

Satisfaction of Individuals with Physical Disabilities Regarding the Use of Assistive Technologies

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Abstract

Background: The individual's personality and social factors influence a person's desire or ability to use assistive technology devices. Therefore, these components contribute to a positive or negative influence on the use of assistive technology and on the degree of satisfaction with the use. **Objective:** The aim of the study was to evaluate levels of satisfaction of individuals with physical disabilities with their prescribed assistive technology device. **Methods:** A quantitative questionnaire survey using The Quebec User Evaluation of Satisfaction with Assistive Technology 2.0 and questionnaire on sociodemographic and health data. Data collect took place from August 2018 to April 2019, in the Physiotherapy Clinic of a Community University, in the Specialized Center for Physical and Intellectual Rehabilitation II and in the support networks for individuals with disabilities, such as: Roda Solta, Association for Supporting Families of Impaired People, Association of Disabled People and athletes of the women's Paralympic Handball Championship. **Results:** Fifty-six individuals with physical disabilities between 20 and 80 years old participated in the research, 27 women (48.2%) and 29 men (51.8%). The results suggested that individuals are quite satisfied with their assistive technology device $M=3.56(SD=1.09)$ and more or less satisfied with the professional services provided $M=3.28(SD=1.34)$. Among the 12 items considered most important by the participants, durability of device (54%) prevailed, followed by comfort (28%) and safety (24%). **Conclusions:** The patients are satisfied with the assistive technology device but not with the professional's services provided. Assistive technical devices need to be adapted to the user's needs, always aiming to improve health condition and quality of life.

Keywords: Health promotion, Patient Satisfaction, People with Disabilities, Physiotherapy Specialty, Rehabilitation.

1. Background

According to the World Health Organization (WHO) statistics (1) about 1 billion people worldwide have some form of disability. In 2013, the Brazilian Institute of Geography and Statistics released the results of the 2013 National Health Survey (NHS) (2) in Brazil 1.3% of the population declared that they had physical disabilities, with the men having a higher level (1.6%) than women (1.0%).

Only 5 to 15% of the individuals who need care products in low- and middle-income countries have access to one assistive technology (orthosis, prosthesis and wheelchairs) However, the aging of the population can lead to motor injuries, which consequently increase the chances of using auxiliary devices (3). Thus, the demand for better rehabilitation services and efficient assistive technologies will be necessary to serve this population with motor injuries,

The International Classification of Functioning, Disability and Health (ICF) has broadened the understanding and measuring of disability. It includes aspects of functionality, disability and health of people. In the International Classification of Functioning (ICF), deficiency arises from the interaction between health problems and contextual factors such as environmental and personal factors. The environmental factors include the following: products and technologies (4).

Technology, which may seem perfect for a need, may be misused or even not used when personal criteria, social characteristics or environmental needs are not considered, thus leading to personal frustration, and to waste of devices(5).

The individual's personality and social factors influence a person's desire or ability to use assistive technology devices. Therefore, these components contribute to a positive or negative influence on the use of assistive technology and on the degree of satisfaction with the use (6). Therefore, what is the satisfaction of people with physical disabilities regarding the use of assistive technologies? The aim of the study was to evaluate levels of satisfaction of individuals with physical disabilities with their prescribed assistive technology device.

Methods

The research was quantitative and exploratory and involved the use of Quebec User Evaluation of Satisfaction with Assistive Technology (2.0)(QUEST2.0) Give a ref to the tool. The participants were residents in the Itajaí Valley region and were invited to participate by personal contact or by telephone. Telephone numbers were provided by the leaders of the disability support networks. These include people with disabilities who used assistive technologies such as wheelchairs, Canadian crutches, axillary crutches, walkers, walking sticks, prosthetics, and orthotics, among others. Inclusion criteria were individuals with physical disabilities who use some device, aid or any other help in the field of assistive technology. Exclusion criteria were individuals with disabilities other than physical disabilities and impaired underage individuals.

Data collect took place from August 2018 to April 2019, in the Physiotherapy Clinic of a Community University, in the Specialized Center for Physical and Intellectual Rehabilitation II and in the support networks for individuals with disabilities, such as: Roda Solta, Association for Supporting Families of Impaired People, Association of Disabled People and athletes of the women's

Paralympic Handball Championship. After contacting those responsible for the support networks, a data collection schedule was organized according to the dates and times that people with disabilities performed their rehabilitation or sports activities. Data collect took place in the aforementioned places, in a private room and only the researcher and the participants were present. The collect was scheduled on the dates and times available by the participants so that it did not interfere with their activities. The average time for applying the questionnaire was 20 minutes for each participant.

The data collect instrument was the test called Quebec User Evaluation of Satisfaction with Assistive Technology (2.0), which was developed with the objective of assessing user satisfaction with the assistive technology device in several aspects, justifying the need for the effective use of these devices. The reliability or internal consistency of the instrument items was tested by Cronbach's alpha coefficient for each factor and for each item removed, and for the total score. Cronbach's alpha coefficients for the B-Quest's "device", "services" and "total score" items were 0.862, 0.717 and 0.826, respectively (7).

Quebec User Evaluation of Satisfaction with Assistive Technology (2.0) was validated in Brazil in 2014 by Carvalho; Gois Júnior (7) and consists of 12 items related to satisfaction regarding two dimensions: assistive technology device and service. For each item, the participant assessed their satisfaction using a scale from 1 to 5, where 1 (Dissatisfied), 2 (Not Satisfied), 3 (More or Less Satisfied), 4 (Very Satisfied) and 5 (Fully Satisfied) with the assistive technology being used. The questions about device satisfaction are 8 in total and point to items such as dimensions, weight, fit, safety, durability, ease of use, comfort and effectiveness. However, the service dimension is made up of 4 issues that address the delivery process, technical assistance, professional services - information, guidance received to use the device, support services. After the 12 questions, the participant chose 3 items that they considered most important for complete satisfaction in the use of the assistive technology, among 12 words such as: dimensions, weight, adjustments, safety, durability, ease of use, repairs/technical support, comfort, effectiveness, follow-up services, professional services, delivery.

From the results of the Quest2.0 application, the data referring to the measurement instrument were tabulated and processed in a spreadsheet using the Statistical Package for Social Sciences (18.0) statistical program. Descriptive analyses for mean and standard deviation were performed.

The research related to human use has complied with all the relevant national regulations and institutional policies, has followed the tenets of the Declaration of Helsinki, and has been approved by the Ethics Committee on Researches with Human Beings of the University of Vale do Itajaí (number 2.577.51). The legal participants signed the Informed Consent Form.

Results

The study included 56 people aged between 20 and over 60 years old. Regarding gender in the sample, the percentage was higher in males and lower in females. Table 1 summarizes the main sociodemographic characteristics of the individuals evaluated.

Table 1 – Sociodemographic and health characterization of the physically disabled participants.

Variable	N	%
Age group (years old)		
20 - 30	14	24.9
31 – 60	33	59.0
Above 60	9	16.1
Gender		
Male	29	51.78
Female	27	48.22
Marital Status		
Single	26	46.4
Married	21	37.5
Divorced	6	10.7
Widower/Widow	3	5.4

Among the causes for the physical disabilities of the research participants were diseases that affect the nervous system, n=31 (55.3%), followed by traumatic accidents, n=25 (44.6). Still regarding the disabilities, the time of each motor impairment was evaluated, especially the time from 0 to 5 years of disability, n=21 (37.4%), being more recent injuries and which may influence the use or not use of assistive technology devices.

It was decided to use the terms plegias and paresis in order to define whether the impairment resulting from the motor system was total or partial. The term lower limb discrepancy was considered from 4cm onwards with impaired community gait. Predominance was identified in relation to mobility aids, especially wheelchairs. This may be explained, in part, by the fact that the sample had a higher prevalence of individuals with some neurological pathology and nervous system impairment, and this etiology stood out in the research, n=31 (55.3%), as the major cause of the physical disabilities in the study. Table 2 presents the health characterization of the physically disabled participants.

Table 2 – Health characterization of the physically disabled participants.

Variable	n	%
Physical Disability Etiology		
Nervous System Impairment	31	55.3
Traumatism	25	44.6
Time of Physical Disability (years)		
0 - 5	21	37.4
5 -10	9	16.1
10 - 20	17	30.3
Over 20 years -	8	16.2
Type of Physical Disability		
Paraplegia	16	28.6
Amputation	20	35.7
Paraparesis	4	7.1
Hemiparesis	8	14.3
Tetraparesis	2	3.6
Hemiplegia	2	3.6
Assistive Technology being used		
Wheelchair	26	46.4
Canadian Crutch	12	21.4
Axillary Crutches	2	3.6
Prosthesis	8	14.3
Walking Stick	3	5.4
Powered Wheelchair	1	1.8

The overall satisfaction result of the 56 survey participants showed $M=3.56$; $SD=1.09$ in the device dimension and $M=3.28$; $SD=1.34$ in the service dimension. These results show that individuals are more

satisfied with the assistive technology device and less satisfied with the professional services provided. Classified by the Quest 2.0 instrument as Fairly Satisfied in the device dimension and More or Less Satisfied in the service dimension.

The results of the instrument that asked the participant to choose three items out of twelve options, which the participant considered most important to obtain satisfaction with an assistive technology, were the durability of the device, being cited most frequently (54%) among the 56 study members, followed by comfort (50%) and safety (43%). Table 3 shows the relationship between satisfaction and the type of assistive technology.

Table 3-Relationship of user satisfaction with the type of Assistive Technology.

Type of Assistive Technology	Mean (SD) of device	Mean (SD) of service
Wheelchair	3.22 (±1.12)	2.62 (±1.31)
Canadian Crutches	4.21 (±0.77)	4.41 (±0.82)
Axillary Crutches	2.81 (±1.14)	2.12 (±0.53)
Prosthesis	3.33 (±1.20)	3.50 (±0.84)
Walking Stick	4.04 (±1.12)	4.00 (±1.52)
Powered Wheelchair	4.87	5.00

Table 4 shows which physical disabilities the participants have who are most satisfied with the assistive technology device and professional services provided, as well as those who are most dissatisfied. It may be related to the impairment level on each physical disability displayed by the participants. Pearson's chi-square test revealed no statistically significant differences between levels of satisfaction (device and service) by type of disability and type of assistive technology.

Table 4- Relationship between Assistive Technology user satisfaction and the type of physical disability.

Type of Disability	Mean (SD) of device	Mean (SD) of services
Paraplegia	2.85 (\pm 1.13)	2.32 (\pm 1.21)
Amputation	3.55 (\pm 0.97)	3.33 (\pm 1.13)
Hemiparesis	4.40 (\pm 0.77)	4.50 (\pm 0.65)
Hemiplegia	4.56 (\pm 0.44)	4.50 (\pm 0.70)
Paraparesis	3.96 (\pm 1.19)	3.87 (\pm 1.93)
Tetraparesis	4.62 (\pm 0.35)	3.25 (\pm 2.47)

Discussion

This study evaluated the satisfaction of individuals with physical disabilities regarding the use of assistive technologies. In relation to gender, the overall percentage was n=29 (51.8%) men and n=27 (48.2%) women with physical disabilities, in contrast to another study,[8] which investigated the prevalence and factors related to disability, with 53.1% being female. the epidemiological profile of individuals with physical disabilities in this study is similar to other published studies (9).

Similarly the age range of, individuals using some kind of assistive technology who were 31 – 60 years which is also similar to other published works (10,11). The most prevalent cause of physical disabilities in the study were the neurological disorders n=31 (55.3%). In the above research, neurological problems also appeared as the main etiology of physical disabilities (43.3%)(11).One of the main neurological diseases in this study was Stroke, and in Brazil it is the leading cause for death in the adult population, as well as one of the main reasons for disability, since 70% of the patients do not resume a productive life. Advances in technologies and treatments have increased the survival of people who have suffered a stroke, increasing the number of people with sensorial and/or motor disabilities. In addition to the stroke that appeared frequently in the research, diseases like Myelomeningocele, Poliomyelitis, Meningitis, Transverse Myelitis and Congenital Diseases were the reason for the developed physical disabilities.

The second most cited etiology in the study was trauma, n=25 (44.6%), which can cause spinal cord injuries, which are also related to the high incidence of traffic accidents. According to the latest WHO update, in February 2019, road traffic injuries cause significant economic losses for individuals, their families and countries as a whole. Traffic accidents cost most countries 3% of their gross domestic product (12). Poor road traffic education often leads to negligence in the attitudes of drivers, cyclists and pedestrians resulting in an acquired physical disability. Firearm trauma was also cited by participants as a cause of their physical disability within the research etiology category.

In 2014 A study in Brazil aimed to analyze the care of people injured by firearms in Brazilian emergency services, in 24 capitals indicated that 1.5% for self-caused injuries, 15.9% for aggression and 65.1% for legal intervention were caused by firearm. There was predominance of assistance to male patients, young adults (20 to 39 years old), brown skin color and low schooling (13).

The time of physical disability of the participants that prevailed in the study was 0 to 5 years, $n=21$ (37.4%), being more recent lesions, in the sequence the time between 10-20 years, $n=17$ (30.3%), was persistent what about those who had an impairment between 5 and 10 years.

Impairment time can be influenced by satisfaction with assistive technology, since adaptation to using an assistive technology in recent injuries is necessary. Early motor physiotherapy improves the patient's potential for the recovery of functionality and the greater chance for recovery from lost functions during this period, and may act to guide the use of the assistive device which will become easier to use (14).

In this study, the time of physical disability of the participants with hemiplegia and hemiparesis was from 0 to 5 years, most of them attending Physical Rehabilitation Centers with professionals such as the Physiotherapist helping in the adaptation and rehabilitation process within the physical disability. There are patterns in the mobility needs of subjects with stroke, which may change over time due to the functional evolution of the condition (15). This so reinforces the importance of specialized services and of professionals properly trained to follow up the process of assessment, prescription, training and reassessment in the context of assistive technologies, since in this study the participants were more or less satisfied (Quest 2.0) regarding the professional services provided. The difference between the levels of functional independence among the participants may relate to using different types of mobility aids, as well as to the high levels of dependence on preponderant wheelchair use among the subjects (16).

The Quebec User Satisfaction Rating with Assistive Technology (2.0) contains 12 questions divided into two dimensions: device and service. The questions of both device and service dimensions enable answers in which participants select items between 1 and 5. The answers from the professional services provided obtained $M = 3.28$; $SD = 1.34$ being rated More or Less Satisfied. The average proportion of device responses $M = 3.5$; $SD = 1.09$, then rated very satisfied with QUEST 2.0.

The study by Joseph *et al* (17) in Florida, aimed to determine the level of customer satisfaction on the orthotic assistive device and the professional guidance services with QUEST 2.0, obtained a participants' average score for the device section of 4.53 and the services mean was 4.71, resulting in a satisfaction rating of Fully Satisfied with the assistive technology device and with the follow-up services. The difference in technology satisfaction of the study participants in Brazil with what occurred in Florida (USA) may be related to the North American socioeconomic situation that allows people to access professional support from the moment they purchase the assistive device.

In the QUEST 2.0 stage on the 3 main categories for the device characteristics that would lead to total satisfaction, the most frequently selected items stood out: Durability $n=30$ (54%), Comfort $n=28$ (50%) and Safety $n=24$ (43%). The study by Chen *et al* (18) that assessed the satisfaction of 280 assistive technology users, corroborated two T-QUEST items that were most often cited as the most important: 'Comfort' $n=149$ (53.2%) and Safety $n=120$ (42.9%); durability was not one of the three items chosen by the survey participants.

Regarding satisfaction with the types of assistive technologies, the most satisfied individual in the survey is the motorized wheelchair user, both in the device dimension ($M=3.22$; $SD=1.12$) and in the service dimension ($M=2.62$; $SD=1.31$). The reduction in efforts when using the motorized wheelchair is a consequence of technological innovations following wheelchair motorization, including sharing levels of autonomy between the user and the wheelchair navigation system (19). But some disadvantages may come to occur when using a motorized wheelchair such as weight gain, physical de-conditioning and high acquisition cost.

The individuals using axillary crutches ($n=2$) were the most dissatisfied in the research's device and service dimensions. Such devices, like axillary crutches, allow for an increased autonomous mobility of the user; however, they require load transfer from lower to upper limbs, which may have some negative effect on these limbs (19). Canadian crutches users are satisfied both with the device and with the service provided. In Australia, Polese *et al* (20) evaluated the perception of chronic hemiplegics on using Canadian crutches and walking sticks as walking aids. The results showed an improvement in the mobility of hemiplegic individuals when these devices are prescribed during rehabilitation, indicating greater confidence when walking.

However, prosthesis wearers are dissatisfied with the device and the service. It was identified through other research that the user drop-out rate for lower limb prostheses is 33.87%, mainly due to negative factors such as size and difficulties in fitting inadequate prostheses. This may be related to problems with assessment and prescribing, and may still prevent functional gains from the rehabilitation treatment[3].

Manual wheelchair users had greater dissatisfaction both in device and in service. A manual wheelchair is a device that requires adjustments such as seat size, depth, arm and foot rest, armrests, to be adequate. But with proper ergonomics, mobility is provided and complications like falls, contractures and pressure ulcers are prevented [21].

Mandy *et al* [23] explored the experiences of 11 hemiplegic users with their manual wheelchairs. The results identified four main themes: heteronomy, wheelchair design inadequacy / inadequacy, poor sidewalk and road conditions that prohibit wheelchair use, and lack of adequate wheelchair provision. The results confirm that the current manual arrangement of new and used wheelchairs for this group of users is inadequate and highlighted the problems and problems arising from the current layout.

Walking stick and walker users had a fairly high level of satisfaction with the device, whereas in relation to service satisfaction, walker users are less satisfied. In its turn, the use of walking sticks and walkers can be related to the group with better physical conditions. Corroborating such idea, a study found that subjects using walking sticks have better levels of mobility as well as lower levels of physical disability[16]. The participant using the insole is more or less satisfied both with the device and with the service. Users should be involved in the decisions about the device they receive to make it easier for them to gain functional results and to be satisfied with the assistive technology [5].

Table 4 shows the relationship between the assessed satisfaction based on the QUEST 2.0 questions and the type of physical disability. The participants with paraplegia were the most dissatisfied within the mean of 1 to 5, both with the assistive technology device ($M=2.85$; $SD=1.13$) that they use and with the professional services ($M=2.32$; $SD=1.21$) provided, rated as More or Less Satisfied and Not Satisfied

according to QUEST 2.0. In contrast, physically handicapped individuals with tetraparesis displayed the highest satisfaction with the device ($M=4.62$; $SD=0.35$) and the hemiplegic and hemiparetic patients displayed the highest satisfaction in the research regarding the professional services ($M=4.50$; $SD=0.65$), being classified as Very Satisfied and Totally Satisfied.

Regarding satisfaction with the type of physical disability, the most dissatisfied members both in the device and in the service dimensions were mostly women, paraplegics, single women, manual wheelchair users, and athletes from a Paralympic Sports Support Club where the research took place, and this may be linked by the fact that the athletes use the assistive technology device for their sport as well as for daily life activities, thus demanding a better quality. The most satisfied in the research both in device and in service were mostly men, married, hemiplegic, Canadian crutches' users, and who attended the rehabilitation centers where the research took place, conducting rehabilitation physiotherapy sessions.

In Brazil, in 2011, the National Plan for the Rights of Individuals with Disabilities - Living Without Limits was presented, aiming to ensure and strengthen the Rights of Individuals with Disabilities. This political and social movement implemented by the government sought to support and favor the lives of people with disabilities in general, with access to education, social inclusion, health care and accessibility [22]. In this prerogative, the rehabilitation services received an investment in specialized rehabilitation centers and orthopedic workshops to expand the supply of orthoses, prostheses and mobility aids throughout Brazil.

User satisfaction with the use of assistive technology promotes a need for assistance reduced by users and an improved quality of life, independence and freedom. Mandy et al [23] examined the experiences of users of a power device and found that in the thematic analysis gave rise to five themes: independence and positivity, emotions, impact on family and social life, equipment functionality and motivation. Users reported that the need for assistance was reduced and that their quality of life, independence, and freedom improved.

The limitations of the study are pointed out as difficulties in the face of data and location of people with physical problems in health centers and in illnesses, often due to lack of support from the teams, the estimated sample number calculated is not possible.

The satisfaction of individuals with physical disabilities regarding the use of assistive technologies was more evident in the questions related to using the assistive technology, whereas they showed dissatisfaction with the dimension related to professional services. In this context, it is emphasized that for a better satisfaction regarding the professional services, greater professional support is needed from the time the device is acquired. It is also suggested to future physiotherapists that, when assessing and recommending an assistive technology, the patient's needs, personality, skills and socioeconomic situation should be observed, since there is no point in prescribing a device that the individual cannot afford. It needs to be adapted to the user's needs, always aiming to improve health condition and quality of life.

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