The impact of mobility assistive technology devices on participation for individuals with disabilities

Article *in* Disability and rehabilitation. Assistive technology · March 2015

DOI: 10.3109/17483107.2015.1027295

CITATIONS
38

READS
2,955

5 authors, including:

Teresa ellen Plummer
Belmont University
17 PUBLICATIONS **118** CITATIONS
SEE PROFILE

Ann Eubank
Blue Cross Blue Shield of Tennessee
1 PUBLICATION **38** CITATIONS
SEE PROFILE

Disability and Rehabilitation
Assistive Technology

http://informahealthcare.com/idt
ISSN 1748-3107 print/ISSN 1748-3115 online

Disabil Rehabil Assist Technol, Early Online: 1–10
 DOI: 10.3109/17483107.2015.1027295

informa
healthcare

RESEARCH PAPER

The impact of mobility assistive technology devices on participation for individuals with disabilities

Jordan Carver, Ashley Ganus, Jon Mark Ivey, Teresa Plummer, and Ann Eubank

School of Occupational Therapy, Belmont University, Nashville, TN, USA

Abstract

Aim: This study aims to address the gap in research and contribute to the body of knowledge on the perspectives assistive technology device users have toward their devices. *Method*: Mixed methods were used to better understand the impact of mobility assistive technology devices (MATDs) on participation for individuals with disabilities. The Functional Mobility Assessment was administered in conjunction with two qualitative questions developed by the research team allowing participants to expound on the impact of their MATD experience. Participants were recruited online via the National Spinal Cord Injury Association website and in-person at Abilities Expo in Atlanta, Georgia, and the International Seating Symposium in Nashville, Tennessee. *Results*: Results are consistent with findings from prior research regarding accessibility for individuals with disabilities. Corresponding findings were found in both the quantitative and qualitative data and are categorized into several major themes: environment (indoor and outdoor), surface heights, transportation, dependence, independence, quality of life and participation. *Conclusion*: Quantitative data from this study indicate that users of MATD are satisfied with the way in which their devices enable maneuvering indoors, while qualitative data suggest otherwise. Implications for healthcare practitioners are described and future recommendations are provided.

➤ Implications for Rehabilitation

- Healthcare professionals should advocate for proper mobility assistive technology devices (MATDs) for their patients in order to enable increased independence, safety and efficiency.
- Healthcare professionals must be cognizant of the impact of the environment and/or environmental barriers when prescribing MATD.
- Additional areas of interest for future research may include investigating the impact of MATD in association with date of onset of disability, according to diagnoses, or specific to length of time since acquiring the device.

Keywords

Adults, assistive technology, experiences, mobility, participation, unmet needs

History

Received 18 July 2014
Revised 3 January 2015
Accepted 05 March 2015
Published online 27 March 2015

Introduction

According to the 2012 Disability Status Report, 37.6 million individuals in the USA have some level of disability with over 20 million individuals presenting with some ambulatory disability [1]. Currently, there are about 3.6 million wheelchair users and 11.6 million persons requiring the use of a cane, crutches or walker for mobility assistance in USA [2]. This is a startling statistic as 2010 data indicated an estimated 2.8 million wheelchair users in the USA [3]. Thus, the number of persons with a mobility-related disability that may require the use of assistive technology (AT) is rapidly growing.

Mobility is defined as an ''individual's ability to move his or her body within an environment or between environments and the ability to manipulate objects'' [9 p. 1]. Such abilities enable a person to pursue life activities of his or her choosing. However, impairments in body structures or functions can compromise a person's ability to perform tasks of daily living and community socialization [4]. These impairments can occur following a sudden traumatic accident such as a spinal cord injury or may result from gradual progression of a disease like multiple sclerosis. Individuals with less visible mobility impairments, such as osteoarthritis of the knee or those with reduced standing tolerance, may also experience mobility impairment and require the use of AT.

The definition of AT most frequently cited in relevant literature, and generally accepted internationally, is ''any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of

Address for correspondence: Jordan Carver, School of Occupational Therapy, Belmont University, 1900 Belmont Blvd., Nashville, TN 37212, USA. Tel: +1 (615) 618-7870. E-mail: jordan.carver@pop.belmont.edu

individuals with disabilities'' [5, p. 5]. Mobility assistive technology devices (MATD) include wheelchairs, walkers, canes, crutches, gait trainers and scooters. These devices are designed to enhance quality of life and provide important functional benefits to assist the user while participating in activities of daily living [6]. Nevertheless, while the intended purpose for the device is enhancement, assistive devices can be perceived to negatively influence a person's life [6]. Poorly fitted devices may result in negative consequences to physical functioning, quality of life and occupation [7,8]. A study by Jutai and Day [9] discovered that owners of these devices sometimes neglect or fail to use the functional technology while research by Kaye et al. [10] found wheelchair users to have the highest level of activity and functional limitation and the lowest level of employment when compared to their counterparts. Functional and activity limitations can be linked to economic and social oppression as individuals who do not have access to technology are limited in their ability to gain employment, maintain educational pursuits or engage in leisure activities [11]. This existing research provides valuable insight into important themes in AT.

Limited attention has been given in both past and current research to assess the impact of MATD intervention on consumers [6]. While the intended benefits of AT are well known among caregivers, consumers, health professionals and policy-makers, there is limited empirical evidence to justify the benefit and efficacy of wheelchair provision [12,13]. The purpose of this study is to understand how MATDs impact participation for individuals with disabilities. The authors aim to address the gap in research and contribute to the body of knowledge on the perspectives AT device users have toward their MATDs.

Functional mobility is necessary to participate in activities of daily living, leisure pursuits and community participation. It is also a key component of independence for those with disabilities. The Functional Mobility Assessment (FMA) instrument was used to assess the attitudes of mobility device users toward their AT. Kumar et al. [14] report that the FMA is a ''reliable and stable tool for assessing the functional performance of individuals who use or need wheeled mobility and seating interventions'' (p. 1) thus endorsing the FMA as a useful tool to further explore the effect of MATDs from the perspective of the user.

Literature review

There is a paucity of literature regarding the way in which AT devices affect the consumer. The aim of this study is to explore the ways in which consumers feel their MATDs are enabling their participation and to identify barriers for participation. In a study by Chaves et al. [6], the wheelchair is recognized as the most important MATD used by persons with a disability, yet the one that users most associate with barriers to participation. Similarly, in this study, wheelchairs were cited as the most limiting factor, not the disability or physical limitation.

Though many services are available to help individuals obtain AT, limited attention has been given to how these devices actually impact a person's participation in everyday activities. A study by Barker et al. [15] provides that due to large caseloads and productivity requirements, there is often not enough time for practitioners to discuss the impact that AT devices will have on the individual, either physically or emotionally. Often patients are rushed through the wheelchair selection process and are prescribed seating systems or wheelchairs that the healthcare provider deems as the ''right fit''. ''Standard of care'' is defined by Hunt et al. [7] as ''that which a reasonable and prudent practitioner would do under the same or similar circumstances'' (p. 1860). This study highlights problems that arise during a wheelchair fitting due to neglected attention toward the users' environment, as well as needs and preferences for wheelchair design and features [7]. Barker et al. [15] also suggest that although there has been significant research related to seating and positioning, there is little research regarding patient sentiment toward the addition of AT. Additionally, a study by Hoenig et al. [16] suggests that although the marketplace for AT has grown dramatically in the last 50 years, pertinent information ascertaining the views of AT consumers is lacking. The authors provide: ''Despite all of the advances in the technology itself and the large sums of money being spent by consumers and third party payers on assistive technology, we know remarkably little about the actual use of assistive technology and the benefits from the technology in the daily lives of the users'' [16, p. 159].

This vital step in research related to AT is needed to determine if a device is useful for consumers as they function in their homes and communities, and if these devices actually promote independence and mobility in their daily lives.

Participation for MATD users is often determined by many intrinsic factors, such as wheelchair skills and physical capacity, or external factors, such as environmental and social structures. Chaves et al. [6] describe participation as ''the extent of a person's involvement in life situations in relation to impairments, activities, health condition, and contextual factors'' (p. 1854). Mobility limitations become critical as they affect an individual's ability to participate in all activities of daily living thus impacting perception of life satisfaction. Chaves et al. [6] note that the intent of AT is to enhance function and improve the independence of the user; yet, these same devices, if perceived negatively by the user, actually have the reverse effect. Little is revealed in current research about how wheelchairs and related factors of physical disability affect overall participation [6]. A 2011 study by de Groot et al. [17] recognizes a strong relationship between wheelchair users' satisfaction and active lifestyle or participation. Another important aspect in assessment is in the satisfaction of the wheelchair user with the MATD. The study reveals that most of the dissatisfaction voiced by consumers of wheeled mobility devices was related to the slow, lengthy process of obtaining the proper equipment [17].

Lutz and Bowers [18] point out two distinct philosophies regarding the impact of AT devices on participation for individuals with disabilities. First, disability is solely a medical issue and should be handled as such, and second, disability is problematic at the societal level due to societal discrimination and prejudice. According to Kielhofner [19], rehabilitation professionals, when guided by these dominant perspectives, end up doing ''things that disabled persons experience as unhelpful at best and harmful at worst'' (p. 487). Kim and Kyung [20] also reinforce the idea that limitations to happiness and a meaningful life for those using AT devices are not a result of physical restrictions but of the negative connotation that society places on disability. Moreover, McMillen and Soderberg [21] suggest that it is time to move beyond the mere treatment of symptoms and improvement of physical dysfunction to instead focus on the emotional issues surrounding disability. The authors report that although AT devices have helped improve quality of life for individuals with disabilities, most participants in the study expressed that they often felt ''in the way'' or were treated differently by members of society as a result of the AT device [21]. Furthermore, Hoenig et al. [16] provide that in order for AT to actually benefit the consumer, the next step in AT research must move out of laboratory settings and into the environment in which consumers typically use their devices. It is vital that this take place in order to accurately examine the daily life of AT consumers.

In his groundbreaking work *Nothing About Us Without Us: Disability, Oppression, and Empowerment*, Charlton [22] explains that consumers are giving voice to the preposterous nature of able

bodied persons making decisions for those who have a disabling condition or a disability. The author states, ''We are witnessing a profound sea change among people with disabilities. For the first time, a movement of people has emerged in every region of the world which is demanding a recognition of their human rights and their central role in determining those rights'' [22, p. 9].

The World Health Organization's (WHO) International Classification of Functioning, Disability and Health (ICF) [23] emphasizes what people do on a daily basis (i.e. performance) as opposed to what they have the ability to do (i.e. capacity).

The Americans with Disabilities Act (ADA) was the nation's first comprehensive civil rights law that specifically addressed the needs of people with disabilities. Passage of the ADA in 1990 provided a step forward in the inclusion and enforcement of rights for individuals with disabilities. The ADA defines a covered disability as a ''physical or mental impairment that substantially limits a major life activity'' [5, p. 12] and specifically prevents discrimination in employment, access to public services, public accommodations and telecommunications. Although access to the environment has changed in addition to protection of citizens through non-discriminatory laws, not enough has been done to allow persons with disabilities the access to the equipment they need.

According to Scherer [24] in her book *Living in the State of Stuck*, advancement in AT has provided solutions for many persons with disabilities to independently participate in activities of daily living that they find relevant; however, the physical freedom offered by many technical advances has not resulted in the improved quality of life that many envisioned. Even with numerous advances in technology, individuals often abandon or discontinue use of their AT equipment. Scherer posits this is due in part to a lack of a client-centered care and lack of focus on the unique needs of each individual. Acknowledgment of the client's opinions, values and beliefs is an integral part in the selection of AT equipment; however, it is unfortunately often overlooked. Additionally, an empirical study by Scherer [25] notes that most AT equipment is abandoned within the first year, often due to lack of consumer input in device selection, or ''whether or not the device met consumer expectations for effectiveness, reliability, durability, comfort, and ease of use'' (p. 440). According to current literature, there is evidence to support the need for the consumers' voice to be heard when choosing MATDs that affect their overall participation, independence and mobility within the community.

Methods

Researchers used the disability theory as an interpretive framework throughout the study in order to gain insight regarding perceived ease or difficulty of life participation in relation as it related to MATD. Additionally, opportunistic areas in which AT consumers have unmet needs were revealed. Belmont University's Institutional Review Board approved this study as an exempt review.

The study, completed online via SurveyMonkey, included both qualitative and quantitative measures to best understand participant views of participation in relation to his or her current means of mobility. Participants were recruited from MATD users via three venues: National Spinal Cord Injury Association (NSCIA) website (phase I), Abilities Expo (phase II), and International Seating Symposium (phase III). Venues were chosen based on participant inclusion criteria and the large number of MATD users in attendance. Inclusion criteria for all phases included: aged 18–100 years, individuals currently using MATD, and providing informed consent. Sizeable age perimeters were used in order to best represent MATD users across the lifespan.

The online survey commenced with two brief demographic questions followed by the FMA, created by Mark Schmeler, PhD, OTR/L, ATP, and his colleagues at the School of Health and Rehabilitation Science at the University of Pittsburgh [26]. The FMA provides a list of 10 questions regarding the ability of current mobility to meet needs and desires [14]. Each question was answered based on a Likert scale providing the following options: completely agree, mostly agree, slightly agree, slightly disagree, mostly disagree, completely disagree and does not apply (Appendix A). Participants were invited to provide detailed reasoning for any answer provided and additional commentary was requested for questions answered ''slightly disagree'', ''mostly disagree'', or ''completely disagree''. After completion of the FMA, participants were asked to respond to two open-ended questions: ''Are there any barriers to access that you experience on a daily basis? If so, what are they?'' and ''What impact has your current means of mobility had on your life?'' (Appendix A). The accompanying questions were generated by the researchers to supplement the FMA in expectation of accurately examining the attitude of MATD users toward everyday use of their equipment.

Though numerous assessment tools exist to assess functional mobility [27,28,29], the FMA was specifically designed to evaluate the impact of MATD on the user's daily life. The FMA is ''a self-report outcome tool designed to measure the effectiveness of wheeled mobility and seating (WMS) interventions for persons with disabilities'' [14, p. 1].

A study by Kumar et al. [14] assessed the test–retest reliability of the FMA by inviting participants ($n = 41$) to complete a primary questionnaire and duplicate questionnaire within 7 to 21 days of the original. WMS users comprised 51.2% of participants ($n = 21$) with the remaining 48.8% ($n = 20$) being non-WMS who were currently in the device acquisition process. Results of the study provide satisfactory test–retest reliability scores (≥ 0.80) for all items among WMS and non-WMS users. Therefore, the FMA's unique focus on measuring consumer approval and functional variations related to MATD across the spectrum (manual wheelchair, power wheelchair, scooter, walker and cane) allows for a fitting and reliable assessment tool when considering the lived experience of MATD users.

The accompanying questions were generated by the researchers to supplement the FMA in expectation of accurately examining the attitude of MATD users toward everyday use of their equipment. Experts in the field of AT were consulted during development of the supplemental questions and recommendations were incorporated in order to construct pertinent and appropriate questions.

Participants

Phase I. A link was provided on the NSCIA research webpage that led potential participants to the letter of invitation for the research study. The letter included basic information regarding the study and served as informed consent for each participant. After reading the letter of invitation and agreeing to be a part of the study, 10 participants (16.4%) were directed to SurveyMonkey, an approved HIPAA compliant method of data collection, to complete the online survey [30]. Participants ($n = 10$) completed the survey via the NSCIA webpage of which 30% ($n = 3$) used only a manual wheelchair, 20% ($n = 2$) used a cane, 20% ($n = 2$), 10% ($n = 1$) used only a power wheelchair, 10% ($n = 1$) used a manual chair and a walker and 10% ($n = 1$) used a scooter, walker and ambulated.

Phase II. In-person interviews were conducted at the Abilities Expo in Atlanta, Georgia. Abilities Expo is an international exposition held multiple times throughout the year to showcase

new technologies, solutions and opportunities for ability-enhancing products and services for persons with disabilities, caregivers and healthcare professionals [31]. Participants were recruited at the Belmont University booth for 5–10-min interviews via researchers and displayed letter of invitation. Upon agreeing to the terms of the study and giving consent, participants completed the online survey via SurveyMonkey (Appendix A) while seated at the researchers' booth. Forty-six individuals (75.4%) participated in the study during the three-day exhibition.

Phase III. In-person interviews were conducted at the inaugural consumer day event at the 2013 International Seating Symposium (ISS) in Nashville, Tennessee. ISS is an annual event for advanced education in the areas of seating and mobility, and serves healthcare professionals, medical equipment vendors, disability institutes and mobility device users [32]. Similar to phase II, participants were recruited for 5–10-min interviews through a letter of invitation informing attendees of the study design. All participants were informed on the details of the study and provided consent for participation before completing the online survey (Appendix A) at the researchers' booth. Five participants (8.2%) chose to participate in the study of which 40% ($n = 2$) reported use of only a power wheelchair and 60% ($n = 3$) reported use of only a manual wheelchair.

Findings

Data analysis

Analysis of the FMA questionnaire was completed using the Pearson chi-square test to examine trends among MATD users and daily interactions with their device. Because participants were asked to indicate all MATD used, regardless of frequency of use, a great number of possibilities existed when analyzing the data. Therefore, researchers chose to classify responses based on the following associations: participants who use both manual and power wheelchairs and/or other devices, participants who use a power wheelchair and/or other devices, participants who use a manual wheelchair and/or other devices, and participants who indicated using other MATD (i.e. walker, cane, crutch). Ambulation was also represented as a choice in the ''other'' category. Participant answers were classified as follows: disagree, slightly agree, mostly agree and completely agree (Table 1). Finally, the supplemental question responses were examined using QSR NVivo10. The researchers catalogd all answers to qualitative questions and common themes were identified.

Quantitative data

Functional Mobility Assessment. Questions 1 and 2 of the respondent survey asked participants to provide their age and current means of mobility, signifying if more than one device is utilized. MATD acknowledged in the study include: manual wheelchairs, power wheelchairs, scooters, walkers, canes and crutches. Furthermore, participants were asked to respond if they are ambulatory in addition to using a mobility device.

Question 3 of the participant survey stated, ''My current means of mobility allows me to carry out my daily routine as independently, safely, and efficiently as possible.'' Respondents answered as follows: 15% (9 of 60) disagreed that their current means of mobility allowed them to carry out daily routines as independently, safely and efficiently, as possible, 5% (3 of 60) slightly agreed, 41.7% (25 of 60) mostly agreed and 38.3% (23 of 60) completely agreed. There was no statistically significant difference among the types of mobility groups in terms of their responses ($X^2_{df=9} = 7.984$, $p = 0.536$).

The next question added, ''My currents means of mobility meets my comfort needs (e.g. heat/moisture, sitting tolerance, pain, stability). Of those surveyed, 16.4% disagreed (10 of 61), 13.1% slightly agreed (8 of 61), 36.1% mostly agreed (22 of 61) and 34.4% completely agreed (21 of 61). While the majority of responses to this question fell into the mostly agree/completely agree category, the results from the Pearson chi-square test did not provide a statistically significant value ($X^2_{df=9} = 10.788$, $p = 0.291$). However, though no statistical significance exists, there may be clinical significance in the results, as persons who utilize both a manual and power wheelchair reported that their current means of mobility met their comfort needs.

Question 5 of the survey stated: ''My current means of mobility meets my health needs. (e.g. pressure sores, breathing, edema control, medical equipment).'' Respondents answered as follows: 13.3% (8 of 60) disagreed, 8.3% (5 of 60) slightly agreed, while 35.0% (21 of 60) mostly agreed and 43.3% (26 of 60) completely agreed. Although the collected data from this question was not statistically significant ($X^2_{df=9} = 6.487$, $p = 0.690$) it is clinically relevant in that 78.3% (47 of 60) of persons who use manual and power wheelchairs and/or other devices users agreed that their current means of mobility met health needs.

Question 6 of the survey provided ''My current means of mobility allows me to be as independent, safe and efficient as possible.'' Responses indicated that 13.1% (8 of 61) disagreed, 4.9% (3 of 61) slightly agreed, 44.3% (27 of 61) mostly agreed and 37.7% (23 of 61) completely agreed. A statistically significant relationship ($X^2_{df=9} = 19.160$, $p = 0.024$) was found between the mode of transportation and independence by MATD users.

Question 7 of the participant survey asked for response to the following: ''My current means of mobility allows me to reach and carry out tasks at different surface heights as independently, safely, and efficiently as possible (e.g. table, counters, floors, shelves).'' Twenty-two percent (13 of 60) of respondents answered that they disagreed, and 16.7% (10 of 60) slightly agreed. Forty percent (24 of 60) of respondents mostly agreed, and 21.7% (13 of 60) completely agreed. While the data show no statistically significant relationship ($X^2_{df=9} = 8.516$, $p = 0.483$), this information can be considered clinically relevant. Of participants that utilize manual and power wheelchairs and/or

Table 1. Functional mobility assessment.

Questions	Disagree	Slightly agree	Mostly agree	Completely agree
Question 3: *Daily routine* ($n = 60$)	9 (15.0%)	3 (5.0%)	25 (41.7%)	23 (38.3%)
Question 4: *Comfort needs* ($n = 61$)	10 (16.4%)	8 (13.1%)	22 (36.1%)	21 (34.4%)
Question 5: *Health needs* ($n = 60$)	8 (13.3%)	5 (8.3%)	21 (35.0%)	26 (43.3%)
Question 6: *Independence* ($n = 61$)	8 (13.1%)	3 (4.9%)	27 (44.3%)	23 (37.7%)
Question 7: *Surface heights* ($n = 60$)	13 (22.0%)	10 (16.7%)	24 (40.0%)	13 (21.7%)
Question 8: *Transfers* ($n = 54$)	5 (9.3%)	2 (3.7%)	20 (37.0%)	27 (50.0%)
Question 9: *Personal care tasks* ($n = 56$)	3 (5.4%)	5 (8.9%)	20 (35.7%)	28 (50.0%)
Question 10: *Indoor mobility* ($n = 58$)	3 (5.2%)	2 (3.4%)	26 (44.8%)	27 (46.6%)
Question 11: *Outdoor mobility* ($n = 61$)	12 (19.7%)	11 (18.0%)	20 (32.8%)	18 (29.5%)
Question 12: *Transportation* ($n = 59$)	8 (13.6%)	10 (16.9%)	25 (42.4%)	16 (27.1%)

other MATD, 50.0% (3 of 6) disagreed that their current means of mobility allows them to reach and carry out tasks at different surface heights with independence, safety and efficiency. However, only 31.2% (5 of 16) of those that used only a power wheelchair and/or other device and 11.1% (3 of 27) of those that used only a manual wheelchair and/or other device disagreed that access to differing surface heights is made more manageable with their current means of mobility.

Question 8 stated, ''My current means of mobility allows me to transfer from one surface to another.'' Responses were as follows: 9.3% disagreed (5 of 54), 3.7% slightly agreed (2 of 54), 37.0% mostly agreed (20 of 54), and 50.0% completely agreed (27 of 54). The chi-square value ($X^2_{df=9} = 12.332$, $p = 0.195$) indicated that there is not a significant relationship between mobility and an individual's ability to transfer from one surface to another.

Question 9 of the survey asked respondents if their current means of mobility allowed them to carry out personal care tasks (e.g. dressing, bowel/bladder care, eating, hygiene). Respondents answered as follows: 5.4% (3 of 56) disagreed, 8.9% (5 of 56) slightly agreed, 35.7% (20 of 56) mostly agreed and 50.0% (28 of 56) completely agreed. Although the data were not found to be statistically significant ($X^2_{df=9} = 7.239$, $p = 0.612$), there is clinical significance noted, as a total of 94.6% (53 of 56) of respondents agreed that their MATD allowed them to carry out personal care tasks. Among participants that used manual and power wheelchairs, 16.7% (1 of 6) disagreed that their current means of mobility allowed them to carry out personal care tasks. Conversely, only 7.1% (1 of 14) of those using power wheelchairs and/or other devices disagreed and 0.0% (0 of 27) of participants using manual wheelchairs and/or other devices disagreed.

Question 10 of the survey stated, ''My current means of mobility allows me to get around indoors (e.g. home, work, mall, restaurants, ramps, obstacles).'' Responses were as follows: 5.2% disagreed (3 of 58), 3.4% slightly agreed (2 of 58), 44.8% (26 of 58) mostly agreed and 46.6% (27 of 58) completely agreed. A statistically significant relationship ($X^2_{df=9} = 17.114$, $p = 0.047$) was found among MATD users and their ability to get around indoors.

Question 11 of the survey asked respondents to determine if their current means of mobility allowed them to get around outdoors. Respondents answered as follows: 19.7% disagreed (12 of 61), 18.0% (11 of 61) slightly agreed, 32.8% (20 of 61) mostly agreed and 29.5% (18 of 61) completely agreed. There was no statistically significant relationship between these variables ($X^2_{df=9} = 6.187$, $p = 0.721$).

Finally, the survey asked participants to classify how their current means of mobility allows for use of personal or public transportation. Of all study participants, 13.6% (8 of 59) argued against independence in transportation secondary to use of MATD, while 16.9% (10 of 59) slightly agreed, 42.4% (25 of 59) mostly agreed and 27.1% (16 of 59) completely agreed that their MATD allowed for independence, safety and efficiency with transportation. Analysis of responses provided there is no significant relationship ($X^2_{df=9} = 10.110$, $p = 0.342$) among MATD users and their ability to access private or public transportation independently, safely and efficiently. Interestingly, of participants that utilize both manual and power wheelchairs and/or other MATD, 99.9% (6 of 6) agreed that access to transportation was made more manageable with their device, while 80.0% (12 of 15) of those that used only a power wheelchair and/or other device and 88.9% (24 of 27) of those that used only a manual wheelchair and/or other device agreed that access to transportation is manageable with their current means of mobility.

A statistically significant relationship was found among responses to questions 6 and 10 of the respondent survey. The findings from question 6, ''My current means of mobility allows me to be as independent, safe and efficient as possible'', suggest that there is a significant relationship between the mode of transportation and the ability to complete activities that participants want and need to do throughout the day ($X^2_{df=9} = 19.160$, $p = 0.024$). Participant responses to question 10, ''My current means of mobility allows me to get around indoors'', also displays a significant relationship ($X^2_{df=9} = 17.114$, $p = 0.047$). This finding enables the researchers to conclude that there is a meaningful relationship between the mode of transport used and the capacity to maneuver indoors.

Qualitative data

Question 1: Barriers to access. Among participant responses to question 1, ''Are there any barriers to access that you experience on a daily basis? If so, what are they?'' the following themes transpired: environment (indoor and outdoor), surface heights, transportation, personal interactions and device acquisition. Furthermore, many participants stated that no barriers exist on a daily basis, while others note that everything is impacted.

Environment. Environmental access materialized as the primary barrier that participants experience on a daily basis. An overwhelming majority of responses (72.74%) mentioned the physical obstacles that exist in both indoor (38.21%) and outdoor (34.53%) environments.

Indoor environment: The participants described the difficulties that they face daily within public and private buildings. Though access may be available to the building at large, the ability to maneuver within the space was often deemed unreasonable or even impossible when using MATD. Furthermore, participants state that some buildings are simply not accessible. Responses revealed that common indoor environment barriers include, but are not limited to, doorways, restrooms, stairs, ramps and historical buildings.

Doorways: Lack of adequate doorway width was often noted for participants that utilize MATD. Noteworthy responses include ''Doors are not wide enough to get into a building'', ''I cannot get through narrow doorways'', ''Doors are not always wide enough to allow for turns'', ''Heavy doors and narrow doorways'', and ''Getting through doorways, especially if [there are] not automatic doors''.

Restrooms: Similar to doorways, several participants noted trouble in accessing restrooms secondary to narrow doorways or inadequate space to maneuver the MATD in order to perform necessary tasks. Showers were also mentioned as a barrier to access experienced on a daily basis. One participant mentioned that there are many ''older buildings that still have inaccessible areas, particularly restrooms'', while another stated ''going into restroom[s] is a nightmare''.

Stairs: Indoor environments that do not provide an alternative to stairs prove challenging for those using mobility devices. Study participants consistently noted stairs as indoor environmental barriers to access.

Ramps: Ramp access, or lack of, is stated as another limiting factor in accessing indoor environments. One participant noted dependence on others in order to use ramps stating, ''at times they are not the right angle''. Several participants also distinguished a lack of ramps in indoor environments as an impediment.

Historical buildings: One of the more unique responses of participants was the lack of access to historical buildings. ''Some places, especially in historic areas, are still not accessible'', one participant stated. Accessibility is found ''only by stairs or curb, so I am still excluded entrance.''

Outdoor environment. Similar to accessing indoor environments, participants noted daily obstacles while navigating outdoors. Over one-third (34.5%) of all responses regarding

daily barriers to access mentioned difficulty with outdoor environments. Among study participants, several common responses regarding outdoor environment difficulties emerged: uneven surfaces, curbs, sidewalks, ramps and stairs.

Uneven surfaces: Consistency of surface materials presented as a major obstacle for study participants. One participant mentioned ''grass, gravel and other outdoor surfaces'' as a daily barrier, while another mentions ''grass, gravel, and uneven terrain''. Potholes and bad drainage were also noted as barriers.

Curbs: Curbs posed another level of difficulty when navigating the outdoor environment. Although sidewalks, by law, are supposed to be of a certain width and contain curb cuts, this is often not the case. ''Lack of curb cuts'' posed difficulty for several study participants.

Sidewalks: Lack of sidewalks or unkempt sidewalks presented a challenge for participants as access to environments was denied or made more problematic. Sidewalks with large cracks or bumps prove difficult for MATD users.

Ramps: As with indoor environments, ramp access, or lack of, was mentioned as a barrier for study participants. Ramps that are not of appropriate grade or slope make access for persons using mobility devices difficult. When no ramp is present, device users may be required to access the environment by maneuvering their MATD on a hill, which proves treacherous and unsafe. Furthermore, similar to ramps, one participant stated that ''steep driveways'' are problematic when using mobility devices.

Stairs: Though not always considered, stairs were another barrier frequently mentioned for MATD users in outdoor environments. As aforementioned, one participant noted that historical sites are often accessed ''only by stairs or curbs, so [the participant is] still excluded entrance''.

Surface heights. Study participants expressed difficulty when encountering different surface heights in the environment. Shelves in some stores were inaccessible, while the cabinets in the home presented difficulties for other participants. One participant noted, ''If things are not within reach, then access is difficult, even with some mobility assistance.'' Heights of restaurant tables were also problematic for some participants, as table heights often did not allow wheelchair users adequate space underneath the table, leaving the MATD user unable to access the table. Nearly 7% (6.26%) of the responses generated from this question referred to difficulties that study participants encountered with surface heights.

Personal interactions. The ability to have eye contact with peers while conversing was noted by a single participant in the study. Although this result indicated only a small percentage, of the generated responses, the researchers felt that it was important to mention as it directly pertains to the ability to participate in daily communication. The participant noted that being in a wheelchair meant that he/she was ''usually not eye to eye with people'' which made interactions difficult. This is supported by the RESNA position paper on the application of seat-elevating devices for wheelchair users. The RESNA position on using seat-elevators for wheelchairs states that during early developmental stages ''it is necessary to be at peer level for social and cognitive development and to avoid learned helplessness'' [33, p. 71].

Transportation. Of the surveyed MATD users, 3.99% of responses indicated barriers to access related to transportation. Participants reported difficult barriers when attempting to enter and exit cars. Accessible parking was indicated as problematic due to limited availability within the community. Study participants noted an inadequate amount of accessible taxicabs for hire by those traveling with the aid of mobility devices. Additionally, planes and cruise lines were noted as being inaccessible. One participant stated ''getting on a plane is a nightmare ... cruise lines [are] not accessible even though [located] in a handicapped room.''

No daily impact. Interestingly, one-fourth of participant responses (25%) deny interactions with barriers on a daily basis. One participant stated, ''It has gotten so much better'' and no longer encountered daily obstacles, while another mentions that his/her current MATD is the reason for a lack of barriers.

Everything impacted. Additionally, four participant responses (7.69%) noted that everything presents as a barrier to access during daily routines. One participant noted ''There are always barriers; nothing is completely accessible'', while another mentioned living in a ''rural southern small town'' and that the barriers were ''too many to mention''.

Question 2: Impact on life. Investigation of participant responses to question 2, ''What impact has your device had on your life?'' resulted in the generation of the following themes: environmental access (positive and negative), dependence, independence, quality of life, overall participation (positive and negative) and no impact.

Environmental access. Similar to responses generated when analyzing daily barriers, participants mentioned the impact that their MATD has had on accessing their surroundings. Of participant responses, 28.12% mentioned the impact of environmental access.

Positive. Some participants note the advantageous effects that the MATD has made regarding access: ''Gives me the ability to leave my house and go places'', ''Gives access to my environment'', ''Helped me to get around better'', ''Makes it easier to travel longer distances'' and ''My power assist chair is fantastic to navigate stores and work out''.

Negative. Unfortunately, others describe the difficulty that they have faced since acquiring their device. Several participants cited a lack of spontaneity in their lives stating, ''I have to plan and research where I go. I cannot go through gravel and outdoors to the places I want to go unless I have my freewheel. I am limited by the accessibility of a place'' and ''[It] somewhat limits places we can go. [We] have to plan outings in advance''. Another notes how travel and socialization with family has been impacted declaring, ''It has made my life more limited travel wise ... .customizable transport is expensive and also limited. I don't come home for school breaks because it is expensive''. Furthermore, one participant shares the influence of MATD on employment: ''[I] can no longer work. [I] use to go into people's homes and redecorate, but now feel like a liability in their homes... [I] can no longer do activities in the rain. [It is] not worth it because it takes too long to get ready with all of the equipment''.

Dependence. Of those surveyed, 5.57% responses reported that MATDs make them dependent on others for assistance. Specifically, ''being slow'' was mentioned more than once as a characteristic factoring into the need for greater dependence. One respondent stated, ''It has slowed me down once I became ill. I cry more now because at times I am unable to get things done on my own.''

Independence. Over one quarter of the study responses (25.75%) were coded into the theme of independence. Responses noted that the MATD enabled the individual the ability to have more independence, gain access to his or her environment and carry out activities of daily living. One participant describes this by stating ''it has allowed me to be as independent as I can be and not have to bother people all the time'', while another said ''due to strength issues, limited manual mobility, the option of power or power assist was introduced to my lifestyle and gave me greater independence and mobility while post-op from rotator cuff injury''.

Quality of life. Several participant responses (10.53%) noted that their MATD has had a great impact on their quality of life. When asked, ''What impact has your device had on your life?''

One participant responded, ''Practically life or no life!'' while another mentioned ''[I] haven't let it stop me. I am passionate about outdoor living sports, but have continued to do so [in my wheelchair]. I make money doing what I love!'' Other notable responses include ''I've had very few limits for years because of my device; I can do almost anything with my chair – even climb a mountain!'' ''It's allowed me to get back into the world and enjoy life'', and ''Great. [I am] able to live daily.'' Finally, one study participant mentions that the impact of the device has much to do with the user's perspective stating, ''depends on how you cope with it. If you accept your disability, you can do anything; if you don't accept it, everything is a barrier. It's all in your mindset.''

Overall participation

Positive. An increase in participation of daily activities was often noted in participant responses (18.28%). One participant mentioned the ability to participate in higher education once acquiring the appropriate MATD, while others affirm their ability to better contribute to society once receiving their device. Still others note the physical impact the device has made on their ability to participate stating, ''[It] helped me to get around better and helps me feel more stable and like I'm not going to fall. [It has] decreased the number of falls [and] even helps when exercising'' and ''[It] helps me retain energy longer''. Finally, one participant notes the social impact the device has made, testifying it has helped him/her to ''meet a lot of interesting people!''

Negative. A slightly larger percentage of responses (18.42%) reflect a decline in participation secondary to the MATD. One participant mentioned, ''Life has changed 180 degrees. [I am] unable to go anywhere by [my]self though completely independent before. [My] wheelchair does not fit into the accessible van correctly, severely limiting mobility.'' Other participants also note decline in participation due to transportation and time limitations as their MATD ''slows life down''.

No impact. Seven percent of surveyed participant responses indicated that MATDs have had no impact on their life, designated by a reply of ''none'' to the question ''What impact has your device had on your life?''

Discussion

Questions were asked of participants regarding satisfaction with MATDs in relation to their participation and if the equipment met their current mobility needs. Corresponding findings were found in both the quantitative and qualitative data and are categorized into several major themes: environment (indoor and outdoor), surface heights, transportation, dependence, independence, quality of life and participation.

When asked to answer questions regarding ability of MATD to carry out daily routines, meet health needs, increase independence, support completion of personal care tasks and manage access to differing surface heights, participants that report using both power and manual wheelchairs disagreed more often than all other subgroups. Based on these findings, researchers speculate that persons who use both power and manual wheelchairs may have significant comorbidities that may require the use of multiple MATDs.

Interestingly, quantitative data indicated that users of MATD were satisfied with the way in which their devices enabled them to maneuver indoors, while the qualitative portion of that question suggested different results. Several participants distinguished a lack of ramps in indoor environments as an impediment. Despite the passage of ADA in 1990, participants inferred, according to results of the quantitative and qualitative data, that the environment is still not accessible. One user suggested difficulty in ''getting through doorways, especially if [there are] not automatic doors''. ''Some places, especially in historic areas, are still not accessible'', one participant stated. Finally, according to another participant, accessibility is found ''only by stairs or curb, so I am still excluded entrance''.

Recommendations

In accord with outcomes of this study, the authors suggest that an important consideration for healthcare professionals would be to consider the impact of the environment or environmental barriers when prescribing MATD. Additionally, clients should also receive relevant information and education on the environmental impact of their MATD. Practitioners may need to consider deeming home and work assessments an essential part of the initial evaluation process.

Findings from this study are consistent with findings from prior research regarding accessibility for individuals with disabilities. In a 1993 report by the United Nations, it was inferred that according to international policy and guidelines, all housing should be accessible for all people [34]. Unfortunately, this is not the case. Time and again, research and practice have proven that home modifications are an asset for individuals' ability to ''manage chronic health conditions, increase independence, safety, ease of use, security, self-esteem, [and] self-confidence'' [35, p. 44]. Home modifications may include adding adaptive hardware and using assistive technologies as interventions to aid in managing poor health conditions, maintaining or improving function, ensuring safety and helping minimize health care costs [35]. Unfortunately, home modifications are difficult to obtain in many areas of the country. This limitation is not due to a lack of providers (e.g. carpenters, remodelers, contractors) but a lack of specialists who are knowledgeable in pertinent environmental factors and functional abilities of the individual for whom renovations are completed [35].

Implications for healthcare practitioners

Healthcare practitioners using the person–environment–occupation model view occupational performance as a combination of the intersection of the person, environment and occupation [36]. Interventions utilizing this framework incorporate a client-centered approach with equal emphasis given to both the environment and occupation. Healthcare professionals may choose to pursue specialized training to conduct accurate home assessments and prescribe appropriate modifications in order to address all aspects affecting a person's quality of life and independence [35].

According to the quantitative data, a majority of respondents indicated that their current means of mobility enabled them to be as independent, safe and efficient as possible. Researchers theorize that this finding suggests the use of MATDs create a sense of independence; thus, empowering users of MATD. Comments such as, ''it has allowed me to be as independent as I can be and not have to bother people all the time'' and ''the option of power or power assist was introduced to my lifestyle and gave me greater independence and mobility'' validate this shared sentiment among users.

Limitations

Probable limitations of this study include the sample size, number of data collection sites, geographic location, and number of respondents with recent injuries. The small sample size limits the generalizability of the results; however, the study sample was extracted from a cohort of MATD users. There is a need for future studies with a larger population size of those who use MATDs.

Moreover, a larger sample population would allow a more encompassing examination of MATD users' perspectives.

Data collection utilized two physical sites and one online location. Given more time, researchers would have expanded the number of physical data collection sites as well as extended the period of time the online survey remained ''live''. Finally, marketing of the online data collection survey was limited to the National Spinal Cord Injury Association's website. Future researchers may benefit from extending the website offerings to reach a broader base of MATD users.

The geographic location of the physical data collection sites was the southeast portion of the USA – specifically Atlanta, Georgia, and Nashville, Tennessee. These events attracted a range of individuals from the surrounding areas but were not a representative sample of the broader population of USA MATD users. Additionally, due to the close proximity of the Shepard Center to the Atlanta, Georgia, exposition, many of the survey respondents were newly injured with perspectives that may vary greatly from individuals who have been using MATDs for a longer period of time. Although the findings from this study revealed important areas in relation to MATD, it may not be representative of other populations of mobility device users. Furthermore, it may also prove difficult to properly analyze data from a mixed methods research study and correctly interpret and integrate the findings.

Future research recommendations

Additional areas of interest for future research may include investigating the impact of MATD in association with date of onset of disability, according to diagnoses, or specific to length of time since acquiring the device. Moreover, assessing specific age ranges related to different types of MATD or levels of reported independence according to age may prove useful. Future research may also want to explore if differences are observed among single MATD users versus multiple MATD users. Further specification of the indoor environment being used by the AT consumer may also prove advantageous in future studies. For example, is the MATD used in a work environment or a home environment, or in a publicly accessible property or a private home? Finally, future studies may include supplemental questions regarding consumer satisfaction in order to best understand the impact of MATD from the perspective of the user.

Conclusion

The purpose of this study was to expose and explore the implications of MATDs on the users' perception of life participation. It is important to look beyond the actual MATD and instead focus on factors influencing the interaction between a person with a disability and their environment. If rehabilitation is to succeed, with users of MATD receiving the full benefits of their devices, interventions must concentrate on reducing the gap between what a person wants or needs to do and what they actually do, subsequent to a life long disability or a sudden onset disability or injury. One participant eloquently stated the positive effect that MATD has had on his/her life: ''Having a properly configured wheelchair allows me to be an active, independent member of my community. Any investment in mobility pays dividends in employment, use of discretionary income, and lower caregiver burden.''

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this article.

References

1. Erickson W, Lee C, von Schrader S. 2012 Disability status report: United States. Ithaca, NY: Cornell University Employment and Disability Institute (EDI); 2012. Available from: http://www.disabilitystatistics.org [last accessed 12 Aug 2012].
2. Brault M. Americans with disabilities: 2010. Current population reports. Washington, DC: United States Census Bureau; 2012:70–131.
3. LaPlante M, Kaye S. Demographics and trends in wheeled mobility equipment use and accessibility in the community. Assist Technol 2010;22:3–17.
4. Cowan R, Fregly B, Boninger M, et al. Recent trends in assistive technology for mobility. J NeuroEng Rehabil 2012;9:1–8.
5. Cook A, Polgar J. Cook & Hussey's assistive technologies: principles and practice. 3rd ed. St. Louis, MO: Mosby Elsevier; 2008.
6. Chaves E, Boninger M, Cooper R, et al. Assessing the influence of wheelchair technology on perception of participation in spinal cord injury. Arch Phys Med Rehabil 2004;85:1854–8.
7. Hunt P, Boninger M, Cooper R, et al. Demographic and socioeconomic factors associated with disparity in wheelchair customizability among people with traumatic spinal cord injury. Arch Phys Med Rehabil 2004;85:1859–64.
8. Scherer M, Glueckauf R. Assessing the benefits of assistive technologies for activities and participation. Rehabil Psychol 2005; 50:132–41.
9. Jutai J, Day H. Psychosocial impact of assistive devices (PIADS). Technol Disabil 2002;14:107–11.
10. Kaye H, Kang T, LaPlante P. Mobility device use in the United States. Disability statistics report (14). Washington, DC: US Dept. Education, NIDRR; 2000:1–60.
11. Gray D, Quatrano L, Lieberman M. Conclusions: moving to the next stage of assistive technology development. In: Gray D, Quatrano L, Lieberman M, eds. Designing and using assistive technology: the human perspective. Baltimore, MD: Brookes; 1998:299–310.
12. Finlayson M, Hammel J. Providing alternative financing for assistive technology. J Disabil Stud 2003;14:109–18.
13. Mills T, Holm M, Schmeler M. Test–retest reliability and cross validation of the functioning everyday with a wheelchair instrument. Assist Technol 2007;19:61–77.
14. Kumar A, Schmeler M, Karmarkar A, et al. Test–retest reliability of the functional mobility assessment (FMA): a pilot study. Disabil Rehabil Assist Technol 2013;8:213–9.
15. Barker D, Reid D, Cott C. The experience of senior stroke survivors: factors in community participation among wheelchair users. Can J Occup Ther 2006;73:18–25.
16. Hoenig H, Giacobbi P, Levy C. Methodological challenges confronting researchers of wheeled mobility aids and other assistive technologies. Disabil Rehabil Assist Technol 2007;2: 159–68.
17. de Groot S, Post M, Bongers-Janssen H, et al. Is manual wheelchair satisfaction related to active lifestyle and participation in people with a spinal cord injury? Spinal Cord 2011;49:560–5.
18. Lutz B, Bowers B. Understanding how disability is defined and conceptualized in the literature. Rehabil Nurs 2003;28:74–8.
19. Kielhofner G. Rethinking disability and what to do about it: disability studies and its implications for occupational therapy. Am J Occup Ther 2005;59:487–96.
20. Kim S, Kyung A. Meaning of life for adolescents with a physical disability in Korea. J Adv Nurs 2003;43:145–57.
21. Mcmillen A, Soderberg S. Disabled persons' experiences of dependence on assistive devices. Scand J Occup Ther 2002;9: 176–83.
22. Charlton J. Nothing about us without us: disability, oppression, and empowerment. Ipswich, MA: University of California Press; 1998.
23. World Health Organization (WHO) ICF: International Classification of Functioning, Disability And Health. Geneva: WHO; 2001.
24. Scherer M. Living in the state of stuck: how technology impacts the lives of people with disabilities. 3rd ed. Cambridge, MA: Brookline Books; 2005.
25. Scherer M. Outcomes of assistive technology use on quality of life. Disabil Rehabil 1996;18:439–48.
26. NRRTS. Outcome measures project. March 2011. Available from: http://www.nrrts.org/LiteratureRetrieve.aspx?ID=83699.

27. Badke M, Di Fabio R, Leonard E, et al. Reliability of a functional mobility assessment tool with application to neurologically impaired patients: a preliminary report. Physiother Can 1993:45;15–20.
28. Graham H, Harvey A, Rodda J, et al. The functional mobility scale. J Pediatr Orthop 2004;24:514–20.
29. Tiedemann A, Shimada H, Sherrington C, et al. The comparative ability of eight functional mobility tests for predicting falls in community dwelling older people. Age Ageing 2008;37:430–5.
30. SurveyMonkey. HIPAA Compliance and SurveyMonkey. 2014. Available from: http://help.surveymonkey.com/articles/en_US/kb/HIPAA-Compliance-and-SurveyMonkey [last accessed 13 Aug 2012].
31. Abilities expo: Fostering the capabilities of the differently-abled. 2013. Available from: http://www.abilitiesexpo.com/about.html [last accessed 9 Aug 2012].
32. Disabled World. 2013 International Seating Symposium (ISS) Nashville, TN. 2013. Available from: http://www.disabledworld.-com/news/events/2013/nashville.php [last accessed 12 Aug 2012].
33. Arva J, Schmeler M, Lange M, et al. RESNA position on the application of seat-elevating devices for wheelchair users. Assist Technol 2009;21:69–72.
34. United Nations. Standard rules on the equalization of opportunities for persons with disabilities. New York: United Nations; 1993.
35. Sanford J, Pynoos J, Tejral A, Browne A. Development of a comprehensive assessment for delivery of home modifications. Phys Occup Ther Geriatr 2002;20:43–55.
36. Schultz-Krohn W, Pendelton H. (eds). Pedretti's occupational therapy practice skills for physical dysfunction. 7th ed. St. Louis, MO: Elsevier Mosby; 2013.

Appendix A

Subject Code:_____

Functional Mobility Assessment (FMA)

DIRECTIONS:

Step 1. Please answer the following 10 questions by **placing an 'X' in the box under the response** (completely agree, mostly agree, slightly agree, etc.) that best matches your ability to function while in your current means of mobility (i.e., walking, cane, crutch, walker, manual wheelchair, power wheelchair or scooter). All examples may not apply to you, and there may be tasks you perform that are not listed. **Mark each question only one time.** If you answer, ***slightly, *mostly, or *completely disagree for any question,** please **write and specify the reason for your disagreement in the C*omments* section.**

Step 2. Please determine your priorities, by rating **the importance of the content in each of the 10 questions** in the shaded box to the right of each question. Rate your highest priority as 10, and your lowest priority as 1.

What is your current means of mobility device? *(Check all that apply)*	Walking_____ Walker_____ Cane_____ Crutch_____ Manual Wheelchair_____ Power Wheelchair_____ Scooter_____

	Completely Agree	Mostly Agree	Slightly Agree	*Slightly Disagree	*Mostly Disagree	*Completely Disagree	Does not apply	Rating priority
1. My current means of mobility allows me <u>to carry out</u> my daily routine as independently, safely and efficiently as possible: *(e.g., tasks I want to do, need to do, am required to do-when and where needed)*								
Comments:								
2. My current means of mobility meets my <u>comfort needs</u>: *(e.g., heat/moisture, sitting tolerance, pain, stability)*								
Comments:								
3. My current means of mobility meets my <u>health needs</u>: *(e.g., pressure sores, breathing, edema control, medical equipment)*								
Comments:								
4. My current means of mobility allows me <u>to be as independent, safe and efficientas possible</u>: *(e.g., do what I want it to do when and where I want to do it)*								
Comments:								

Subject Code:_____

	Completely Agree	Mostly Agree	Slightly Agree	*Slightly Disagree	*Mostly Disagree	*Completely Disagree	Does not apply	
5. My current means of mobility allows me to reach and carry out tasks at different surface heights as independently, safely and efficiently as possible: *(e.g., table, counters, floors, shelves)*								
Comments:								
6. My current means of mobility allows me to transfer from one surface to another: *(e.g., bed, toilet, chair)*								
Comments:								
7. My current means of mobility allows me to carry out personal care tasks: *(e.g., dressing, bowel/bladder care, eating, hygiene)*								
Comments:								
8. My current means of mobility allows me to get around indoors: *(e.g., home, work, mall, restaurants, ramps, obstacles)*								
Comments:								
9. My current means of mobility allows me to get around outdoors: *(e.g., uneven surfaces, dirt, grass, gravel, ramps, obstacles)*								
Comments:								
10. My current means of mobility allows me to use personal or public transportation as independently, safely and efficiently as possible: *(e.g., secure, stow, ride)*								
Comments:								

Qualitative Questions

Project Title: The impact of mobility assistive technology devices on participation for individuals with disabilities

(1) Are there barriers to access that you experience on a daily basis? If so, what are they?
(2) What impact has your current means of mobility had on your life?