One World Project's Wheelchair Skills Training Camp in Morocco – Effects of a Community Peer-Based Programme

Tomasz Tasiemski

Poznan University of Physical Education

Maciej Wilski

Poznan University of Physical Education

Piotr Urbański (✉ piotr.u.awf@gmail.com)

Poznan University of Physical Education <https://orcid.org/0000-0003-0579-3065>

Research

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Abstract

Background. Access to health services was found to be a major problem for over half of persons with disabilities in Morocco. This has created the need to increase opportunities for community-based rehabilitation activities in this country. The aim of this study was to assess wheelchair skills of persons with physical disabilities attending the first Wheelchair Skills and Empowerment Camp in Morocco, and their satisfaction with the manual wheelchairs available during the camp activities.

Methods. 19 persons (13 male and 6 female) with physical disabilities took part in the project. Mean years since injury or illness was 24 years. The following measures have been used: the Queensland Evaluation of Wheelchair Skills test, and the Quebec User Evaluation of Satisfaction with assistive Technology.

Results. Study participants improved their overall wheelchair mobility skills ($p=0.002$; $d=0.20$), especially the ability to ascend and descend a ramp ($p=0.012$; $d=0.67$). The participants were significantly larger satisfied with the new provided wheelchairs in comparison to their own wheelchairs with regard to five of the satisfaction items i.e. ease in adjusting ($p=0.011$; $d=0.96$), safety and security ($p=0.014$; $d=0.97$), durability ($p=0.037$; $d=0.81$), ease to use ($p=0.045$; $d=0.87$), and comfort ($p=0.006$; $d=1.03$).

Conclusions. Findings of this study suggest that there is a need for structured wheelchair skills training and better-quality wheelchairs for persons with physical disabilities in Morocco. The study also confirmed that community peer-based programmes in low-resource countries can play an important role in rehabilitation in persons with physical disabilities, even many years since their injury or illness.

Background

Convincing evidence that comprehensive care systems for people with physical disabilities, compared with non-systematic approaches, result in better functional outcomes has been shown in previous studies (1, 2). However, the majority of individuals with disabilities around the world manage their lives with non-systematic processes, and only a few highly developed countries provide comprehensive systems of coordinated care (3). More recently, professional interest in the quality of the services provided for persons with disabilities, including healthcare and rehabilitation programs in low and middle-income countries has increased, but this issue is still a demanding task (4, 5).

According to the new country classifications based on income level (2019–2020), Morocco belongs to the group of countries with lower middle income (6). The Moroccan population includes around 5.1% of person with disabilities, which is around 1,53 million people. Over 50% of the population are people with physical disabilities, and over 80% are professionally unemployed (7). Access to health services was found to be a major problem for 55.3% of persons with disabilities, and another 52.5% wanted financial support to cover their basic needs. Furthermore, there is still a widespread belief in Morocco that persons with disabilities are severely limited in their productive capacity and are a burden for their families (8).

It seems that this belief, when combined with an insufficient governmental health-care support system, has created the need to increase community-based rehabilitation (CBR) activities in this country. CBR activities are often introduced and managed by a community or non-profit organizations and have gained an important role in the process of rehabilitation, adaptation and inclusion within the community of people with disabilities in countries with high level of poverty (9). CBR was developed due to the institutional rehabilitation programmes, which were not meeting the needs of persons with disabilities worldwide (10). Its strategy aims at enhancing the lives of persons with disabilities within their community, supporting the medical care and needs of people with disabilities, improving their independent living skills and their self-esteem. The well-developed example of CBR for persons using wheelchairs is an Active Rehabilitation program, defined as a community level transfer of practical life and social skills from experienced, active wheelchair users to the newly disabled and/or less empowered wheelchair users in their communities (11, 12). This model was developed in Sweden in 1976 and since then has been introduced in more than 20 countries around the world. Despite the positive evidence of the effectiveness of Active Rehabilitation programmes, this approach has not been systematically explored (9, 11).

In September and October 2019 the International Research and Exchange Board (IREX) implemented the 12-month *One World* project in Morocco. The project aimed to educate local wheelchair users, organizations for people with disabilities, government officials and media journalists about the need for buying appropriate wheelchair and on the provision of wheelchairs according to the World Health Organization (WHO) guidelines (12). In order to effectively implement this project, 46 new wheelchairs were bought by IREX and distributed free of charge among the Moroccan participants with physical disabilities in order to improve their daily mobility in the future. Level of satisfaction with assistive device such as wheelchairs are very important for the users. Previous research has shown that people with disabilities using wheelchairs are generally satisfied with this assistive device. However, a few parameters such as weight and difficulties propelling outdoors demonstrate a low level of satisfaction among users (13).

Two of the main components of the project were the 6-day *Wheelchair Skills and Empowerment Camp* followed by the 5-day *Train-the-Trainers Camp*. The camps were based on an Active Rehabilitation training program, where training is led by peer mentors (individuals who have successfully faced a comparable experience), and is primarily delivered through 5–10 days of residential training courses (9, 11). The primary aim of this study was to assess wheelchair skills of persons with physical disabilities attending the first *Wheelchair Skills and Empowerment Camp* in Morocco, and their satisfaction with the manual wheelchairs available during the camp.

Methods

Training program and procedures

The *One World* project included all key elements of the Active Rehabilitation training camps described by Divanoglou et al. (2019). Participants of the training camp had to arrive at the site with their own manual wheelchairs. Individuals with physical disabilities from Morocco were invited to participate in the project if they met the following inclusion criteria: (a) had a physical disability that caused inability to walk; (b) were using a manual wheelchair as their main mode of mobility and were able to push it for a few meters on an even surface; (c) had to be free of severe complications such as pressure sores; (d) were at least 18 years of age; and (e) were residing in Morocco.

Duration period of the Active Rehabilitation camp usually varies from 5 to 10 days depending on available funding and personnel. In Morocco all participants with physical disabilities participated in a 6-day program (September 8-14, 2019) that included 9 training sessions (total for 29 hours). The camp was organized in wheelchair accessible facilities (Kenzi Club Agdal Medina, Marrakech, Morocco).

Activities of daily living and wheelchair skills training were incorporated into the camp schedule, and took place at the natural time and environment. Sports and therapeutic recreation activities such as cardiorespiratory fitness, strengthening and ball sports were part of the training. Education sessions during the camp were intended to help participants acquire or maintain knowledge that would allow them to optimally manage their condition. Topics such as adapted physical activity, fertility, sexuality and relationships were discussed. All the camp activities were delivered by three experienced peer mentors with disabilities who use a wheelchair for daily mobility: two with spinal cord injury, and one with Polio. Setting goals of the camp (improvement of individual wheelchair skills), and both initial and final assessment of these skills were done. The information from initial assessment was used to customize intervention (wheelchair skills training) with regard to the specific needs of participants.

Former participants of the Active Rehabilitation camps can become peer mentors. This transition is completed through participation in a special *Train-the-Trainers Camps*, as well as by having the ability to deliver practical and/or theoretical sessions. A *Train-the-Trainers Camp* took place in Marrakesh in the following week (September 16-20, 2019). Non-disabled assistants helped to implement all camp activities.

All participants received oral information about the evaluation procedures. A written informed consent was obtained from each participant. There was no need for an ethical approval for this research, as the wheelchair evaluation study was included in the camp training schedule (good practice program evaluation) as an activity required within the *One World* project. Each participant took part in the wheelchair evaluation test in the beginning and at the end of training camp using their own wheelchair:

- First day of the camp: Evaluation of wheelchair skills and satisfaction with own manual wheelchair, collection of demographic and disability characteristics.
- Last day of the camp: Evaluation of wheelchair skills using own manual wheelchair, and assessment of satisfaction with new wheelchairs.

During the training camp all of the participants had a chance to try and use five other type of low-cost wheelchairs which are produced mainly for people with disabilities living in developing countries (<https://www.clasphub.org/products>). The following wheelchairs were provided by the camp organizers: (1) Whirlwind Roughrider – Folding; four-wheeler with long wheelbase, folding x-brace frame, adjustable back, removable armrests, and adjustable seat depth, (2) INTCO Active – Rigid; four-wheeler with rigid frame, adjustable wheelbase length, backrest height and angle, fold-to-seat back with quick folding mechanism, and removable arm support, (3) INTCO All Terrain – Rigid; four-wheeler with rigid frame, adjustable back height and back recline, arm rests removable and ergonomic, adjustable foot support, and quick release rear axle, (4) Motivation Active – Folding; four-wheeler with folding x-brace frame, adjustable footrests, height backrest, upholstery, and seat depth, rear wheels with slight camber, (5) Motivation Rough Terrain – Rigid; three-wheeler with rigid frame, padded seat and back, adjustable backrest height and angle, removable armrests, and backrest that can be folds down.

Measures

1. To assess differences in wheelchair skills (baseline/completion of the camp) using their own wheelchair, *The Queensland Evaluation of Wheelchair Skills* (QEWS) was used (14). QEWS was initially designed for use with persons with spinal cord injury in the acute hospital setting, as well as in the community without extensive or specialized testing equipment. The QEWS evaluation is short. It consists of 5 items i.e. negotiating an indoor circuit, ascending and descending a ramp, maintaining balance on back wheels, ascending and descending a gutter, and a six-minute push test (distance in metres covered in six minutes). Each item was evaluated in scores ranging from 0 to 5 depends on level of performance described in the test manual. The total score was calculated by adding all individual scores (range: 0-25). The test is simple (easy to administer), and relevant for the training camp context (can be easily integrated into the schedule of the programme). QEWS is characterized by high reliability and validity, and was used in studies on person with disabilities (14). Divanoglou et al. (2019) reported that QEWS is sufficiently sensitive to detect change over a 10-days period of residential Active Rehabilitation programme.
2. To assess subjective differences between own and new wheelchairs the *Quebec User Evaluation of Satisfaction with assistive Technology* (QUEST, Version 2.0) was used (15). The questionnaire consists of 12 satisfaction items. Due to the purpose of this study, this measure was modified in the following way: a) only the first 8 questions related to *satisfaction with the device* were used (i.e. dimensions, weight, ease in adjusting, safety and security, durability, ease to use, comfort, effectiveness) while omitting 4 questions related to *satisfaction with the service* (i.e. service delivery, repairs and servicing, professional service–information, follow-up services) as camp participants were not able to answer them with regard to new provided wheelchairs, b) the words *assistive device* were exchanged with the word *wheelchair*, as only this assistive device was tested. This questionnaire is a self-administrated tool. It is short and simple. Participants are asked to rate their satisfaction with the device on a 5-point scale that ranges from *1=not satisfied at all* to *5=very satisfied*. For 8 items related to *satisfaction with the device*, ratings of the valid responses are added

and this sum is divided by the number of valid items in this scale. The participants were also asked to choose the three most important items related to the evaluated assistive device. The previous study suggests that the QUEST is a reliable, representative, and valid instrument to measure the satisfaction of users of assistive technology in persons with disabilities (16,17). Permissions was obtained from the authors to translate QUEST into Arabic using the back translation method. Two professional English-Arabic translators made the translation with final assistance of a bilingual person with a disability who uses a wheelchair and works as wheelchair designer (Arabic person living in the US).

3. To collect the demographic and disability characteristics, a part of the *International Spinal Cord Injury Survey* was used. Through this questionnaire we collected information about: gender, present age, marital status, education, type of disability, years since injury or illness, and need for assistance for day to day activities.

Statistical analysis

Descriptive data was presented as n , *Mean* and standard deviation (SD). To check the normality of the data, the Shapiro-Wilk test was used. Due to not normal data distribution, the Wilcoxon test was used to check the difference between variables. To describe the magnitude of the difference between different dates of measurement, the effect sizes (d) were calculated as the difference between means, divided by the within standard deviation of the difference. Using Cohen's criteria, an effect size ≥ 0.20 and < 0.50 was considered small, ≥ 0.50 and < 0.80 medium and ≥ 0.80 large (18). All statistical analyses were performed with the IBM Statistical Package for Social Sciences software (IBM SPSS Statistics version 21, Chicago, IL, USA). The level of significance was set at $p \leq 0.05$.

Participants

Nineteen persons (13 male and 6 female) with physical disabilities took part in the project. However, 3 persons were excluded from the analysis due to their late arrival at the training site. The mean age of participants included in the analysis ($n=16$) was 33 years ($SD=9.4$) and mean years since injury or illness was 24 years ($SD=11.0$) for study group. The majority of study participants were single ($n=10$), 5 were married and 1 was divorced. Seven participants had graduated from at least high school. Others had a lower level of education. With regard to type of disability, 5 persons had Polio, 4 persons had a spinal cord injury, 3 persons had cerebral palsy, and 7 persons had other type of disability. Seven participants did not need assistance with their day to day activities, and 7 persons had assistance from family members. One person had a paid caregiver, and 1 person received assistance from friends.

Results

Wheelchair skills

The comparison of the results on wheelchair skills measured at the baseline and on the completion of the camp activities (Table 1) shows that the camp participants achieved medium improvement in ascending and descending a ramp ($p = 0.012$; $d = 0.67$). Also the total QEWS score obtained at the end of the camp (mean = 17.9) was higher than in the beginning (mean = 16.8), and this difference was statistically significant ($p = 0.002$; $d = 0.20$). With regard to other evaluated items of wheelchair skills, i.e. negotiating an indoor circuit, maintaining balance on back wheels, ascending and descending a gutter, and a six-minute push test, no significant improvements were observed during the camp. However, the calculation of exact distance (metres) covered during the baseline evaluation within six minutes in comparison to distance covered on the completion of the camp activities was significant ($p = 0.015$; $d = 0.15$).

User satisfaction with different wheelchairs

The overall user satisfaction (Table 2) with a newly provided wheelchair was significantly larger in comparison to satisfaction with their own wheelchair ($p = 0.024$; $d = 0.93$). Also, camp participants were significantly larger satisfied with five items of the new wheelchair in comparison to their own wheelchair such as ease in adjusting ($p = 0.011$; $d = 0.96$), safety and security ($p = 0.014$; $d = 0.97$), durability ($p = 0.037$; $d = 0.81$), ease to use ($p = 0.045$; $d = 0.87$), and comfort ($p = 0.006$; $d = 1.03$). With regard to the three remaining items of user satisfaction (dimensions, weight, effectiveness) no significant differences were noted between the new wheelchair and their own wheelchairs ($p > 0.05$). The most important three satisfaction items of their own wheelchairs were: ease to use, comfort, and weight.

Discussion

This study found that the inaugural *One World Project's Wheelchair Skills Training Camp* in Morocco had positive effects on participants with physical disabilities. Participants advanced their general wheelchair mobility as assessed through a practical test (QEWS). Findings of this study are in line with other qualitative studies about the large and important benefits of residential community peer-based training programmes (19). This inaugural training programme in Morocco offered an exceptional opportunity for 19 participants with impaired mobility to meet and cooperate with an international team of peer mentors. Learning independent living skills from experienced peer mentors seems to be an effective way of becoming more self-reliant despite a physical disability that affects mobility.

Participants in the current study improved their wheelchair mobility skills, especially in relation to their ability to ascend and descend a ramp. In other skills such as ascending and descending a gutter, as well as in a six-minute push test, individual improvement was noted, yet it did not reach statistical significance. Surprisingly, the calculation of exact distance covered during the initial and final evaluation within six-minutes push test showed a significant difference. Improvements in distance covered during the test could be associated to the intensive and demanding training programme, which included ball sports and other activities that aim to improve cardiorespiratory capacity and sitting balance. No improvement was observed in relation to negotiating an indoor circuit, and in maintaining balance on back wheels. In terms of the indoor circuit, the ceiling effect was noted as study participants scored 5.0 points before and after the training, which was expected given that the recruitment requirements for the

programme mandated that the participants were able to push a manual wheelchair independently. Moreover, this item seems to be not enough sensitive to detect changes in wheelchair skills in the abilities of community-dwelling individuals. It should be noted that the test measure (QEWS) was originally developed to be used in acute hospital settings (14).

These findings are broadly similar to those of Divanoglou et al. (2019). In their study conducted in Botswana (middle-income country), the ceiling effect was also shown with regard to the first item i.e. negotiating an indoor circuit. Similarly, the overall improvement in wheelchair skills was observed as a result of the 10-day residential Active Rehabilitation programme (11). Interestingly, with regard to other items of QEWS, the results differ between studies. Participants with spinal cord injury in Botswana improved significantly their ability to maintain balance on back wheels, ascend/descend a gutter, and in a six-minute push test, but did not show significant progress in ascending/descending a ramp. In our study the opposite results were observed. Statistically significant improvement was seen only with regard to going up and down on a ramp. These differences could be explained in different ways. First of all, our participants had much more years since injury or illness than participants in the study of Divanoglou et al. (on average 24 years versus 4 years), and had 50% less training time comparing to camp in Botswana (11). Secondly, our participants underwent the training using interchangeably both their own and a new wheelchairs and five training days were probably not enough to comfortably and effectively use the new mobility equipment. It is also necessary to admit that some of the new wheelchairs were not ideally assigned and adjusted to the individual participants of the camp in Morocco. The different brands of wheelchairs were selected and purchased when the recruitment for the project was not yet finished, so there was no chance to collect in advance the users measurements and preferences to fit the wheelchairs according to the WHO guidelines (12). This type of problem demonstrates the difficulties that project designers often have to face while working in low resourced countries.

The above findings highlight the importance and benefits from training wheelchair skills even many years after injury. Our participants had lived with their disabilities on average for 24 years and still benefited from such training. Wheelchair skills are very important for community mobility and have been associated with community participation (20, 21). In countries like Morocco, where public buildings and transportation are not accessible for people with reduced mobility, a good level of wheelchair skills positively benefit their everyday functionality.

This study also shows differences in the acceptance of different wheelchair models available during the camp. According to the governmental policy only Chinese hospital transportation wheelchairs are provided free of charge, yet all but one participant arrived at the training site with other brands of their own wheelchair, which they had purchased second hand. In order to increase the effectiveness of the *One World* project, 46 new active wheelchairs were purchased by IREX and distributed among the camp participants. The project participants were significantly more satisfied with the new wheelchairs than with own wheelchairs with regard to five assessed satisfaction items i.e. ease in adjusting, safety and security, durability, ease to use, and comfort. The results of this study are similar to findings described by Bergstrom and Samuelson (2006), and de Groot et. al. (2011). Those studies showed that wheelchair

users in the Netherlands and Sweden are most satisfied with wheelchair handling aspects such as ease to use as well as safety and security.

Study participants were also asked about the most important satisfaction items of their wheelchairs. Participants listed ease to use, comfort, and weight as the most important issues. This is probably because wheelchairs available to people with disabilities in Morocco are not customized to individual user needs and are very heavy. Even the new provided wheelchairs were still very heavy to operate easily, as they all weighed approximately 20 kg. None of the previous studies showed such low satisfaction with their own wheelchair. Findings of the current study suggest that there is a great need for providing good quality and appropriate wheelchairs for people with physical disabilities in Morocco.

Strenghts And Limitations

The strength of this project and research study resides in a very comprehensive approach to wheelchair provision and wheelchair skills training. This project included several interconnected parts. It started from education in the WHO guidelines regarding wheelchair provision, practical training in wheelchair assembling and fitting to the individual user needs, wheelchair skills training camp for people with disabilities run by foreign peer-trainers, train-the-trainers camp for future Moroccan peer-trainers, and the implementation of a second wheelchair skills training camp but this time run by the recently trained Moroccan wheelchair trainers. This evaluation study from the very beginning was included in the project activities in order to monitor the effectiveness of the wheelchair skills training activities.

There are also some limitations to the present study. Participants of the inaugural wheelchair skills training camp represented a wide range of different physical disabilities that affected their mobility. On the one hand it was in line with an open approach i.e. type of disability did not limit participation in the project, but on the other hand it influenced study results and complicated their interpretation. Because the study group was not homogenous, type of disability could highly affect the improvement of wheelchair skills in the individual cases. All of the participants were using a wheelchair for daily mobility, but there were different capabilities to operate a wheelchair among the participants, which included people with spinal cord injury, Polio, cerebral palsy, leg amputation etc. Future studies should include better specified recruitment strategies, which gather in one camp, participants with a similar type of disability. Another limitation was the short training period (6 days). A long-term program could help to observe the effects of such trainings, and to indicate whether the outcomes presented in the study can be maintained or improved in the future. The difference between weather conditions during evaluations could also affect the study results. This baseline assessment was done on September 8th, 2019 (22°C; cloudy at 10 AM), and the final assessment was done on September 14th, 2019 (24°C; sunny at 10 AM with a strong equatorial sun). The temperature during the final evaluation combined with fatigue resulting from participation in the camp could impact individual participant results. The lack of a comparable control group limits our ability to claim causality between the project programme and the observed outcomes. However, the participants were living a rather long time with their disabilities. It is therefore reasonable to

suggest that the outcomes were attributed largely to their participation in the *One World* project rather than to any other factor.

Conclusions

Findings of this study suggest that there is a need for structured training and rehabilitation for persons who use wheelchairs in Morocco. Participants of this study, despite a long time since their injury or illness, achieved significant improvements in their wheelchair performance within a relatively short time of the training camp. This confirmed that community peer-based programmes in low-resource countries can play an important role in improving wheelchair skills in persons with physical disabilities not only at the initial stages of rehabilitation but even when individuals live many years with disability. This study also showed that wheelchair provision in Morocco could be improved as camp participants declared higher satisfaction with their new provided wheelchairs than with their own wheelchairs.

List Of Abbreviations

CBR - community-based rehabilitation

QEWS - Queensland Evaluation of Wheelchair Skills

QUEST - Quebec User Evaluation of Satisfaction with assistive Technology

WHO – World Health Organization

Declarations

Ethics approval and consent to participate

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000. Informed consent was obtained from all patients for being included in the study.

Consent for publication

Not applicable

Availability of data and material

The data that support the findings of this study are available on request from the corresponding author.

Competing interests

The authors declare that they have no competing interests.

The first author of this paper (Tomasz Tasiemski) declares that he has been employed by the International Research and Exchange Board (IREX) as a consultant and peer-trainer in the project funded by the US State Department, Bureau of Democracy, Human Rights, and Labor in order to implement the training with participants with disabilities in Morocco and to conduct this research as a part of project evaluation. However, the employer IREX had no any influence on the study design, data collection, analysis and interpretation of data, in the writing of the report, and in the decision to submit the article for publication.

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Authors' contributions

TT, MW, PU was responsible for design of the study, drafted the work or substantively revised it, TT was responsible for data interpretation and acquisition, Each author approved the submitted version and agreed both to be personally accountable for the author's own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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Not applicable

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Tables

Table 1

Effects of Wheelchair Skills and Empowerment Camp on the QEWS test.

Study participants (n = 16)	Baseline	Completion of the camp	Effect	
QEWS items	Mean (SD)	Mean (SD)	P-value	size (d)
1 Negotiating an indoor circuit	5.0 ± 0.0	5.0 ± 0.0	–	–
2 Ascending and descending a ramp	4.1 ± 0.7	4.6 ± 0.8	0.012	0.67
3 Maintaining balance on back wheels	1.9 ± 2.3	1.8 ± 2.3	–	–
4 Ascending and descending a gutter	3.0 ± 1.4	3.4 ± 1.5	0.059	0.28
5 Six-minute push test	2.8 ± 1.8	3.6 ± 1.5	0.068	0.48
Distance covered in six minutes (metres)	521 ± 298	564 ± 281	0.015	0.15
Total score	16.8 ± 5.5	17.9 ± 5.3	0.002	0.20

Bold values indicate statistically significant results

Table 2

Participants' satisfaction with their own wheelchair and the new wheelchair on the QUEST.

Study participants (n = 16)		<i>own wheelchair</i>	<i>new wheelchair</i>		
QUEST items		<i>Mean (SD)</i>	<i>Mean (SD)</i>	<i>P-value</i>	<i>Effect size (d)</i>
1	Dimensions	3.3 ± 1.6	3.9 ± 0.9	0.251	0.46
2	Weight	3.4 ± 1.8	4.3 ± 0.8	0.074	0.64
3	Easy in adjusting	3.0 ± 1.7	4.3 ± 0.9	0.011	0.96
4	Safe and secure	3.3 ± 1.6	4.5 ± 0.7	0.014	0.97
5	Durability	3.6 ± 1.6	4.6 ± 0.7	0.037	0.81
6	Easy to use	3.2 ± 1.6	4.3 ± 0.8	0.045	0.87
7	Comfort	3.3 ± 1.5	4.5 ± 0.7	0.006	1.03
8	Effectiveness	3.3 ± 1.7	3.9 ± 0.9	0.233	0.44
Total (<i>mean</i>)		3.3 ± 1.4	4.3 ± 0.6	0.024	0.93

Bold values indicate statistically significant results