



Satisfaction with assistive technology device in relation to the service delivery process—A systematic review

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ABSTRACT

The service delivery process (SDP) of assistive technology devices (ATDs) is attracting interest, as the provision of ATDs is critical for the independence and participation in society of individuals with disabilities. The purpose of the current study was to investigate what impact the SDP has on satisfaction with ATDs in individuals with disabilities in relation to everyday activities. A systematic literature review was conducted, which resulted in 53 articles included. The results showed that there are factors in almost all the different steps of the SDP that affect the satisfaction with of the devices, which can lead to underutilization and abandonment of ATDs. Only a few studies have been conducted with a design robust enough to generalize the results; therefore, more research is needed. Therefore, the conclusion is the SDP as a whole contributes to the satisfaction with and usability of ATDs in individuals with disability in relation to achieving the desired goals of participation in everyday activities, for the articles included must be deemed as moderate. A client-centred approach in the process is advocated, and was found to be an important factor for an effective SDP and satisfied users.

ARTICLE HISTORY

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KEYWORDS

assistive devices;
participation; prescription;
self-help devices

Introduction

The service delivery process (SDP) of assistive technology devices (ATDs) is attracting increased interest, as the provision of ATDs is critical to the independence and participation in society of individuals with disabilities (Adya, Samant, Scherer, Killeen, & Morris, 2012; Association for the Advancement of AT in Europe (AAATE), 2012; Brandt, Samuelsson, Töytäri, & Salminen, 2011). The SDP is a process comprised of different steps building on an assessment of needs that have shown that ATDs appear to be the best interventions for enhancing activity and participation in daily living for the individual (AAATE, 2012; Bartfai & Boman, 2014; Brandt et al., 2011; Dahlberg, Blomquist, Richter, & Lampal, 2014; Steel & de Witte, 2011). Although the SDP varies from country to country, the steps of the existing SDPs correspond to: initiative, assessment of need, selection of the assistive solution, selection of the equipment, authorization, implementation, management, and follow-up (Association for the Advancement of AT in Europe (AAATE), 2012).

In rehabilitation, ATDs can be prescribed in order to improve the performance of activity, and therefore increase the person's participation in daily living (International Standards Organization [ISO], 2016). The ISO, in its classification of Assistive Products for Persons with Disability (ISO9999:2016), defined ATD as “any product, instrument, equipment, or technology adapted or specially, whether acquired commercially, modified or customized, that is used to maintain, increase, or improve the functional capabilities of individuals with disabilities.” The definition of ATD used by the ISO has been revised because of technological development (e.g., increased use of smart products, which affects

the boundaries between the prescribed ATDs and personal equipment). Prescribers and other professionals working with ATD are shouldering increased responsibilities for providing advice, and recommend devices that are not prescribed, but can be bought off the shelf (Association for the Advancement of AT in Europe (AAATE), 2012; Blomquist & Jacobsson, 2011; Dahlberg et al., 2014). The definition of ATD has also been changed to align with the terminology of the International Classification of Functioning, Disability and Health (ICF; WHO, 2007), which also attracted attention in research and in relation to the SDP (Bernd, van der Pijl, & de Witte, 2009). For example, Steel, Gelderblom, and de Witte (2012) concluded that more focus is needed on integrating research into practice, and that the use of ICF could strengthen this. The ICF has also been used to develop tools for ATD selection.

Several different guides or models were developed to support the provision of ATDs, which indicates that the process for service delivery is in some ways complex, but of importance for individuals with disabilities (Bartfai & Boman, 2014; Lenker & Paquet, 2003; Lenker et al., 2012; Scherer & Craddock, 2002; Scherer, Jutai, Fuhrer, Demers, & DeRuyter, 2007). To warrant accessibility to ATD is considered a prerequisite for equal opportunities for individuals with disabilities to participate in everyday activities (Association for the Advancement of AT in Europe (AAATE), 2012). However, little is known about how the SDP or its different parts contribute to the use of and satisfaction with the ATD by the individual. Satisfaction is defined as the critical evaluation and aspects toward the use of the ATD, with two underlying dimensions respectively related to ATD: device and services

(Demers, Weiss-Lambrou, & Ska, 2002). Federici, Scherer, and Borci (2014) concluded that the number and models of ATDs have grown remarkably, but the quality of the service delivery system for ATD has not advanced to the same level.

Approximately one third of all ATDs prescribed to adults are abandoned—a reason being that the users have not participated in the prescription process (Brown-Triolo, 2003; Scherer & Craddock, 2002). An understanding of the person with disability behind the AT is a prerequisite for use, and attention given to the needs of the individual (Brown-Triolo, 2003). In a literature review, some evidence was also found that user involvement in the SDP and training in use of the device had an impact on reducing ATD abandonment, more satisfaction with the device, improved quality of life, and less restriction of activity (Brandt, Christensen, & Grünberger, 2015). Bernd and colleagues (2009) concluded that professionals need to ensure the process of ATD selection is evidence-based. Other important implications for practice elucidated were the use of a structured and systematic procedure; the use of a client-centered approach, which might reduce the risk of non-use; and the fact that an interdisciplinary team working with evaluation and documentation of their measures in ATD selection ensures quality in the process. Involving the ATD user in the process (i.e., the use of a client-centered approach) seems to be of the essence for user

satisfaction and effective service delivery regarding ATDs (Bernd et al., 2009; Brandt et al., 2015). The aim of the study was to investigate what impact the SDP has on satisfaction with ATDs in individuals with disability in relation to everyday activities.

Methods

The review followed a systematic and structured methodological approach according to preferred reporting items for systematic reviews and meta-analyses (PRISMA) guidelines (Moher, Liberati, Tetzlaff, & Altman, 2009).

Inclusion and exclusion criteria

Inclusion criteria were as follows: (a) empirical qualitative and quantitative studies, (b) a study population of individuals with disabilities in need of an ATD, (c) article describes in some way all the units in the SDP of ATD (see Figure 1), and (d) articles published in English-language peer-reviewed journals. Also included were articles where the participants were prescribers of ATDs or people related to individuals with disabilities in need of an ATD (e.g., parents, teachers). Additionally, articles were also included if a measurement of satisfaction in service delivery was used and presented (e.g.,

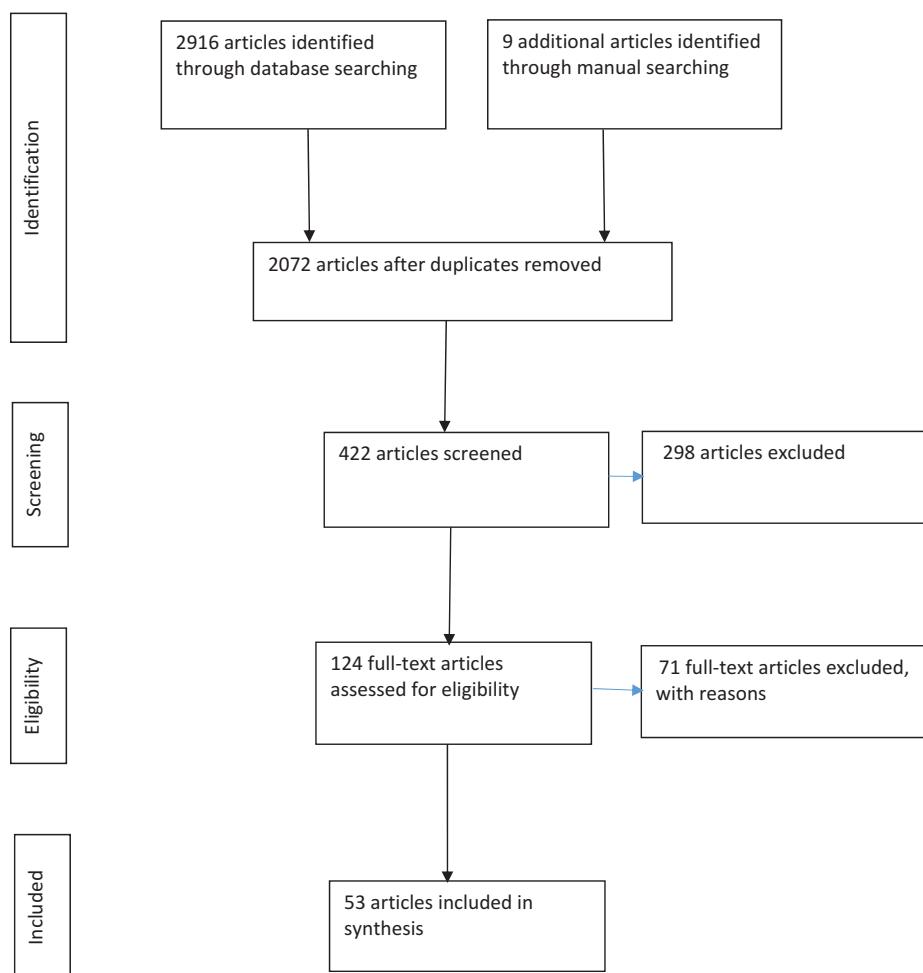


Figure 1. Flowchart of information through the different phases of the systematic review.

the Quebec User Evaluation of Satisfaction with AT [QUEST]). Articles were excluded if focus was exclusively on consumables, housing alterations, work-related, or educational devices. Studies that focused solely on outcomes relating to the ATD product design were also excluded.

Search strategy

To design a well-constructed question and find terms for searching; the template PICOS (P: patient or problem of interest, I: intervention being considered, C: comparison intervention [if any], O: anticipated clinical outcome, and S: study design) was used (Baker, 2006; Moher et al., 2009). Comparison (i.e., the C in PICOS) was not topical in the present review and was excluded.

To identify search terms, a pilot database search was initially carried out in December 2014 by a librarian at the National Board of Health and Welfare. In consultation with the librarian, databases and search terms to be used were determined.

The applied search terms were identified by Medical Subject Headings (MeSH), the National Library of Medicine's controlled vocabulary thesaurus, consisting of sets of terms naming descriptors in a hierarchical structure that permits searching at various levels of specificity (NIH, 2015). In addition, free similar keywords were used. The final database searches were made by the authors in August 2016, when articles published before January 2016 were included. In Table 1, the applied search terms in combination with Boolean logic [AND, OR] are shown, which reduced the potential number of findings in a feasible way.

To identify relevant studies for inclusion, electronic searches of nine databases were performed. The databases Academic Search Premier, Allied and Alternative Medicine (AMED), Cumulative Index to Nursing and Allied Health (CINAHL), Cochrane Library, Education Resources Information Center (ERIC), PUBMED, Psych Info, Scopus, and Web of Science were searched from their earliest available records to January 2016. A manual search was performed of included articles' reference and related citation lists (Aveyard, 2010). Beyond this, the journals *Assistive Technology*, *Technology and Disability*, and *Disability and Rehabilitation:*

Assistive Technology (available from 2006) were manually searched for the period 2000 to December 2015.

Search outcome

Search outcomes, including the screening and selection process, were managed using the bibliographic management program EndNote X7. The process is shown in a flowchart in Figure 1. The initial screening process was first based on titles, then on abstracts of potential articles, and finally, if the abstract did not provide sufficient information, on full-text articles. The database and manual search resulted in 422 relevant abstracts, which were screened, and 124 articles identified, which were retrieved in full-text. These articles were assessed for eligibility according to PICOS (Baker, 2006). Eligibility for inclusion was assessed independently by both authors, and the articles were included when 100% agreement between reviewers was achieved. Reasons for exclusion of the 67 rejected articles were, above all, that the articles did not include all units of the SDP, or focused on work-related or educational devices.

Data extraction and analysis

Fifty-three articles met the inclusion criteria and were reviewed in depth. To provide an overview, study characteristics from each article were summarized in Table 2. Data were extracted using the following headings: Author/s, publication year, country of origin, aim, sample, type of ATD, major result and design, experiences of SDP. In order to identify key themes regarding which factors affect the satisfaction with and use of assistive technologies in individuals with disability in relation to the SDP, a content analysis was conducted (Graneheim & Lundman, 2004). To compare and contrast the results of each study, a line-by-line coding of findings was carried out initially, using a close inspection of the units in the SDP. Qualitative data from the studies with quantitative design, such as open-ended questions, were incorporated into this coding process. In the next step, the initial codes were grouped to form broader descriptive themes.

Table 1. The applied search terms in combinations with Boolean logic [AND, OR].

PI(C)O	MeSH	Free text search
P: Individuals with disabilities in need of AT	disable* OR "**cognitive impairment" OR "cognition disorders" OR "communication disorders" OR "intellectual disability" OR "learning disorders" OR "motor skill disorders" OR "mental disorder" OR "vision disorders" OR "hearing loss" OR "visually impaired person" OR "speech disorders" OR "deafness" OR "blindness"	disable* OR "**cognitive impairment" OR "cognition disorders" OR "communication disorders" OR "intellectual disability" OR "learning disorders" OR "motor skill disorders" OR "mental disorder" OR "vision disorders" OR "hearing loss" OR "visually impaired person" OR "speech disorders" OR "deafness" OR "blindness"
Assistive technology	AND (Boolean logic) "self-help device" OR "communication aids for disabled"	AND (Boolean logic) "assistive technology*" OR "assistive device" OR "assistive equipment" OR "self-help equipment" OR "assistive aid" OR "self-help technology*" OR "technology* aid*"
I: The service delivery process	"prescriptions" OR "access to information" OR "informed consent"	"prescribing process" OR "service delivery" OR "train" OR "information" OR "instruction" OR "follow-up" OR "evaluation" OR "prescribing"
O: Perceived participation and satisfaction in the SDP, the benefits of the AT, satisfaction with the AT	"patient participation"	"participation" OR "satisfaction" OR "benefit" OR "involvement" OR "client-centered" OR "user centered" OR "client influence" OR "collaborative decision-making" OR "barrier" OR "failure" OR "part-taking" OR "abandonment"

Table 2. Articles included in the review.

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
Anderson et al. (2014) Australia	To explore parents' perceptions of existing support for children with a speech generating device (SGD).	Six Australian parents of school-aged children who used an SGD	SGDs	Having an SGD at home generates ongoing support needs, which had not been well met for some parents in our study. Results suggest that timely, well-coordinated, family-centered support may enhance the service experience for families with a new device. The application of occupational justice is essential for promoting client-centered ATD services, particularly in evaluation of needs, selection, and acquisition of ATD, and training and support in the use of ATD.	Qualitative	D4
Arthanat et al. (2012) USA	To explore personal meanings of occupational justice among consumers of ATD and to propose strategies that integrate values of occupational justice in ATD services.	Seven users of ATDs (age 26–52 years)	Mixed types	Information gained in this investigation may be used to improve professional–family and team relationships, and serve to benefit AAC users in school and home settings.	Qualitative	Q3
Bailey et al. (2006) USA	To examine family members' perceptions regarding the use of AAC devices in school. Factors perceived to affect students' use of AAC devices, family expectations, and benefits of AAC device use were explored.	Six family members of seven youths who primarily used AAC devices	AAC devices		Qualitative	Q3
Batavia and Hammer (1990) USA	To identify and prioritize the factors used by long-term users to assess their assistive devices, thus providing the basis for developing criteria that will be helpful in the design, manufacture, and selection of devices.	Small groups of experts in ATD and long-term users of ATD	Mixed types	Seventeen general factors for 11 types of ATD were identified. These constitute an initial step toward the development of design, engineering, and selection criteria based on the specific concerns of consumers.	Delphi method	Q3
Benedict et al. (1999) USA	To determine the impact of ATD use on child and family function and whether use by young children is related to caregiver satisfaction with a device.	13 families with a child with motor impairment	Mixed types	Application of this preliminary study's methods will provide valuable information on the effectiveness of ATDs for younger children with special needs.	Telephone survey using the QUEST instrument	D3
Bergström and Samuelsson (2006) Sweden	To investigate how adults with spinal cord injury (SCI) assessed their satisfaction regarding various aspects and use of their manual wheelchairs.	124 adults with SCI	Wheelchairs	A discrepancy was shown between the high levels of satisfaction expressed by users regarding wheelchair propulsion and the lower levels reported regarding comfort while sitting in the chairs during various activities. This indicates the need for increased knowledge and development concerning individual solutions, incorporating comfort, as well as ease of use into the design of manual wheelchairs.	Survey using the QUEST instrument	D3
Borg et al. (2012) Bangladesh	To explore the relation between outcomes of ATD use and user involvement in the SDP in Bangladesh.	285 ATD users	Hearing aids and wheelchairs	The findings support the provision of ATD as a strategy to improve the ability of people with disabilities to participate in society. They also support current policies and guidelines for user-involvement in the SDP. Simplified strategies for provision of hearing aids may be explored.	Qualitative	O2
Borg & Östergren (2015) Bangladesh	To contribute to a better understanding of challenges and solutions to the equitable provision of ATD in resource-limited environments.	285 ATD users	Mixed types	Age, gender, type of impairment, and socioeconomic status need to be considered when planning and implementing equitable provision of ATD.	Qualitative	D3
Chan and Chan (2006) China	To investigate the psychometric properties of the Chinese version of the QUEST 2.0 (C-QUEST) in terms of content and substantive and factor validity, and to explore its applicability in measuring user satisfaction with mobility and seating equipment among Chinese people with SCI.	33 individuals with SCI	Wheelchairs	The 12-item C-QUEST was shown to be a valid and relevant instrument for capturing the level of user satisfaction among Chinese people with SCI in the context of mobility and seating equipment.	Survey using the QUEST instrument	D3
Chen et al. (2014) Taiwan	To investigate user satisfaction with orthotic devices and service using the Taiwanese version of the QUEST.	280 subjects who used orthoses	Orthoses	There is a need for improved orthotic devices and services, especially with respect to the comfort of the devices and the provision of subsidy funding.	Survey using the QUEST instrument	D3
Copley and Ziviani (2007) Australia	To develop and trial a team assessment and planning process aimed at investigating the experiences of and outcomes for educational team members.	14 students and their educational staff teams	Mixed types	Further research is required to objectively measure direct student outcomes and to determine the impact of team dynamics.	Case study	O3

(Continued)

Table 2. (Continued).

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
Cowan and Turner-Smith (1999) UK	To investigate experiences of people with physical disabilities who used electronic ATD.	134 users of electronic ATD	Electronic ATD	The majority of the equipment was used regularly, with many respondents using between three and six items; 60% of respondents reported a problem with current provision processes. The most common of these were funding issues, information availability, maintenance, training, switches, assessment, and delays.	Survey	D3
Craddock and McCormack (2002) Ireland	To outline the development of an AT service delivery model and suggest that a client-focused social and participatory service delivery model for AT could achieve the best results for people with disabilities and their careers.	6 ATD users	Mixed types	Technology liaison officers are people with physical disabilities who have been trained and achieved a certificate in ATD, who act as a liaison between users and potential users of ATD, and the Central Remedial Clinic's Client Technical Services Department.	Case study	D3
de Groot et al. (2011) The Netherlands	To describe the satisfaction of manual wheelchair users with hand-rim wheelchair-related aspects and the relationship between wheelchair users' satisfaction, personal and lesion characteristics, and active lifestyle and participation in society in people with a SCI.	109 wheelchairusers with SCI	Wheelchairs	Dutch people with SCI are in general quite satisfied with their hand-rim wheelchairs. Some aspects of the wheelchairs (dimensions and simplicity of use) are important to optimize as these are related to an active lifestyle and participation.	Survey using the QUEST instrument	D3
de Jonge and Rodger (2006) Australia	To explore the experiences of 26 ATD users with a range of physical impairments as they optimized their use of technology in the workplace.	26 people with congenital and acquired conditions	Mixed types	This research identified structures important for effective ATD use in the workplace, which need to be put in place to ensure that ATD users are able to master and optimize their use of technology.	Qualitative	Q2
de Jonge et al. (2001) Australia	To describe and understand the factors the participants perceived as important in integrating technology into the workplace, as well as the barriers encountered in the process.	15 people with acquired and congenital disabilities, their employers (eight), or co-workers (four)	ICT	By identifying the issues and support strategies for technology users in the workplace, appropriate measures can be implemented to ensure that the spirit of disability discrimination legislation is realized.	Qualitative study	Q3
Derosier and Farber (2005) USA	To gather data concerning the psychosocial impact of speech recognition software on individuals with physical disabilities, and to identify how satisfied these individuals were with this software as a computer access method.	10 users	Speech recognition systems	Although this study demonstrated that these speech recognition software users are generally satisfied with the software, and that it has had a positive impact on their lives, it also suggests that there is a need to examine the role of training on satisfaction with and successful use of the software.	Survey using the QUEST and Psychosocial Impact of Assistive Devices Scales (PIADS)	D3
Dijcks et al. (2006) The Netherlands	To examine the feasibility, internal consistency, and convergent validity of KWAZO.	4,637 ATD users	Mixed types	KWAZO is a new questionnaire for assessing the quality of an ATD provision process from a client's perspective. It has good measurement properties and its self-report format makes it an easy-to-use tool for assessment of the quality of ATD provision.	Survey	D3
Dolan and Henderson (2014) UK	To characterize the provision of wheelchair seating both pre- and post-clinical intervention, and to compare and contrast the two largest diagnostic groups.	146 patients, mean age 45 years	Wheelchairs	The results for those with cerebral palsy (CP) and multiple sclerosis (MS) reflect the respective stable and progressive nature of these conditions. Referrals for those with MS should be prioritized. Wheelchair seating users with MS should be reassessed 18 months after provision.	Retrospective study of clinical case notes	D3
Friederich et al. (2010) The Netherlands	To identify theoretical frameworks and instruments used by rehabilitation professionals to perform the selection process for ATD in neurological rehabilitation centers in six Western European countries.	29 professionals from neurological rehabilitation centers	Mixed types	There is a lack of evidence-based ATD-specific methods for the selection process. The development of comprehensive, easy-to-use tools for the selection of ATD is recommended.	Survey	D3

(Continued)

Table 2. (Continued).

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
Goodacre and Turner (2005) UK	To evaluate the experience of using the QUEST in a postal survey and discuss the potential application of this administration method in routine practice for obtaining user evaluation.	54 clients over the age of 18 years supplied with a stair lift	Stair lifts	Using the QUEST in a postal survey may offer one mechanism for obtaining data and can provide data in relation to satisfaction with assistive technologies and associated services. An aim of using outcomes in relation to ATD is to determine not only whether or not ATD works, but also, given the increasing range of equipment available, which device works best.	Survey using the QUEST instrument	D3
Gramstad et al. (2013) Norway	To investigate the unmet needs and experiences of housebound elderly people in Norway who applied for ATD.	Nine elderly people who were housebound and applied for ATD	Mixed types	Observers' assessments of unmet ATD needs are not readily experienced as such by the elderly. Adjusting expectations and activities enabled the participants to maintain meaningful activities, but also made the difficulties less likely to be articulated as unmet needs. When encountering elderly people, health-care professionals must be sensitive to the unarticulated needs and potential difficulties of the elderly in performing everyday activities.	Qualitative	Q3
Hammel et al. (2013) USA and Canada	To compare and contrast the perspectives, issues, and priorities of multiple stakeholders in the USA and Canada related to mobile technology (MT) access, use, and outcomes.	Consumer: $n = 45$, caregiver: $n = 10$, service provider: $n = 10$	MT	The conceptual fit model and factors related to self-management of MT represent new knowledge and provide a framework for stakeholder-based evaluation of MT outcomes.	Qualitative multiple-case study design	Q3
Hedberg Kristensson et al. (2006) Sweden	To explore older patients' experiences of participation in the SDP.	22 users of mobility device	Mobility devices	The study concluded that it was necessary to develop a more client-centered approach in community-based rehabilitation, challenging occupational therapists and physiotherapists to encourage patient participation in the process of prescribing mobility devices.	Qualitative	Q3
Hedberg Kristensson and Iwarsson (2003) Sweden	To survey the quality of documentation in patient records in community-based OT, with a particular focus on the technical aid prescription process.	182 patients in need of technical aids	Mixed types	There is a considerable need for quality development in occupational therapy documentation, targeting documentation in general, but also concerning the specific aspect of documenting the technical aid prescription process.	Survey	D3
Jedeloo et al. (2002) The Netherlands	To investigate whether or not differences exist between local service delivery systems and, if so, how these can be explained.	503 adult users	Mobility devices	Differences in clients' satisfaction with different service delivery systems do exist and are determined by delivery time, user opinion, access, and quality of information.	Survey using the QUEST and Internal Positive Psychology Association (IPPA) instruments	D2
Karmarkar et al. (2009) USA	To analyze satisfaction data collected from three cohorts of older individuals living in nursing homes and community settings.	132 older adults	Wheelchairs	Level of satisfaction should be incorporated as an outcomes measure for evaluating wheelchair prescriptions and service delivery programs. A re-evaluation process of wheelchair fit as the users age should be established to aid in the provision of the best quality wheelchairs and service delivery programs.	Survey	D2

(Continued)

Table 2. (Continued).

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
Kittel et al. (2002) Australia	To identify factors that influence individuals with a SCI to abandon their first wheelchair before 5 years of use.	Three individuals with SCI	Wheelchairs	Factors influencing manual wheelchair abandonment for these participants were consistent with findings from the literature concerning dissatisfaction with and abandonment of ATD. Lack of experience in wheelchair use and selection, functional limitations encountered with the design of the wheelchair, and the manner and timing of the prescription process combined led to dissatisfaction and ultimately abandonment.	Descriptive qualitative design	Q3
Krantz et al. (2011) Sweden	To describe the experience of prescribing active rigid-frame ultra-lightweight wheelchairs.	278 prescribers of wheelchairs	Wheelchairs	Prescribers in this study emphasized self-image, design, appearance, and aesthetics as components of user needs and preferences when prescribing active wheelchairs.	Survey	D3
Lenker et al. (2013) USA	To explore areas of ATD outcomes most valued by ATD users. A secondary objective was to identify elements in the device acquisition process that affect outcomes.	24 adult ATD users	Mixed types of ATD	ATD outcomes studies are needed that report data regarding (a) the impact of ATD on participation, (b) costs of ATD provision, and (c) key elements in the ATD SDP. Consumers highly value the impact of ATD on their independence, subjective well-being, and participation at work and school. The process of acquiring ATD is often lengthy and frustrating for consumers.	Focus group	Q3
Lidström et al. (2012) Sweden	To investigate how many children with physical disabilities use a computer-based ATD, and to examine differences in characteristics between children and youths who do and do not use computer-based ATDs.	287 children with physical disabilities	ICT devices	Improved coordination of computer-based ATDs usage in school and in the home, including service and support, could increase the opportunities for children with physical disabilities who use computer-based ATDs to perform the computer activities they want, need, and are expected to do in school and outside school.	Survey	D3
Lindsay (2010) Canada	To explore the challenges that clinicians (i.e., speech language pathologists and occupational therapists) experience in prescribing AAC devices.	11 speech language pathologists and occupational therapists	AAC devices	Service providers and policy makers should be cognizant of the contextual factors influencing health providers' decisions to prescribe AAC devices.	Qualitative	Q3
Mao et al. (2010) Taiwan	To develop and validate a cross-sectional version of the QUEST 2-0 for users of technology devices in Taiwan.	105 volunteer assistive device users in the community	Mixed types	Users of assistive devices from different cultures may have different concerns regarding satisfaction.	Cross-sectional QUEST survey	D3
Martin et al. (2011) USA	To examine the relationship between consumers' involvement in the pre-purchase decision-making process, their perceptions of feeling informed, and their degree of satisfaction with and use of ATD.	145 individuals with a range of disabilities	Mixed types	Talking with other users, auditioning the device, and searching the internet are important ways for consumers to gather information. When consumers feel informed, they are more likely to be satisfied with the ATD and to retain it.	Exploratory study	D2
Maximo and Cliff (2015) UK	To understand how ATD service provision currently functions in the city of Belo Horizonte, Brazil in order to provide context-specific interventions and recommendations for improving the services system.	28 stakeholders directly involved in the SDP	Mixed types	The study clearly defines the service provision function and staff difficulties in the city of Belo Horizonte, providing information for further studies.	Qualitative	Q3
McClure et al. (2009) USA	To investigate the frequency of wheelchair repairs that occurred in a 6-month period and the consequences of breakdowns on users living with SCI and to determine whether certain wheelchair and subject characteristics are associated with an increased number of repairs and adverse consequences.	People with SCI who used a wheelchair for more than 40h/wk (n = 2,213)	Wheelchairs	Frequent repairs and breakdowns to wheelchairs can have a negative impact on a person's life by decreasing community participation and threatening health and safety. Changes in insurance reimbursement policies and patient and clinician education are necessary to reduce the number of repairs and adverse consequences that occur.	Convenience sample survey	D3

(Continued)

Table 2. (Continued).

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
McNaughton et al. (2008) USA	To gain a better understanding of parents' perspectives on the technology learning experiences of children who use AAC.	Seven parents of individuals with cerebral palsy who used AAC devices.	AAC devices	Fundamental to successful intervention is the recognition of the importance of the family in the assessment and intervention process, and the critical importance of partnerships between families and professionals.	Focus group methodology	Q3
Mumford et al. (2014) Canada	To apply response efficiency theory to creating the access technology delivery protocol (ADTP).	A 12-year-old boy	Custom smile-based access technology	This case supports further development and testing of the ATDP with additional children with multiple or severe disabilities.	Case study	O1
Murchland et al. (2011) Australia	To develop the QUEST 2.1: Children's version; to gain specific information on levels of satisfaction with factors related to the prescription or use of ATDs or services.	98 participants completed with valid QUEST 2.1.	Mixed types	Advice given on selection, reliability, and ease of use were identified as the most important factors in the level of satisfaction experienced by users.	Survey using the QUEST instrument	D2
Parker et al. (1990) USA	To evaluate the perceived barriers to the utilization of AT in a sample of rehabilitative therapists and teachers of children with sensory and other disabilities.	120 teachers and rehabilitative specialists	Mixed types	Especially mentioned was the need for resources to assess and match students to appropriate devices and generate more training for themselves.	Survey	D2
Samuelsson and Wressle (2008) Sweden	To follow up user satisfaction with the use and usefulness of rollators and manual wheelchairs.	262 users (175 rollator users, 87 wheelchair users)	Rollators and wheelchairs	A standardized follow-up will give rehabilitation professionals continuous and valuable information about the effect of and satisfaction with ATD.	Follow-up survey, QUEST	O3
Samuelsson and Wressle (2014) Sweden	To evaluate the effect of electric-powered wheelchairs/scooters (PWC/S) on occupational performance, social participation, health, and life satisfaction, and to estimate the costs and benefits of PWC/S and describe users' experiences of the delivery process.	24 users	PWC/S	PWC/S seem to improve occupational performance, social participation, and life satisfaction for users. Moreover, these improvements seem to have an economic advantage for both users and society.	Survey	D3
Shone et al. (2002) Canada	To explore consumer satisfaction with EADLs and investigate the value that people with degenerative neuromuscular conditions place on these technologies.	40 EADL users and non-users	EADLs	Combining the QUEST with outcome measurement tools that explore other important dimensions, such as the effect on quality of life and psychosocial impact, will help service providers to justify the costs associated with the prescription of sophisticated, costly assistive devices such as EADLs.	Survey using the QUEST and functional independence measure (FIM) instruments	D3
Smith et al. (2002) Australia	To conduct a pilot study to explore factors that affect the acceptability of assistive devices to older people, and hence influence their use of such aids.	40 older people	Mixed types	Recommendations are made for improvements to the existing system of equipment provision and use, including: review and development of consistency of provision and payment policy among service providers; flexibility of payment options; adequate education; and follow-up support for clients.	Qualitative, descriptive study	Q3B
Sprigle et al. (2012) USA	To document the type and duration of activities performed by wheelchair suppliers during the provision of wheeled mobility and seating devices.	12 professionals	Wheelchairs	The results illustrate that the activities undertaken by suppliers during wheelchair provision vary widely, and device complexity and device type has an impact on the types and duration of these activities.	Observation	D3
Steel and de Witte (2011) The Netherlands	To reflect the advances in service delivery since the Horizontal European Activities in Rehabilitation Technology (HEART) study, the impact of European policy and strategy on development in the ATD field, and the current challenges the sector faces.	13 countries	SDPs	European countries have ATD service delivery systems that vary in their structure and sophistication, but share some common challenges to meeting the needs of ATD service users. Several recommendations are made to inform further discussion, and to encourage the various stakeholders in ATD policy and practice to work collaboratively in improving service delivery across Europe.	Survey	D2

(Continued)

Table 2. (Continued).

Author/s (year) origin	Aim	Sample	Type of ATD	Main result	Design	Level of evidence
Sund et al. (2013) Norway and Denmark	The purpose of this study was to investigate how different service delivery systems for assistive devices were associated with the SDP and user satisfaction in two national contexts when electric-powered scooters were provided.	50 Danish and 86 Norwegian adults = 136 total	Scooters	This study supports the assumption that structure of the service has an impact on the SDP, but not that the process has an impact on outcomes in terms of user satisfaction with the SDP.	Follow-up design	O3
Tam et al. (2003) Hong Kong	To solicit information from individuals with disabilities and health-care professionals on the need for, funding for, and satisfaction with ATD and services in Hong Kong.	787 people with disabilities and 443 rehabilitation professionals	Mixed types	Overall, only 40% of end users and 60% of health-care professionals gave a satisfactory rating to ATD services—including equipment installation, repair, and maintenance, as well as other after-sales support. There was a demand for streamlining funding-application procedures improving after-sales support. Participants believed the SRS was not an adequate fit for their needs or their specific disabilities, and resorted to alternative methods of written communication. A better understanding of the compatibility of the clients' needs with the strengths and limitations of the technology may improve the prescription and intervention process for both therapists and their clients.	Survey	D2
van Schyndel et al. (2014) Canada	To describe the experience of adolescents and their parents who experienced abandonment of SRS.	Five participants: two parents and three adolescents	ICT devices	Participants believed the SRS was not an adequate fit for their needs or their specific disabilities, and resorted to alternative methods of written communication. A better understanding of the compatibility of the clients' needs with the strengths and limitations of the technology may improve the prescription and intervention process for both therapists and their clients.	Qualitative design	Q2
Weiss-Lambrou et al. (1999) Canada	To evaluate user satisfaction with wheelchair seating aids.	24 subjects	Wheelchairs	The results support the value of consumer opinion and challenges the assumptions of ATD professionals. This study underscores the appropriateness of assessing consumer satisfaction in a systematic and ecologically valid manner.	Survey using the QUEST instrument	D3
Wessels and de Witte (2003) The Netherlands	To validate the Dutch version of the QUEST (D-QUEST) in users of a large variety of assistive devices.	2,002 users	Mixed types	D-QUEST proves itself to be a highly applicable, reliable, and valid instrument for assessing the satisfaction of users with all kinds of assistive devices. The users were "neither dissatisfied nor satisfied" with the ATD (). Effectiveness, ease of use, and follow-up services are considered critical.	Survey using the QUEST instrument	D2
Vincent et al. (2007) Canada	To evaluate social participation following the use of a new AT is proposed.	15 deaf adults	Hearing aids	Follow-up seems to be an area that needs to be improved. The majority of users are satisfied with the device, but not with the service.	Pre- and post-intervention	E3
Wressle and Samuelsson (2004) Sweden	To evaluate users' opinions on the prescription of mobility devices, and their satisfaction with devices and services.	209 users	Manual or powered wheelchairs, or walkers	Follow-up seems to be an area that needs to be improved. The majority of users are satisfied with the device, but not with the service.	Cross-sectional design using the QUEST instrument	O3

<p>Top Mega-synthesis of descriptive, experimental, outcome, and qualitative research</p> <p>Descriptive research (Base) 1. Systematic reviews of related descriptive studies 2. Association, correlational studies 3. Multiple-case studies (series), normative studies, descriptive surveys 4. Individual case studies</p> <p>Experimental research (Side) 1. Meta-analyses of related experimental studies 2. Individual (blinded) randomized controlled trials 3. Controlled clinical trials 4. Single-subject studies</p> <p>Outcome research (Side) 1. Meta-analyses of related outcome studies 2. Pre-existing groups comparisons with covariate analysis 3. Case-control studies; pre-existing groups comparisons 4. One-group pre–post studies</p> <p>Qualitative research (Side) 1. Meta-synthesis of related qualitative studies 2. Group qualitative studies with more rigor (a, b, c) 3. Group qualitative studies with less rigor (a, b, c) a. Prolonged engagement with participants b. Triangulation of data (multiple sources) c. Confirmation of data analysis and interpretation (peer and member checking) 4. Qualitative studies with a single informant</p>
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Figure 2. Research pyramid levels of evidence (Tomlin & Borgetto, 2011, p. 192).

To evaluate the level of evidence of studies included from different study designs, the description in the Research Pyramid Model was followed (Tomlin & Borgetto, 2011; Figure 2). The model forms a pyramid, where the base represents descriptive research and the three other sides represent experimental, outcomes, and qualitative research. Each side also includes four levels of evidence, which can be seen in Table 2 in the “level of evidence” column. The level of evidence was judged according to the Research Pyramid Model by both reviewers.

Results

Characteristics and level of evidence for articles included

A total of 53 articles met the inclusion criteria for this review; they are presented in Table 2. The articles’ countries of origin revealed that most originated in Europe ($n = 21$) or North America ($n = 20$), and the remainder were conducted in Australia ($n = 7$) or Asia ($n = 5$). None have Africa or South America as their country of origin. Almost half of the articles included were published during the last 5 years (2010–2015, $n = 25$), and the oldest ones were published 25 years ago, in 1990 ($n = 2$). In the articles included, a range of individuals with diverse disabilities and ages, as well users of different types of ATD, participated. In terms of age, the most studied users of ATD were adults (56%), followed by older people >65 years (24%), and children and adolescents <19 years of age (21%).

The different types of ATD included were to a large extent mixed types ($n = 21$). Mobility devices formed the second

largest group ($n = 17$), followed by information and communication technology (ICT) and electronic aids to daily living (EADLs; $n = 7$), augmentative and alternative communication devices (AAC; $n = 4$), and one study each regarding aids to hearing, orthoses, and stairlifts.

Seven studies aimed to study both the SDP as a whole process and the influence of use and satisfaction with ATD in everyday activities (Anderson, Balandin, & Stancliffe, 2014; Borg et al., 2012; Hedberg Kristensson, Dahlin, & Iwarsson, 2006; Hedberg Kristensson & Iwarsson, 2003; Maximo & Clift, 2015; Steel & de Witte, 2011; Sund, Iwarsson, Andersen, & Brandt, 2013).

According to the Research Pyramid Model, most articles included ($n = 53$) were categorized as descriptive research ($n = 31$), with most of these ($n = 22$) belonging to level 3 (multiple-case studies, normative studies, descriptive studies). Fifteen articles were categorized as qualitative research, most ($n = 13$) at level 3 (group qualitative studies with less rigor). Six articles were classed as outcomes research, with four at level 3 (case-control studies, pre-existing group comparisons). One article was judged to be experimental research at level 3 (controlled clinical trial).

As can be seen in Table 2, of the 53 articles included, 40 were at level 3, 11 at level 2, and one at level 4. Only one article was categorized as being at level 1 (Mumford, Lam, Wright, & Chau, 2014). Accordingly, the evidence for the articles included must be deemed moderate.

Findings in the qualitative analysis

A content analysis was conducted (Graneheim & Lundman, 2004), and in the result, six themes appeared. The themes regarding which factors affect the satisfaction with and use of assistive technologies in individuals with disability in relation to the SDP is presented as headings below.

SDP in relation to satisfaction and use of ATD

Some articles included examined the participants’ experiences of the SDP, and findings showed that the entire process was important for the usability of the ATD (Derosier & Farber, 2005; Dijcks, Wessels, de Vlioger, & Post, 2006; Friederich, Bernd, & de Witte, 2010; Jedeloo, de Witte, Linssen, & Schrijvers, 2002; Karmarkar, Collins, Kelleher, & Cooper, 2009; Murchland, Kernot, & Parkyn, 2011; Samuelsson & Wressle, 2014; Shone, Ryan, Rigby, & Jutai, 2002; Smith, Quine, Anderson, & Black, 2002; Tam et al., 2003; Wressle & Samuelsson, 2004). Users’ satisfaction were investigated, based on participation in daily life, as a quality indicator for a more or less successful SDP (Gramstad, Storli, & Hamran, 2013; Kittel, Di, & Stewart, 2002; Sund et al., 2013). One explanation for users’ satisfaction was that the therapist and the user agreed to the choice of product and the device met their expectations (Samuelsson & Wressle, 2014). The opposite also appeared when studies included reported frustration with efforts to obtain appropriate AT services (Chan & Chan, 2006; Jedeloo et al., 2002; Mao et al., 2010; McNaughton et al., 2008; Vincent, Deaudelin, & Hotton, 2007; Wressle & Samuelsson, 2004). For example, if obtaining access to the ATD took a long time, the expectations of the ATD were not

met, and this affected the satisfaction with the usability of the device (Dolan & Henderson, 2014; Murchland et al., 2011). Participants were on the whole satisfied with the professionals involved in the assessment and recommendation of ATDs (Lenker, Harris, Taugher, & Smith, 2013). However, a dilemma was experienced when the prescriber was unsure whether the customer could use the ATD effectively, and was therefore reluctant to prescribe it, despite a related party advocating for the device (Lindsay, 2010). Sometimes, the expectations about the device's usability were unrealistic, which often led to inefficient use, or abandonment (Derosier & Farber, 2005).

Client-centered approach to facilitating an effective SDP

A client-centered approach in the SDP process is advocated, and was found to be an important factor for effective SDPs and satisfied users (Anderson et al., 2014; Arthanat, Simmons, & Favreau, 2012; Bailey, Parette, Stoner, Angell, & Carroll, 2006; Borg et al., 2012; Craddock & McCormack, 2002; de Groot, Post, Bongers-Janssen, Bloemen-Vrencken, & van der Woude, 2011; Hammel et al., 2013; Hedberg Kristensson et al., 2006; Lenker et al., 2013; Martin, Martin, Stumbo, & Morrill, 2011; Shone et al., 2002; Steel & de Witte, 2011; Wressle & Samuelsson, 2004). A prerequisite for a client-centered approach is teamwork, described as collaboration by team members within and across the client, caregivers, therapists, and organizations (Anderson et al., 2014; de Groot et al., 2011). Expectations regarding collaboration with the team varied among the participants. Some expressed this as the professional suggesting an ATD, but the choice being made by the user, while other participants described decisions being made by the professionals before involvement of the user or relatives—a more passive receipt of health care (Bailey et al., 2006; Gramstad et al., 2013). Challenges occurred when the team members (e.g., a child, parents, and teachers) were in disagreement over the use of a device or the time-consuming training that goes with it (Copley & Ziviani, 2007; Lindsay, 2010; Sprigle, Lenker, & Searcyc, 2012). To be a part of the SDP team and be involved in the process requires being informed (Hammel et al., 2013), as well as having knowledge about the prescription process (Anderson et al., 2014; Cowan & Turner-Smith, 1999; Hammel et al., 2013; Kittel et al., 2002; McNaughton et al., 2008; Parker et al., 1990). Lack of communication and coordination between different team members in the SDP can lead to mixed messages (Anderson et al., 2014). Participants described difficulty in understanding the process and the language of the assessment process (Copley & Ziviani, 2007).

Studies included showed that users described being involved in at least some part of the prescription process, (e.g., needs assessment and the choice of ATD; Steel & de Witte, 2011), although it could be difficult to involve people with cognitive problems, such as dementia, if the person was not aware that they needed and received an ATD (Gramstad et al., 2013). The experience of having no involvement in the SDP was described by Hedberg Kristensson and colleagues (2006), where only a few of the participants participated in the process. Lack of involvement stresses the users' perceptions that the professionals were experts in charge of decision making (Bailey et al., 2006), reducing the participants' opportunity to act as leaders of the process, taking charge of problematic occurrences, and claiming responsibility for the SDP (Craddock &

McCormack, 2002; Gramstad et al., 2013). It was desirable that all members of the prescription team consulted with the ATD users to ascertain their opinions and perceived requirements (Kittel et al., 2002).

Meeting the users' needs: Assessment, documentation, and follow-up

In order to select useful ATDs, an assessment of needs was described as an important step before the SDP process (Batavia & Hammer, 1990; Benedict, Lee, Marrujo, & Farel, 1999; Copley & Ziviani, 2007; Hedberg Kristensson et al., 2006), and it was emphasized that professionals need to listen to the specific needs of the person with activity limitations (McNaughton et al., 2008; Samuelsson & Wressle, 2008; Wressle & Samuelsson, 2004); not to do so resulted in the ATD not being used as often as intended (Hedberg Kristensson et al., 2006). However, professionals seldom used assessment instruments in the SDP, and in addition, few of the prescribing professionals (occupational therapists) documented goals in the prescription of ATD (Hedberg Kristensson & Iwarsson, 2003). The documentation of the SDP was important in order to carry out an adequate follow-up, although the routines for follow-up were inadequate (Chan & Chan, 2006). To improve and facilitate follow-up, clear goals were set for the use of the ATD (Hedberg-Kristensson & Iwarsson, 2003). One of the few assessment instruments used to measure the user's satisfaction with assistive technologies and associated services was QUEST, which was used both before and after an intervention (Goodacre & Turner, 2005; Gramstad et al., 2013; Mao et al., 2010; Mumford et al., 2014; Samuelsson & Wressle, 2008; Smith et al., 2002; Wessels & de Witte, 2003).

ATD users and caregivers were often dissatisfied with follow-up services (Benedict et al., 1999; Bergström & Samuelsson, 2006; Chan & Chan, 2006; Chen et al., 2014; Lidström, Almqvist, & Hemmingsson, 2012; Mao et al., 2010; Maximo & Clift, 2015; Samuelsson & Wressle, 2008; Shone et al., 2002; Sund et al., 2013; Vincent et al., 2007). One explanation was that no follow-up occurred, as only about half to one third of users had a follow-up by their prescriber (Samuelsson & Wressle, 2014; Smith et al., 2002; Sund et al., 2013; Wressle & Samuelsson, 2004). In some studies, lack of follow-up was given as a reason for underutilization (Benedict et al., 1999; de Jonge & Rodger, 2006). Not receiving any follow-up was related to the user feeling abandoned. Follow-up was also experienced as controlling, especially regarding frequency of use (Cowan & Turner-Smith, 1999; Samuelsson & Wressle, 2008; van Schyndel, Furgoch, Previl, & Martini, 2014). As participants tended to use only the basic features of their device at follow-up, continuous follow-up was recommended in order to understand how the ATD could be further customized to improve its effectiveness (de Jonge & Rodger, 2006). The follow-up needed to be individualized, as needs differed among the participants, and not everyone was in need of follow-up (Gramstad et al., 2013).

Information and choice of AT

A prerequisite to enable the users' participation in the SDP was availability of information (e.g., available ATD to try), which was dependent on support from suppliers and

financiers' fund (Cowan & Turner-Smith, 1999; Dolan & Henderson, 2014; Hedberg Kristensson et al., 2006; Krantz, Persson, Lindgren, & Bolin, 2011; Smith et al., 2002). The internet was the most commonly-used medium (Friederich et al., 2010), which led to inequality, because the internet was difficult to master for some users (Anderson et al., 2014). Besides the internet (Anderson et al., 2014; Craddock & McCormack, 2002; Friederich et al., 2010; Martin et al., 2011) and professionals (Friederich et al., 2010; Martin et al., 2011), information regarding ATD was provided by equipment suppliers/manufacturers (Anderson et al., 2014; Friederich et al., 2010; Krantz et al., 2011; Martin et al., 2011), professionals' exhibitions and trade fairs (Krantz et al., 2011), or users' parents (Anderson et al., 2014). Lack of information, such as receiving no written information (Smith et al., 2002) or manuals for the equipment (de Jonge & Rodger, 2006), were examples that could lead users to abandon their ATD (Anderson et al., 2014). The information could differ depending on professionals' differing levels of knowledge, which could result in a low quality of service (Chen et al., 2014; Jedeloo et al., 2002). For example, Jedeloo and colleagues (2002) found that available information could be difficult to read and comprehend for elderly people. The participants felt that they were not fully informed if the benefits of the ATD were highlighted but potential problems were missing, leading to false expectations of the device (van Schyndel et al., 2014).

Training and support

Training and support were necessary for the efficiency of the ATD (Cowan & Turner-Smith, 1999; Hedberg Kristensson et al., 2006). Receiving training led to increased participation in everyday activities (Borg et al., 2012; de Jonge & Rodger, 2006; Kittel et al., 2002; Smith et al., 2002; van Schyndel et al., 2014) and, for example, provided participants with up-to-date instruction on the use of the device, and therefore increased its usability (van Schyndel et al., 2014). The need for training and support was affected by the user's learning ability (Batavia & Hammer, 1990); although, in some cases, the issue of education and training seemed irrelevant, as the participants experienced the use of the devices as self-evident (Smith et al., 2002). Which activities and in what context the ATD would be used (Murchland et al., 2011) affected the need for training and support (Bailey et al., 2006; Benedict et al., 1999). High technology, such as communication devices and ICT, often used in school settings, were examples of ATD that needed time to learn (Lidström et al., 2012; Lindsay, 2010), and teachers did not always understand (Bailey et al., 2006). Continuous support was described as desirable (Anderson et al., 2014), appreciated (de Jonge, Rodger, & Fitzgibbon, 2001), and facilitated the use of the device (Craddock & McCormack, 2002), but was reported to be limited due to users' difficulty in travelling long distances to reach the professionals (Anderson et al., 2014; Benedict et al., 1999), as well as costs (Anderson et al., 2014). Lack of support placed demands on the user (Anderson et al., 2014), and friends, acquaintances, and co-workers were asked for support with compatibility problems (de Jonge et al., 2001). Lack of professional support led to devices being abandoned (Anderson

et al., 2014), and hindered prescription of devices (Lindsay, 2010). Participants reported they were given no instruction on how to use the ATD (mobility device); for example, how to use the device's brake, which is crucial for safety and usability (Hedberg Kristensson et al., 2006). Moreover, insufficient training affected level of stress, handling, and time with the device (Bailey et al., 2006), and led to underutilization and abandonment (Arthanat et al., 2012; Benedict et al., 1999; Cowan & Turner-Smith, 1999; de Jonge & Rodger, 2006; Derosier & Farber, 2005).

Societal influences on the SDP

Social, cultural, and economic differences were seen to influence the provision of ATD (Weiss-Lambrou, Tremblay, LeBlanc, Lacoste, & Dansereau, 1999), and policy barriers such as age or eligibility restrictions also affected support and service (Anderson et al., 2014). In many countries, the costs of the ATD were not fully covered by the welfare allowance and were a barrier to acquiring an ATD (Borg & Östergren, 2015; Chen et al., 2014; de Groot et al., 2011; Lenker et al., 2013; Mao et al., 2010; Shone et al., 2002; Smith et al., 2002). The cost for the users varied from a portion to the full cost of the device or repair fees (Chen et al., 2014). Hidden costs, such as those for maintenance or installation of a power point for recharging the ATD, were difficult for some users to meet (Arthanat et al., 2012; Hammel et al., 2013; Mao et al., 2010; Smith et al., 2002). The cost for modification or repair of the device resulted in users trying to find inexpensive ways to modify their device (de Jonge & Rodger, 2006), or to repair it themselves or with the help of relatives (Batavia & Hammer, 1990). This was especially problematic regarding high-technology devices, such as communication aids (Batavia & Hammer, 1990; Lindsay, 2010). When the users were responsible for the cost, the level of service became important and was associated with dissatisfaction with the service (Anderson et al., 2014). In countries where the ATD users needed to pay for the ATDs, funding agencies or private health insurances (Martin et al., 2011) were facilitators (Lenker et al., 2013), but at the same time barriers, as it was time-consuming to search, find, and apply for funding (Arthanat et al., 2012; de Jonge et al., 2001). The fear of buying the wrong product could lead users to refrain from obtaining an ATD they needed. The users' satisfaction was closely related to cost of the device and the perception of the product's value (Mao et al., 2010).

Frequent need for repair was described by several participants, who said that their device often broke down (Anderson et al., 2014; McClure et al., 2009), and dissatisfaction was commonly reported (Chen et al., 2014; Shone et al., 2002). The inconvenience of this frequent need for repair affected participation in everyday activities negatively (McClure et al., 2009). Users reported that there were often delays in waiting for service, and therefore, the ATD could not be used for a long time (Bailey et al., 2006; de Jonge et al., 2001; Hammel et al., 2013). Prescribing professionals needed to take into account experiences with different ATD regarding maintenance and problems in order to make the best decision for the user while being fiscally accountable (Lindsay, 2010). Swift and easy access to technical support was seen as essential (Anderson et al., 2014), as organizing repairs was very time-consuming (Bailey et al., 2006; Chen et al., 2014).

Discussion

To our knowledge, this is the first review that has drawn attention to the whole SDP for individuals with disability in relation to satisfaction and usability of ATD. Current research seems, instead, to focus on and validate the different areas of the SDP separately. SDP is a complex process consisting of several areas and, from a systems theoretical perspective, each area influences the others directly or indirectly (Scherer et al., 2007). An explanation of why the research into the whole process is sparse may be that the availability of ATD is based on the different disability policies in different countries, as well as the social and economic conditions or cultural differences in attitudes to ATD in the countries (Anderson et al., 2014; Borg & Östergren, 2015; Chen et al., 2014; de Groot et al., 2011; Lenker et al., 2013; Mao et al., 2010; Shone et al., 2002; Smith et al., 2002; Weiss-Lambrou et al., 1999). However, it would be possible to compare the users' satisfaction with and usability of the ATD between countries, as this study shows not identical factors, but many similarities in the different SDPs. Thus, the SDP usually includes taking initiative, assessment of needs, selection of assistive solution, authorization, implementation, management, and follow-up (Association for the Advancement of Assistive Technology in Europe (AAATE), 2012). Therefore, more research is needed to find methods of investigating the factors that influence the SDP in different countries throughout the world. A study by de Groot and colleagues (2011) is an example of research that compared user satisfaction and use in two different countries. A methodological prerequisite was to use a common assessment instrument connected to the SDP (i.e., QUEST). It is also important to continue to develop the SDP in relation to the ATD models (Federici et al., 2014), as the quality of service delivery system for ATD has not advanced to the same level.

The result also suggests that there are factors in almost all the different steps of the SDP that can lead to abandonment of the ATD. Lack of support, information, and follow-up, insufficient training, and unrealistic expectations of the ATD all lead to abandonment and underutilization of the device (Anderson et al., 2014; Arthanat et al., 2012; Bailey et al., 2006; Benedict et al., 1999; Cowan & Turner-Smith, 1999; de Jonge et al., 2001). This confirms the notion that the SDP as a whole is important and affects the satisfaction with and use of the ATD. Moreover, the results indicate that all aspects of the SDP, including the needs assessment, affect the satisfaction with the ATD, but only a few studies have been conducted with a design robust enough to generalize the results. Seeing as the SDP has not been studied in its entirety to any larger extent (seven of the articles included had that purpose) also limits the possibility of drawing a general conclusion, considering the evidence regarding this issue. The available evidence seems to show that participation in the SDP affects satisfaction with and use of the ATD, but it has not become clear whether any one part of the prescription process is more important than another. Consequently, the evidence is low regarding the impact of the SDP on the satisfaction with and usefulness of the prescribed ATD; thus, more research in the area is needed.

A client-centered approach in the SDP is advocated, and was found to be an important factor for an effective SDP and satisfied users (Anderson et al., 2014; Arthanat et al., 2012; Bailey et al., 2006; Borg et al., 2012; Craddock & McCormack, 2002; de Groot et al., 2011; Hammel et al., 2013; Hedberg Kristensson et al., 2006; Lenker et al., 2013; Martin et al., 2011; Shone et al., 2002; Steel & de Witte, 2011; Wressle & Samuelsson, 2004). Brandt and colleagues (2015) also found that user involvement in the SDP and training in the use of the device had a positive impact on the outcomes. However, Bernd and colleagues (2009) concluded professionals need to ensure that the process of ATD selection is evidence-based. Points suggested for achieving an evidence-based practice are: using a structured, systematic procedure relying on a model and suitable instruments with a client-centered approach; working in interdisciplinary teams with clearly-allocated roles; and evaluating and documenting the process and the outcome to ensure the quality of the process. The importance of having a user focus in the SDP was illustrated in different AT models (Brown-Triolo, 2003; Lenker & Paquet, 2003; Scherer & Craddock, 2002). For example, Scherer's model Matching Person with Technology (MPT; Scherer & Craddock, 2002) emphasizes an inclusive user-centered orientation, which supports our results showing that users report increased satisfaction when they are involved in aspects of the SDP (Gramstad et al., 2013; Hedberg Kristensson et al., 2006; Steel & de Witte, 2011). Thus, it is important to capture the user's unique requirements in the needs assessment. A means to assure user participation in the needs assessment and the SDP is the use of assessment instruments, although these are not used to the extent that they could be. Proper documentation of the SDP and the goal of the ATD prescription (Lenker & Paquet, 2003) is stressed as lacking, which could affect the ATD's usability. Lack of assessment instruments and poor documentation could be a reason why intervention studies examining the effect of ATD use with large numbers of participants are scarce. Use of assessment instruments could facilitate measuring satisfaction with and use of ATD, and is advocated by the authors (Bernd et al., 2009; Lindsay, 2010). Using structured methods, including assessment instruments, is essential at the needs assessment to achieve the purpose of the prescription of ATDs (Scherer et al., 2007).

Methodological considerations

A limitation in the search procedure may be that a broad variation of search terms were used to define the scope of the research, with focus on the SDP of different types of ATD. The search procedure generated a considerable number of irrelevant articles, which may also have led to relevant articles not being included. Therefore, to prevent this, a supplementary manual search of three journals with a particular focus on the area of ATD was carried out. In congruence with Brandt and colleagues (2011), we included articles regardless of study design. Drawing from earlier literature reviews (Anttila, Samuelsson, Salminen, & Brandt, 2012; Brandt et al., 2015), we know that there have not been many studies performed using a robust enough method to provide compelling evidence or to allow for generalization. In order to handle this

deficiency in this research area, we used the Research Pyramid Model (Tomlin & Borgetto, 2011), which includes different types or methods of research. Our conception regarding evidence was confirmed, as the articles included were deemed moderate, with only one article rated at level 1. Although, within this field, randomized control trials (RCT) studies are not always required, and by using the Research Pyramid Model, different levels of evidence can be displayed.

Implication for practice and future research

An important implication for practice is to use a structured and systematic SDP with a client-centered approach. To involve the ATD user in the process seems to be of the essence for user satisfaction and effective service delivery regarding ATDs, which also reduces the risk of abandonment of the device. Further research is needed to validate the use of any existing instruments or to develop new ones (e.g., for children and youths with disabilities) where there is a deficiency. The SDP as a whole needs to be studied to ensure that it contributes to a regimen where the user feels satisfied with and involved in the ATD prescription. Ensuring that the user is involved in the needs assessment and in all aspects of the SDP requires appropriate assessment instruments. Further research is also necessary to confirm whether any area of the SDP is more important than any other. There are also few intervention studies and studies of the SDP based on the client's satisfaction and participation in the process, and few studies of whether clients' levels of activity and participation in everyday activities increased with the support of an aid. Additionally, research studies are needed that report data on the costs and cost-effectiveness of ATD provision and how this affects the outcome regarding the ATD usability.

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