alpha for the SEWM was 0.91, internal consistency was $r = 0.90$. Significant correlations between pairs of scales of the entire sample (SEWM-ESES: 0.60; SEWM-GSE: 0.50 ($p < 0.05$; $n = 47$, 2-tailed) and of the subgroup comparison (SEWM-ESES recreational $r = 0.61$; elite $r = 0.73$), demonstrated fair construct and concurrent validity of the SEWM.**
Conclusion: **The SEWM was found to be reliable and valid in active spinal cord injury. A larger more diverse sample is needed to support the psychometric qualities of the SEWM scale.**

Key words: self-efficacy; hand rim wheelchair; mobility; spinal cord injury.

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INTRODUCTION

Rehabilitation interventions following spinal cord injury (SCI) require major adaptations in physical capacity, and the development of skills and functional behaviour. An important change that many patients with SCI (80%) will encounter in early rehabilitation is the transition from being a walking individual to a manual wheelchair user (1). Therefore, one of the main rehabilitation interventions will focus on wheelchair skills and manual wheeled mobility (WM), since wheelchair skills can make the difference between dependence and independence in daily life for people with SCI (2). In addition, there are many wheelchair skills tests applied to measure wheelchair skill performance and perceived WM abilities (3). It can be expected that there is a positive relationship between the level of manual wheelchair skill performance and participation in persons with SCI (4) (participation as defined in the International Classification of Functioning, Disability and Health (ICF) classification system) (5). Accordingly, changes in WM behaviour can be demonstrated, for example, from unsuccessful to successful completion of a certain wheeled mobility task, or from unsteadiness or fear of falling, to improved balance function while moving around with a wheelchair.

Self-efficacy beliefs are defined as the confidence an individual has in performing a set of skills required to succeed in a specific task; perceiving self-efficacy is a major factor influencing behaviour change, especially when complex skills need to be learned (6).

Perceived self-efficacy influences choice of activities and motivational level, and contributes to the acquisition of knowledge and refinement of new abilities (7). Perceived self-efficacy also influences individual judgments, effort, resilience, life choices, and perseverance in the face of difficulties (8). In short, when perceived self-efficacy is high, people will generally make more effort, set higher goals, and persevere through obstacles.

The Attitude, Social Influence and Self-Efficacy model (ASE) is used as a basis for interventions on behavioural change in the context of health and a physically active lifestyle (9). Van der Ploeg et al. (10) suggested integrating the ASE model into the ICF Model of Functioning, Disability and Health (5), which describes the multidimensional aspects of functioning, disability and health in the context of environmental and personal factors. It was recommended that the ingredients of the ASE model are instrumental to the rehabilitation outcome of physical activity stimulation in the context of rehabilitation programmes (10). As a result, a new model, describing the relationship between Physical Activity behaviour and functioning of people with a Disability (the PAD model) was proposed. The PAD model conceptualizes the possible relationship between physical activity, its determinants,

[1]The latest version of the SEWM scale is available from: http://www.scionn.nl/inhoudp28.htm, http://www.scionn.nl/SEWM%20English.pdf.

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and functioning in people with disabilities, taking into account personal and environmental factors (11). Since WM is a physical activity that may affect participation, and perceived self-efficacy is a meaningful "personal factor" that determines physical activity behaviour, the PAD model is chosen as the theoretical framework underpinning the current study (Fig. 1).

Despite the different studies on wheelchair skills and the development of different test batteries for measuring WM performances (3), the role of personal traits on wheelchair skill acquisition has not been dealt with in detail. Nor has the perceived self-efficacy in wheeled mobility and wheelchair skills been evaluated comprehensively.

Perceived self-efficacy scales can be general and cover a broad spectrum of activities, such as the Generalized Perceived Self-Efficacy (GSE) scale (12), which is presumably the most recognized perceived self-efficacy scale. Other perceived self-efficacy scales can be domain specific, such as the SCI Exercise Self-Efficacy Scale (ESES) (13). To summarize, there are two levels of perceived self-efficacy scales; *global* self-efficacy scales, and *domain-specific* self-efficacy scales, which measure either the level of *functioning or assessing specific skills*. Domain-specific scale items are constructed at an intermediate level of difficulty and are better predictors than global tests (6).

The current study was designed to develop a new clinimetrically reliable and valid scale for perceived self-efficacy in manual wheeled mobility (SEWM).

Further objectives were:

- to test the internal consistency of the new SEWM scale among a group of wheelchair users with a SCI;
- to evaluate the concurrent validity in comparing the outcomes of the new SEWM scale with the existing GSE scale and the ESES;
- to evaluate the construct validity by means of associations between the SEWM scale scores and basic characteristics such as age, activity level, lesion level, completeness of spinal cord injury and time since injury.

METHODS

The initial item pool for the SEWM was based on the GSE (12) and the ESES (13). The GSE consists of 10 items and assesses a general sense of perceived self-efficacy on a 4-point-Likert scale (minimum score 0, maximum score 40). It aims to predict coping with daily difficulties as well as adaptation after experiencing all kinds of stressful life events. In samples from 23 nations, Cronbach's alphas ranged from 0.76 to 0.90, with the majority in the high 0.80s. Criterion-related validity is documented in numerous correlation studies where positive coefficients were found with favourable emotions, dispositional optimism, and work satisfaction. Negative coefficients were found with depression, anxiety, stress, burnout, and health complaints. The weakness of the GSE is that, as a general measure, it does not tap specific behaviour change. Therefore, in most applications it is necessary to add a few items to cover the particular content of the survey or intervention (14).

The ESES (13) is a recently developed tool measuring SCI exercise self-efficacy in community-dwelling adults who participate in structured exercise programmes as well as assessing exercise self-efficacy beliefs in occasional as well as habitual exercisers with spinal cord injuries. Similar to the GSE, the ESES consists of 10 items assessed in a 4-point-Likert scale (minimum score 0, maximum score 40). Preliminary findings indicated that the ESES is a reliable instrument with high internal consistency (Cronbach's alphas 0.92, $n=368$) and satisfying content and construct validity (13). The current research team reviewed and modified the items of these scales for presumed relevance to the SCI population and WM skills (3). Arguments and discussions for the enhancement of acceptable face validity of the scale were performed based on a literature review and on the comments of experts and wheelchair users. The wheelchair users represented different lesion levels (3 people), and the professional experts were 2 physiotherapists and two adapted physical instructors with many years of experience of working with SCI patients. They were invited to review the scale with regard to item content, clarity, relevance and format. Finally, 10 items were selected and constituted the 4-point Likert-scale SEWM. This generated a similar structure to both scales, the GSE and the ESES. For instrument design, the following definition of ICF for (wheeled) mobility was adopted: "Moving around using equipment:

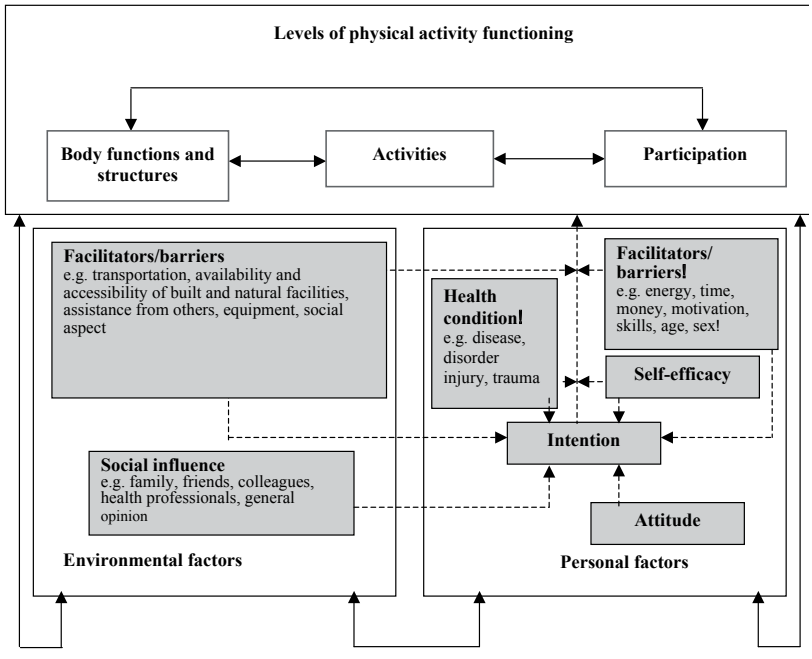

Fig. 1. The Physical Activity for people with a Disability (PAD) model, an integrated model of physical activity behavior and its relation with functioning and disability. The framework of the International Classification of Functioning, Disability and Health (ICF) model is shown by the white boxes and the solid arrows, while the determinants of physical activity behavior are shown in the grey boxes. The dashed arrows in the PAD model represent the pathway through which these factors determine physical activity, although not all possible pathways and relations are shown in the model. Most of the dashed arrows also work in the opposite direction and, as shown in the general framework, all components of the integrated model more or less interact with each other. Published by permission from Wolters Kluwer (10).

moving the whole body from place to place, on any surface or space, by using specific devices designed to facilitate moving or create other ways of moving around, such as with skates, skis, or scuba equipment, or moving down the street in a wheelchair or a walker" (5).

The SEWM scale was originally developed in English and translated into Dutch and Hebrew by psychologists who were experts in the field and spoke both languages fluently, following a bi-directional translation procedure.

Study design

Participants who, after verbal explanation, consented to participate in the evaluation study received an informed consent form, a personal information form, the GSE, ESES and the new SEWM. All procedures were performed in accordance with the guidelines of the Declaration of Helsinki. The study was approved by the medical ethics committee of the Catholic University of Leuven, Belgium.

The SEWM scale instructs respondents to rate how confident they are with regard to the virtual performance of specific and general WM skills on a 4-point Likert scale (1 = not at all true, 2 = rarely true, 3 = moderately true, 4 = always true).

Data collection and sample characteristics

The SEWM was tested in a group of 47 wheelchair users with SCI (paraplegic, lesion level T4 to L4, male/female ratio: 42/5). Eventually, two subgroups were discerned. The first group comprised 25 elite wheelchair basketball players from 6 countries: UK, USA, Belgium, The Netherlands, Greece and Israel. The questionnaires for this group were completed during the preliminary European wheelchair basketball tournament in Badajoz, Spain (2008) and in a joint training camp of team Great Britain and team Israel during the preparations for the 2008 Paralympics. The questionnaires were also passed to the Chicago wheelchair basketball college team. A second group of 22 individuals, participating in different recreational activities, also completed the scale. This group comprised people with a SCI from Belgium (a recreational activities group from KU Leuven sport faculty) and from Israel (Tel-Aviv "veterans house" (*Beit-Ha'Lochem*)). The recreational activities of these participants are described in Table I.

Statistical procedures

Descriptive statistics, internal consistency, concurrent and construct validity analyses were conducted for the whole sample and for the two subgroups (elite athletes/recreational) separately, using SPSS 15.0 (SPSS Inc., Chicago, USA).

Internal consistency of the scale was determined by computing Cronbach's alpha and Split-half (Spearman–Brown) correlation coefficients.

Concurrent and construct validity was obtained by correlating the total scores of the SEWM with the total scores of the GSE and the ESES in the same populations. Statistical significance was set at $p < 0.05$. To support findings, regression analysis (predictive ability) of the SEWM and the ESES was performed. Basic demographic variables (age, lesion level, completeness of SCI, and time since injury) were statistically compared between both groups of participants, and a statistical comparison of their total scores on the SEWM scale was carried out. This procedure serves as another means to evaluate construct validity of the scale. Age was compared between groups by means of the *t*-test applied following Levene's test for equality of variances; for lesion level comparison, Pearson χ^2 test was used; a comparison between participants with complete and incomplete SCI was performed with Fisher's exact test; and for comparison of time since injury, a non-parametric Mann-Whitney test was applied; regression analysis (R-square) was used to test the correlations between SEWM total scores and the independent variables age, and time since injury. The non-parametric Mann-Whitney test was used to test the relationship between the SEWM total scores and completeness of SCI (complete/incomplete), and between lesion levels (high-level paraplegic/low-level paraplegic).

Table I. *Subjects' characteristics (*n = *47)*

Characteristics	*n*
Countries, *n*	
UK	3
Greece	4
Israel	19
Holland	5
Belgium	13
USA	3
Male, *n*	42
Female, *n*	5
Age, years, mean (SD) [range]	38.2 (13.9) [18–75]
Time since injury, mean (SD) [range]	16.9 (13.1) [2–52]
Complete/Incomplete SCI (missing data), *n*	32/12 (3)
Lesion level	T4–L4
Elite[a]/Recreational	25/22
Age, years, mean (SD)	
Elite	31.7 (8.7)
Recreational	45.6 (15.2)
Elite, *n*	
Complete	18
Incomplete	5
Missing data	2
Recreational, *n*	
Complete	14
Incomplete	7
Missing data	1
Lesion level	
Elite	
>T12	11
≤T12	11
Missing data	3
Recreational	
>T12	8
≤T12	14
Time since injury, mean (SD)	
Elite	14 (9.9)
Recreational	20.1 (15.7)

[a]International level wheelchair basketball players.
SD: standard deviation.

RESULTS

Only those subjects with SCI who were daily manual wheelchair users were included in the pilot study. Participants' demographic and clinical characteristics are shown in Table I. At this stage of the development of the scale, only persons with paraplegia were involved in the study. Descriptive statistics (means, standard deviations (SDs), and range of scores) for all 3 perceived self-efficacy scales are shown in Table II. The percentage of maximal values of all 3 scales is shown in Table III.

Internal consistency

Item descriptive statistic of the SEWM for the two groups was performed (Table IV). Cronbach's alpha of the entire sample ($n = 47$) was 0.91 for the SEWM and 0.88 and 0.85 for the ESES and GSE, respectively. High internal consistency of the SEWM was confirmed in split-half (equal Length Spearman–Brown 0.90), as shown in Table V.

Performing internal consistency examination for the 10 items of the SEWM of the elite athletes group only ($n = 25$), showed

Table II. *Descriptive statistics for all perceived self-efficacy scales for the entire sample and for the 2 groups separately*

	n	Min	Max	Mean	SD
GSE – total score	47	25	40	35.5	3.9
ESES – total score	47	18	40	34.3	4.8
SEWM – total score	47	14	40	34.7	6.0
GSE – total score[a]	25	28	40	36.4	3.7
ESES – total score[a]	25	25	40	35.6	4.1
SEWM – total score[a]	25	26	40	37.2	3.4
GSE – total score[b]	22	25	40	34.5	4.1
ESES – total score[b]	22	18	40	32.9	5.2
SEWM – total score[b]	22	14	40	31.9	7.0

[a]Athletes group, [b]Recreational group.
SD: standard deviation; GSE: Generalized Perceived Self-efficacy Scale; ESES: Spinal cord injury Exercise Self-Efficacy Scale; SEWM: Self-Efficacy in Wheeled Mobility Scale.

lower correlations for two items (item 8 and 9) with the total score (Cronbach's alpha of the elite athlete group was 0.81, shown in Table VI).

Concurrent validity

There was a statistically significant correlation between both pairs of scales (Spearman's correlation SEWM and GSE = 0.50; SEWM and ESES = 0.60 ($p < 0.05$; $n = 47$, 2-tailed). Correlations between the two scales (SEWM and ESES), among recreational vs elite athletes, showed lower values for the recreational sample (recreational: 0.61; elite athlete = 0.73). Explained variance among the scales in the athlete group were higher, compared with the non-athletes group (SEWM vs ESES: R-square non-athletes = 0.38, elite athletes = 0.53; SEWM vs GSE: R-square non-athletes = 0.14, elite athletes = 0.44). These results demonstrate explained variance (predictive ability SEWM-ESES) of 53% among the elite athlete subgroup (Fig. 2).

Construct validity

There were no statistically significant differences between the athletes group and the recreational group in terms of lesion level, completeness of injury and time since injury. Age of the elite athletes group (mean 31.7, SD 8.7) was significantly lower than in the recreational group (mean 45.6, SD 15.2, $p = 0.001$). To control for the possibly confounding effect of the lower age in the elite athletes group, in comparison with the total SEWM score between the two groups, an analysis of covariance (ANCOVA) model was constructed, with age serving as covariate. This analysis confirmed the higher values of the score in the elite group. (The adjusted mean is greater by 4.4 points in the elite group compared with the unadjusted mean of 5.3).

Table III. *Percentage of maximal value (40)*

	GSE Frequency *n* (%)	ESES Frequency *n* (%)	SEWM Frequency *n* (%)
Yes	38 (81)	39 (83)	35 (74.5)
No	9 (19)	8 (17)	12 (25.5)
Total	47 (100)	47 (100)	47 (100)

Yes = 40.
No < 40.

A regression of the SEWM score on the athlete's age showed a statistically significant decrease in SEWM score with age (a slope of –0.14, $p = 0.02$). A regression of the SEWM score on the time since injury variable, showed a statistically significant decrease in SEWM scores with time (a slope of –0.09, $p = 0.04$). Additionally, a strong positive correlation was found between age and time since injury ($r = 0.74$). A stepwise backwards regression of SEWM scores on both variables, showed that controlling for age, the time since injury is not significant ($p = 0.65$), although negligible in magnitude the association was positive (Table VII).

There was no difference in SEWM total scores between athletes with complete lesions (35.4, SD 4.4) and incomplete lesions (31.8, SD 8.9, non-parametric Mann-Whitney test, $p = 0.47$). However, there were statistically significant differences between SEWM scores of different lesion levels; paraplegics patients with low lesion levels ($n = 19 \leq$ T12) had statistically significant higher SEWM compared to those with high lesion level s ($n = 25 >$ T12) ($p = 0.02$).

Table IV. *Item descriptive statistic of the Self-Efficacy in Wheeled Mobility Scale (SEWM) for the 2 groups*

SEWM items	Recreational ($n = 22$) Mean (SD)	Athletes ($n = 25$) Mean (SD)	All sample ($n = 47$) Mean (SD)
I can overcome barriers and challenges regarding wheeled mobility skills if I try hard enough	3.36 (0.90)	3.68 (0.69)	3.53 (0.80)
I can find means and ways to be independently mobile, using my wheelchair in everyday life settings	3.59 (0.50)	3.72 (0.54)	3.66 (0.52)
I can accomplish tasks that require independent wheelchair mobility such as ascending sidewalks and ramps	3.05 (1.00)	3.72 (0.54)	3.40 (0.85)
When I am confronted with obstacles to wheelchair mobility, I can find solutions to overcome them	3.23 (0.87)	3.72 (0.54)	3.49 (0.75)
I can overcome mobility barriers and challenges even when I am tired	3.14 (0.83)	3.56 (0.58)	3.36 (0.74)
I can be independently mobile with my wheelchair even when I am depressed	3.36 (0.79)	3.64 (0.64)	3.51 (0.72)
I can be mobile with my wheelchair without the support of my family or friends	3.59 (0.59)	3.84 (0.47)	3.72 (0.54)
I can motivate myself to carry out a difficult wheeled mobility skill such as descending an escalator (moving stairs)	2.45 (1.26)	3.60 (0.76)	3.06 (1.17)
I can learn new skills of wheeled mobility without the help of a therapist or trainer	3.05 (1.13)	3.88 (0.33)	3.49 (0.91)
While using my wheelchair, I can usually handle whatever comes my way	3.05 (0.90)	3.80 (0.41)	3.45 (0.77)

SD: standard deviation.

Table V. *Equal-length Spearman–Brown Split half of the self-efficacy in wheeled mobility scale items*

	Value
Cronbach's alpha	
Part 1 (items 1–5)	0.90
Part 2 (items 6–10)	0.80
Correlation between forms	0.81
Spearman–Brown coefficient	
Equal length	0.90

Table VI. *Internal consistency (alpha) of Self-Efficacy in Wheeled Mobility Scale items*

Group	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Recreational $n=22$				
Item 1	28.5	39.4	0.81	0.91
Item 2	28.3	44.4	0.70	0.92
Item 3	28.8	38.8	0.77	0.92
Item 4	28.6	38.7	0.91	0.91
Item 5	28.7	39.6	0.86	0.91
Item 6	28.5	42.3	0.63	0.92
Item 7	28.3	43.9	0.65	0.92
Item 8	29.4	36.6	0.73	0.92
Item 9	28.8	39.9	0.57	0.93
Item 10	28.8	39.4	0.81	0.91
Elite athletes $n=25$				
Item 1	33.5	9.3	0.55	0.80
Item 2	33.4	9.1	0.82	0.77
Item 3	33.4	9.5	0.68	0.78
Item 4	33.4	9.3	0.76	0.77
Item 5	33.6	9.8	0.52	0.80
Item 6	33.5	9.1	0.66	0.78
Item 7	33.3	9.7	0.71	0.78
Item 8	33.6	11.6	–0.02*	0.87
Item 9	33.3	11.5	0.18*	0.83
Item 10	33.4	10.7	0.43	0.81

*Items with lower correlation with the total score.

DISCUSSION

The stronger an individual's sense of efficacy for physical tasks, the more positive his or her perceived psychological well-being (15). Some support for perceived self-efficacy as a mediator of an individual's wheelchair mobility behaviour was found by Hedrick (17) in 1985, who reported that participation in tennis by wheelchair mobile adolescents increased their perceived self-efficacy in tennis. Hedrick also examined whether experience of success in tennis could impact on other competency domains; perception of physical competence was enhanced, but no impact on social or cognitive competence was

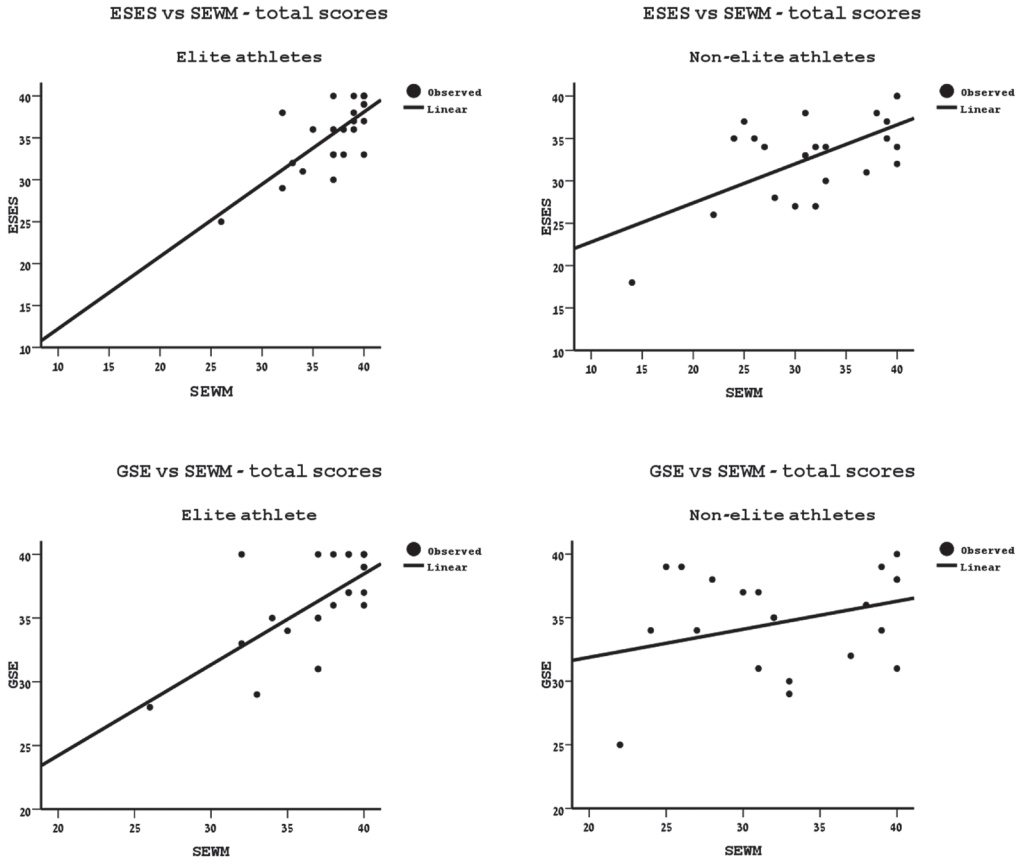

Fig. 2. The ability to predict ESES and GSE from SEWM for elite and non-elite athletes. The solid lines represent the linear regression. The percentages of explained variations (R2) are: ESES, elite athletes 53.3%; ESES, non-elite athletes 37.9%; GSE, elite athletes 44.3%; GSE, non-elite athletes 14.1%. SEWM: Perceived self-efficacy in Wheeled Mobility scale; ESES: Exercise Self-Efficacy Scale; GSE: Generalized Perceived Self-efficacy Scale.

Table VII. *Stepwise regression of Self-Efficacy in Wheeled Mobility Scale (SEWM) on "age" and "time since injury"*

	Unstandardized coefficients B ± SE	*t*	*p*
Model 1			
(Constant)	40.565 ± 2.657	15.267	0.000
Age	–0.174 ± 0.091	–1.902	0.064
Time since injury	0.045 ± 0.097	0.462	0.65
Model 2			
(Constant)	40.120 ± 2.454	16.348	0.000
Age	–0.14 ± 0.060	–2.357	0.02

[a]In model 1, both variables are entered and it shows that controlling for age, the variable time since injury is not significant and its coefficient is positive. Model 2 shows that the dominant variable associated with the decrease in SEWM is age. SE: standard error.

noted. Greenwood et al. (17), who investigated psychological well-being of wheelchair tennis participants and wheelchair non-active participants, found a significant correlation between perceived self-efficacy in wheelchair mobility and perceived self-efficacy in wheelchair tennis. The wheelchair mobility scale that was used in Greenwood et al's study (18) was formulated according to Bandura's (6) recommendations, and consisted of 16 items. Greenwood's scale measured the individuals' strength of perceived self-efficacy by having participants indicate on a scale from 0 to 100, their perceived confidence in completing each task. However, in the study by Greenwood et al. (18), no details are provided on the scale items and on the statistical procedures to validate and to confirm the reliability of the scale. Therefore, it was deemed necessary to develop a new reliable and valid perceived self-efficacy scale in wheeled mobility for SCI.

Reliability of the Self-Efficacy in Wheeled Mobility Scale

Current preliminary findings indicate that the SEWM is an instrument with high internal consistency. However, an internal consistency examination for the 10 items of the SEWM for the elite athletes group separately, showed lower correlations for 2 items (item 8 and 9) with the total score. In particular, item item 8 ("I can motivate myself to carry out a difficult wheeled mobility skill such as descending an escalator (moving stairs)") lowered the internal consistency of the scale. When these two items were removed, the consistency increased substantially. The reason that item item 8 lowered the internal consistency of the scale could be related to the fact that this item contains a specific and rather challenging task (descending an escalator). Item 9 includes negative expression ("I can learn new skills of wheeled mobility without the help of a therapist or trainer"), which might also reduce the consistency. In order to lessen the influence of these two items, it is advised to rephrase the sentences. In order to keep the 10 items set, a suggestion for new phrasing may be, for item 8: "I can motivate myself to carry out a difficult and challenging wheeled mobility skill" and for item 9: "I can learn new skills of wheeled mobility by myself". Obviously this requires follow-up analysis.

The concurrent validity of the Self-Efficacy in Wheeled Mobility scale

Regarding the concurrent validity, the moderate size of the correlations indicate a good fit of the SEWM with the ESES and the GSE scales, and allows the conclusion that the measure is specific enough that it does not measure the same elements as the other scales.

In the present study, correlation investigations showed higher scores for the SEWM vs ESES than for the SEWM vs GSE. This can be explained by the fact that the ESES and the SEWM were both developed specifically for SCI populations, yet the SEWM is the more specific perceived self-efficacy scale measuring self-efficacy in wheeled mobility perceptions of people with SCI. These results support initial assumptions that self-efficacy perceptions are domain-specific, which means that an individual can have high perceived self-efficacy for the skills associated with one activity and at the same time express lower perceived self-efficacy for other domains of activity (18). For instance, some individuals may be highly certain that they can accomplish tasks that require independent wheelchair mobility, such as ascending pavements and ramps, and simultaneously be completely unconfident about their teaching skills. In the current study, almost 80% of participants reached a maximum score in all 3 scales; this is probably due to the specific sample of athletes involved in this study. Yet, compared with the GSE and the ESES, fewer participants reached the maximum score for the SEWM scale, supporting the specificity of the SEWM.

The construct validity of the Self-Efficacy in Wheeled Mobility scale

A psychometrically well-built assessment tool for measuring perceived self-efficacy in wheeled mobility may find future applications in measuring self-efficacy beliefs in wheelchair skills performance in SCI. It can be applied in structured enhancement WM programmes and in assessing progress in WM levels in occasional as well as regular activity for people with SCI. Construct validity is the degree to which the scores of the SEWM are related to variables that are hypothesized or known to be related to WM. From the literature it is known that lesion level, motor completeness of the lesion, age and activity levels are directly related to the performance of wheelchair skills in persons with SCI (19). It was assumed, that also in the case of perceiving self-efficacy in wheeled mobility, when the construct validity of the SEWM is good, these determinants will be significantly associated with the scale scores. Supporting the construct validity of the SEWM, age was found to be inversely related to the SEWM scores. In addition, paraplegics patients with low lesion levels had higher SEWM scores compared to paraplegics with high lesion levels (lack of control of abdominal muscles). This was the case in previous actual WM skills performance tests, in SCI populations (19). Therefore, it can be cautiously suggested, that following an extended study with a heterogeneous population and with a larger sample, the SEWM has the potential to be used as a predictor tool for actual WM skills performance. Furthermore, as reported in the literature, for most WM skills test development processes, construct validity was based on correlating the new WM skill test with the FIM instrument (3). The SEWM scale presented

here can perhaps be used as a substitute for the FIM for the purpose of WM test development.

Differences in activity levels, as detected in this study, support the construct validity of the new scale; there is a clear tendency for higher scores on all 3 scales in the elite athletes group; when individuals perform a task, they judge their performance and develop self-efficacy beliefs about their mastery of the task. "Individuals review their capabilities for a desired behaviour through acting-out or performing the skills necessary to achieve the behaviour successfully (enactive mastery experience), mastery experience is a very influential self-efficacy source" (7). If individuals successfully complete a desired behaviour, such as ascending a ramp without incident, then they experience a sense of mastery for that behaviour. The best way to increase self-efficacy perceptions, using enactive mastery, is through extensive practice (20). With regard to sport, self-efficacy beliefs, past success in training and competition are important antecedents of perceived self-efficacy (7). The elite wheelchair basketball players who participated in our study probably gained more WM experiences and competence through practice, and therefore hold higher beliefs about their WM capabilities.

Limitations and future work

The current sample ($n = 47$) is rather homogeneous and not very large. A future examination should consider a larger more varied sample, including participants with tetraplegia, both male and female. Furthermore, the SEWM scale was compared with two other scales, but it is still unclear to what extent it correlates with measures of the actual WM performances. In the present study exercise behaviour was recorded only through self-report. The SEWM scale needs to be further tested and evaluated in a sample whose WM performances are assessed more comprehensively.

Test-retest examination should be implemented in the future. Methodologically, reliance on split-half methods to determine the stability of the instrument has been criticized due to the multiple ways in which the two halves can be formed based on the set of items. Future study is needed to determine the scale's usefulness and sensitivity for detecting change in perceived self-efficacy as a result of WM interventions for people with SCI.

Including in the sample participants from 6 countries representing 3 different continents is a particular strength of the study. In conclusion**,** the findings indicate that the SEWM is an instrument with high internal consistency. Slightly rephrasing items 8 and 9 is advisable to further improve internal consistency. Concurrent validity was supported mainly in the sub-group investigation, while construct validity was supported by the "age" factor and "activity level", but not for "time since injury". Further study with a larger more varied sample including people with tetraplegia was conducted at the Beijing Paralympic games and supported the clinimetric characteristics of this scale.

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