

Please note: This is the postprint version of the following article

Perspectives of rehabilitation professionals on assistive technology provision to young children in South Africa: A national survey

Article category: Research paper

Authors: Karin van Niekerk^{1,2,*}; Shakila Dada¹; Kerstin Tönsing¹

¹Centre for Augmentative and Alternative Communication, University of Pretoria

Pretoria, South Africa

²Department of Occupational Therapy, University of Pretoria, Pretoria, South Africa

*Corresponding author: Karin van Niekerk, Department of Occupational Therapy, University of

Pretoria, Private bag X20, Hatfield, 0028, South Africa

karin.vanniekerk@up.ac.za

Declaration of interest:

The authors report no declarations of interest

Acknowledgement

This study was financially supported by the National Research Foundation Grantholder linked bursary (TTK 150708124127), the Research Office of the University of Pretoria as well as the Margaret McNamara Education Grant South Africa Programme. Opinions expressed and conclusions arrived at are those of the authors and are not necessarily to be attributed to of the NRF or the University of Pretoria. The authors would like to thank all the participants for their valuable contribution.

Abstract

Purpose: Various factors influence the selection of assistive technology for young children within a context with limited resources, such as South Africa.

Rehabilitation professionals are required to weigh up different factors as part of their professional reasoning process when making AT selections. Insight into the perceived influence of different factors may assist in understanding how professionals make decisions about AT in this context.

Materials and methods: An online survey with questions designed using best-worst scaling was distributed to rehabilitation professionals throughout South Africa. Factors influencing assistive technology selection included in the best-worst survey were identified in previous phases of a larger project. A total of $n = 451$ rehabilitation professionals completed the survey by selecting the factors that were most and least influential on their assistive technology provision.

Results: Results of the survey were obtained by calculating the number of times each factor was selected as most influential across the entire sample, and across all questions, enabling the researchers to sort the items in terms of the frequency of selection.

Conclusions: Even though the rehabilitation professionals that participated in the study provide services in a context with limited resources, assessment and factors pertaining to the assistive technology itself were generally perceived to be of greater influence than environmental factors. It is recommended that these factors be reflected in frameworks and models of AT selection.

Keywords: assistive technology, young children, resource-limited context, selection, best-worst survey, ATD Selection Framework

Introduction

In recent years, rehabilitation services have increasingly shifted towards a socio-ecological approach focussed on the environment, as opposed to the intra-personal approach that characterised earlier services (1). In line with this approach, rehabilitation professionals (RPs) consider different strategies to facilitate participation in the environment for children with disabilities. The provision of AT has been

described to provide access to participation and facilitate learning in all spheres of life (2).

AT selection for young children can be a complicated process that requires RPs to consider a variety of factors that could influence the appropriateness of the AT they select and recommend. Appropriate AT selection, in turn, contributes to user satisfaction, long term use, and cost effectiveness of AT (3). Understanding the factors that influence AT selection is highly valuable, as it could assist professionals to review their AT selection practises. Additionally professionals may become more consciously aware of the need to not only consider a multitude of factors, but also to weigh up the different influencing factors in terms of their perceived importance in order to arrive at the AT recommendation (4). Furthermore, knowledge of these factors could inform training of undergraduate and post graduate professionals in AT selection.

Availability and accessibility of AT continues to be a challenge in contexts with limited resources (5,6), with one estimate stating that only 5 – 15% of people requiring AT (within low and middle income contexts) are able to access it (7). RPs are tasked with balancing the availability and affordability of AT with its acceptability and quality in order to make the most appropriate selections.

In order to gain a contextually situated understanding of the factors that influence AT selection for children with disabilities from birth to six years, particularly in the South Africa context, a three-phased study was undertaken. In this paper, the findings of the last phase will be discussed. This entailed a national survey aimed at determining the extent to which RPs in South Africa perceive different factors to influence their selection of AT for young children. In order to contextualise this phase, a brief overview is given of the project and the first two phases. For more information, the papers by Van Niekerk et al. (8,9) as well as the original thesis (10) can be consulted.

The Assistive Technology Device (ATD) Selection Framework (11) was chosen as the underlying theoretical model for the study. This model indicates that AT selection takes place as a result of the interplay between environmental factors, personal factors (of the user of the AT as well as the RP), as well as specific decision making and ATD selection factors. This model was selected as it pertinently highlights the influence of the recommending RP on the AT selection process in contrast to other frequently-used models such as the Human Activity Assistive Technology (HAAT) model (Cook & Polgar, 2008) and the Matching Person and Technology Model (Scherer, 1998). The inclusion of the RP's influence on the process is compatible with the theory on professional reasoning, a process that underlies all clinical decision-making. According to Schell (12), a professional's reasoning is influenced by the practice context, the client and the personal and professional lens of the professional themselves. The professional's personal lens is formed by aspects such as their intelligence, beliefs and values, while the professional lens is shaped by their practice theories, knowledge, therapy skills and experience (12).

The first two phases of the study aimed to validate the factors included in the ATD Selection framework according to the published literature (Phase 1) and according to the perceptions of South African RPs (Phase 2), making adaptations to the framework after each phase.

In the first phase of the study, a systematic review (9) was conducted to identify factors that RPs perceive to influence the provision of AT as indicated in published literature. The results were analysed deductively according to the ATD Selection framework and confirmed the inclusion of all the existing aspects of the ATD Selection framework. However, findings suggested that characteristics of the AT itself was also

considered in AT selection, and that AT as a separate factor should be added to the ATD Selection framework.

In the second phase, focus groups were conducted to identify and describe the perceptions of South African RPs on the factors that influence their recommendation and provision of AT to young children (8). The results suggested an expansion and adaptation of the ATD Selection Framework in order to represent a comprehensive view of the multitude of factors that influence South African professionals in their recommendations. The results confirmed the influence of personal factors related to the RP themselves, such as their knowledge and skills. As after the systematic review, it was suggested that “assistive technology” be added as a factor to the ATD Selection framework. “Decision making” was also suggested as a new factor to the ATD Selection framework after analysis of the data from the online focus groups.

The adapted ATD Selection framework emerging from these two phases consists of five overarching factors that all influence the selection of AT:

- i. Environment, subdivided into the a) cultural context, b) institutional context, c) social context and d) physical context.
- ii. Personal factors pertaining to the RP and the user of the AT, subdivided into a) resources, b) knowledge and information, c) expectations and d) preferences and priorities.
- iii. Assessment
- iv. Assistive technology
- v. Decision making

Each overarching factor in turn was subdivided into several categories and subcategories, resulting in a total of 48 hierarchically organised factors. For a comprehensive list of all factors please see the supplementary material online.

Although the adapted framework provided a comprehensive indication of the different factors that may influence the selection of AT for young children in the South African context, the perceived extent of the influence of the different factors was still unknown. The third phase of this study therefore aimed to determine the extent to which the different factors were perceived to influence the AT selection process of South African RPs, specifically when selecting AT for young children.

Methods

Design

An online survey design was used, in order to reach RPs working with young children in South Africa on a national scale. Questions were designed using best-worst scaling to elicit a ranking of factors in order of the extent in which they were perceived to influence AT selection for young children. A considerable advantage of best-worst scaling is that it is scale-free (13,14), thereby reducing the possibility of scale bias. Furthermore, it may also address response bias that could influence participants when completing rating scales. Acquiescence bias (tendency to agree) may be of particular relevance, as participants could rate most factors influencing AT provision as highly influential in a rating scale. This may lead to skewed responses (15). Best-worst questions uses to its advantage a participant's inclination to respond in the same manner to extreme options (16).

Participants

Participants were occupational therapists, physiotherapists, speech-language therapists and speech-language therapists and audiologists (dually qualified), registered with the Health Professions Council of South Africa. Registration with this regulatory body is

compulsory in order to practice in the country. Furthermore, professionals were required to recommend and/or provide AT to children between birth and 6 years of age. A list of email addresses of all the registered professionals from the included professional groups was acquired from the Health Professions Council of South Africa after ethics approval for the project had been obtained from the university. The Health Professions Council of South Africa was deemed the most reliable source of email addresses as all professionals receive at least yearly communications from this body in order to retain their registrations. Unfortunately, no employment information is recorded by the regulatory body for registered professionals in South Africa. This implies that the only option was to distribute the survey to all registered professionals, even if they were not eligible to participate (as they did not recommend/provide AT to young children).

The survey was distributed to a total of 14,167 prospective participants. Of these emails, 801 were not deliverable. Therefore, 13,366 invitation emails were delivered to valid addresses. A total of 1,196 professionals opened the survey and 1,196 responses were recorded. In total 338 participants were excluded from the survey as they did not meet the entrance criteria (that was determined in the first three questions). Section 1 of the survey was started by 858 participants and 699 participants started with Section 2. In total, 451 participants completed every question in Section 2. These responses were included in the analysis. Table 1 provides details per profession of the number of valid email addresses (i.e., total number of addresses on each list minus number of addresses where emails were undeliverable), as well as the number of responses received from each group.

Table 1. *Number of Responses per Profession*

Professional group	Number of valid email addresses	Number of usable responses	Percentage of RPs (from group receiving the email) who provided a usable response
Occupational therapists	4,461	222	4.98%
Physiotherapists	6,541	126	1.93%
Speech language therapists	1,021	63	6.17%
Speech language therapists and audiologists	1,343	40	2.98%

Note. Table replicated from Van Niekerk, 2019, p. 119 (10)

Occupational therapists represented 49.22% of the sample, with physiotherapists, speech-language therapists and speech-language therapists and audiologists (dually qualified) also represented. The majority of participants (80.93%) had a Bachelors degree. Table 2 provides the demographic details of the participants.

Table 2. *Demographic details of participants (N=451)*

Demographics	n	Percentage of total
Profession		
Occupational therapist	222	49.22%
Physiotherapist	126	27.94%
Speech-language therapist	63	13.97%
Speech-language therapist and audiologist	40	8.87%
Highest qualification		
Diploma	4	0.89%
Bachelors degree	365	80.93%
Masters degree	79	17.52%
Doctoral degree	3	0.67%
Number of years of experience in recommending/providing AT to children birth to 6 years		
0-2 years	103	22.84%
3-5 years	128	28.38%
6-10 years	84	18.63%
11-20 years	94	20.84%
21-30 years	24	5.32%
31-45 years	16	3.55%
Missing	2	0.44%
Province of South Africa where service is provided		
Eastern Cape	33	7.32%
Free State	21	4.66%
Gauteng	155	34.37%
Kwazulu Natal	66	14.63%
Limpopo	21	4.66%
Mpumalanga	23	5.10%

Demographics	n	Percentage of total
Northern Cape	16	3.55%
North West Province	14	3.10%
Western Cape	102	22.62%
Area where service is provided		
Urban	240	53.22%
Rural	83	18.40%
Both urban and rural	128	28.38%
Current employment setting ^a		
AT Supplier	4	0.9%
Clinic	26	5.8%
NGO	24	5.3%
Private practice	167	37%
Public hospital	149	33%
Public school	59	13.1%
University context	9	2%
Other	13	2.9%
Types of AT recommended/provided ^a		
AT for Seating and positioning	298	66.08%
AT for Mobility	244	54.10%
AT for AAC	162	35.92%
AT for ADL purposes	186	41.24%
AT for classroom purposes	209	46.34%
AT for play/toys	113	25.06%
AT: Other	34	7.54%
Availability of trial (n=4 missing)		
Trial available at work	240	53.7%
Trial unavailable at work	207	46.3%
Trial available in homes	141	31.5%
Trial unavailable in homes	306	68.5%

^a More than one option could be selected here.

Survey instrument

The survey instrument contained two sections and was developed on Qualtrics (an online survey tool). Section 1 included various biographical questions regarding the participants and their practices regarding AT selection/provision. Several questions were based on questions from existing survey instruments (17,18), while others were created by the first author.

Section 2 was developed based on the adapted ATD Selection framework and consisted of best worst survey questions. Participants were presented with 24 questions, each containing varying sets of six items each that may influence the

recommendation/provision of AT. Within each of the 24 questions, participants were required to select one of the six items presented that they found most influential on their AT recommendation/provision, as well as one item they found least influential. The different items all corresponded to factors included in the adapted theoretical framework. A total of 48 items were included.

Question sets were designed in a fractional factorial design (19,20), aimed at smaller and more manageable sets as compared to full factorial design. Question sets were designed to ensure that all items were presented an equal number of times (three times each) across the sets and were balanced in appearance and co-appearance with other items. This was done by use of a computer programme. The written introduction to the survey and the first best worst survey question are presented in Figure 1.

In order to enhance the validity of the questionnaire, an expert panel of five experienced RPs reviewed the factors used in the best worst questions to determine the content validity of the included factors. Wording changes were made in 12 of the items after feedback and examples were included in three of the items to make it easier for RPs to comprehend. Thereafter, two cognitive interviews (21) were conducted with experienced rehabilitation professionals while they were completing the survey. This was aimed at gaining feedback on how the participants understood the questions and to check for misunderstandings. Feedback on the interviews was considered and integrated into the survey where appropriate. Lastly, a pilot study was conducted on 11 participants. The instructions to the best-worst questions in the survey was adapted after the pilot to aid comprehension and one survey question was deleted.

You will now be presented with 24 different sets of 6 factors that all influence the recommendation of AT to children (birth to 6 years) to a certain extent. For every group of 6 factors, please select the factor that you consider to have the **least influence** and the factor that you consider to have the **most influence** on your recommendations.

The same factors will be presented to you in different combinations to determine how you perceive their influence. There are no right or wrong answers. If you are employed in more than one setting, focus your answers on the setting where you are most involved in the recommendation of AT to young children.

For this group of 6 factors, please select the factor that you consider to be **least influential** and the factor that you consider to be the **most influential** in your recommendations.

Least influential		Most influential
<input type="radio"/>	The family's skill and experience with AT	<input type="radio"/>
<input type="radio"/>	Expectations that professionals (e.g. teachers) have of AT for a child	<input type="radio"/>
<input type="radio"/>	The availability of the AT for the child to try out	<input type="radio"/>
<input type="radio"/>	Your approach to assessment, e.g. where or how you do assessments	<input type="radio"/>
<input type="radio"/>	The child's attitude toward AT	<input type="radio"/>
<input type="radio"/>	Availability of funds for AT, e.g. through fundraising or family funds	<input type="radio"/>

Figure 1. *Introductory question and example of a best worst survey item. Note: Figure replicated from Van Niekerk [10, p.338].*

Procedures

All professionals from the four professional groups were sent an electronic invitation via Qualtrics (an online survey tool) to participate in the study electronically, with an individualised link to the survey included in the email. The survey started with an electronic information letter and required consent from the participant in order to continue. One week after the initial email, a follow up email with the link to the survey was distributed. All participants who completed the survey after the first invitation, or

who wrote to the researcher indicating that they were not eligible to participate in the survey, were removed from the mailing list for the second invitation.

Participants were able to complete the survey on mobile phones, tablets or computers, and could do so using any operating system (e.g., Android or iOS). Progress in the survey was saved, so participants could return to it later.

Data analysis

Results of the best-worst items were obtained by calculating the number of times each item was selected as most influential across the entire sample. Each item could be selected by each participant as most influential a total of three times across the survey. The totals obtained enabled the researchers to sort the items in terms of the frequency of selection as most influential across the survey and across the entire sample.

Results

The results for the rank order of factors across all participants in the sample can be viewed in Table 3 and are presented in terms of the factors of the adapted ATD framework.

Environmental factors: Cultural context

Culture is referred to as "... a system of learned patterns of behaviour" (22). These behavioural patterns are "shared by members of the group rather than being the property of an individual" (22). In terms of the influence of the cultural context on AT selection, participants viewed the importance that the child's culture attributed to independence (ranked in 22nd position) as more influential than their beliefs pertaining to the cause of the child's disability (43rd position).

Running head: PROFESSIONALS' PERSPECTIVES ON AT PROVISION

Table 3. *Results of the best-worst items according to components of the theoretical frameworks*

Component of theoretical framework	Factors of the theoretical framework	Item number	Item	Rank
Cultural context	Cultural context (general)	1	Beliefs regarding the cause of disability held by e.g. yourself or the family	43
	Cultural context (general)	2	Importance attributed to independence within the child's culture	22
Social context	Attitudes of parent/family/caregivers	3	The family's attitude toward AT	18
	Attitudes of (other) professionals	4	The attitudes of the professionals that will assist in the implementation of the AT	30
	Attitudes of the child	5	The child's attitude toward AT	13
	Attitudes of the professional (themselves)	6	Your own attitude toward AT	45
Institutional context	Social acceptability	7	The social acceptability of the recommended AT	36
	Practices and practice barriers	8	Current AT practices at the school the child attends/would like to attend	27
	Policy	9	Policies related to AT recommendation/provision applicable to your place of work	39
	Guidelines	10	Guidelines related to AT recommendation/provision implemented at your place of work	32
	Practices and practice barriers	11	Practice barriers related to AT recommendation, e.g. long waiting lists, excessive red tape, the fragmented nature or services	24
Physical context	Financial provision	12	Financial provision for AT, e.g. through tender policy, medical aid	17
	Home/school/hospital/community	13	The characteristics of the physical environment where the child will use the AT, e.g. home, school, community	9
	Home/school/hospital/community	14	Availability of electricity in the home, school and community	47
Knowledge and Information	Home/school/hospital/community	15	Crime rate in the community	48
	Knowledge and training of professionals	16	Your knowledge and training in recommending/providing AT	28
	Self efficacy of professionals	17	Your sense of confidence when recommending/providing AT	40

Component of theoretical framework	Factors of the theoretical framework	Item number	Item	Rank	
Resources	Skill and experience of professionals	18	Your technical expertise and experience in recommending/providing AT	23	
	Resourcefulness of professionals	19	Your resourcefulness in recommending/providing AT solutions	25	
	Knowledge of parents/family/caregivers	20	The family's knowledge of AT	42	
	Skills and experience of parents/family/caregivers	21	The family's skill and experience with AT	31	
	Training of parents/family/caregivers	22	The opportunity/possibility to train families on AT	26	
	Financial	23	Availability of funds for AT, e.g. through fundraising or family funds	11	
	Professional/paraprofessional support	24	Availability of ongoing professional/paraprofessional support for child after AT has been acquired/provided	12	
	Social support	25	Social support, e.g. from friends or relatives available to families and children using AT	21	
	Teamwork between professional and family	26	Availability of a team to work with during the recommendation/provision of AT	35	
	Expert/ mentor	27	The support/opinion of your mentor in recommending/providing AT	44	
	Time	28	Availability of time for recommending/providing AT, including e.g. time for assessment or discussions with family	34	
	Families	29	The family's ability to support the implementation of the AT	5	
	Expectations	Expectations of parents/family/caregivers	30	Expectations of the family regarding AT for a child	15
		Expectations of the professional (themselves)	31	Your expectations related to AT for a child	41
Expectations of (other) professionals		32	Expectations of professionals (e.g. teachers) of AT for a child	37	
Preference	Preference of the child	33	The child's preference regarding AT	29	
	Preference of the parents/family/caregivers	34	The family's preference regarding AT	38	
	Preference of the professional	35	Your preference regarding AT	46	
Assessment	Activity and participation	36	Activities that the child should/would like to participate in	7	

Component of theoretical framework	Factors of the theoretical framework	Item number	Item	Rank
AT	Child characteristics	37	The child's current abilities and skills	2
	Assessment of needs: family needs	38	Needs mentioned by the family	8
	Assessment of needs: perceived needs of child	39	Needs of the child	1
	Therapy goals	40	Your therapy goals for the child	4
	Goodness of fit	41	The match between the child and the AT	3
	Assessment approach of provider	42	Your approach to assessment, e.g. whether you do assessments at the child's home or at your place of work	33
	Device characteristics: cost	43	Cost of the AT	14
	Device characteristics: flexibility	44	The possibility for the AT to "grow with the child"	10
	Availability for trial	45	The availability of the AT for the child to try out	16
	Device characteristics: ease of maintenance, portability	46	Characteristics of the AT, e.g. ease of maintenance, portability	6
	Availability	47	Materials available to make AT at your practice/department	20
	Availability	48	Availability of AT on tender or from AT suppliers	19

Environmental factors: Social context

The social context refers to the interaction with others within the environment (23), including aspects such as attitudes and the social acceptability of the AT. Interestingly, the child's attitude towards the AT was viewed as most influential factor pertaining to the social context and was ranked 13th overall. This was followed by the attitudes of the family (18th position) and the attitudes of professionals that will assist in the implementation of the AT (30th position). The social acceptability of the AT was ranked in 36th position while participants perceived their own attitude to AT as least influential of all factors pertaining to the social context (45th position).

Environmental factors: Institutional context

The institutional context refers to "larger organisations in society" (23), such as the policies of the South African Department of Health or Department of Education. The financial provision of the institutional context (through tender policy in the public sector and medical aids in the private sector) was found to be the most influential factor in the institutional context, ranked in 17th position overall. This is not surprising as financial considerations may determine what AT may even be considered. Practice barriers were ranked in 24th position and has long been described as influential to service delivery to people with disabilities (24,25). Current practices in the school the child will attend (27th position) were perceived as more influential than both the guidelines (32nd position) and policies related to the provision of AT (39th position).

Environmental factors: Physical context

The physical context refers to the physical attributes of an environment (23). As indicated in Table 3, the participants perceived the influence of the characteristics of the physical environment where the child would use the AT as relatively important as

compared to other factors (ranked 9th overall). The availability of electricity (47th) as well as the perceived crime rate in the community (48th) were ranked as relatively less important and were in the last two positions on the list.

Personal factors: Knowledge and information

All aspects pertaining to knowledge and information for the recommending RP as well as the child and family were included. Participants viewed their own technical expertise and experience (23rd position), as well as their own resourcefulness (25th position) as the most influential personal factors pertaining to knowledge and information. The knowledge and training of the RPs in recommending/providing AT was ranked in 28th position with their sense of confidence when recommending/providing AT in position 40.

Pertaining to families, the opportunity/possibility to train families on AT was in 26th position and the family's skill and experience with AT in 31st position. The family's knowledge of AT was perceived as the least influential (42nd position) factor pertaining to knowledge and information.

Personal factors: Resources

Resources refer to all human and financial resources available through the family or the recommending RP. Interestingly, the family's ability to support the implementation of the AT was ranked in fifth position overall and the most influential factor pertaining to resources. The availability of funds (11th position) and of ongoing professional support (12th position) followed. The social support from friends or relatives was placed in 21st position and the availability of time for recommending AT was in 34th position. The availability of a team to work when recommending AT was ranked in 35th position. The support of a mentor was ranked to be in 44th position reflecting its perceived lower

influence.

Personal factors: Expectations

The child and family, as well as the RP bring expectations to the AT recommendation process. Interestingly, the RPs that participated in the study found the expectations of the family (ranked 15th overall), as well as (other) professionals involved with the family (ranked 37th), as more influential than their own expectations regarding AT for a child (ranked in 41st position).

Personal factors: Preferences and priorities

The personal preferences of the child and family, as well as the RP are shaped by their experiences, motivation, judgement and several additional factors (11) that will be different for every person. In terms of preferences, the child's preference was ranked as more influential (29th position) than the family's (placed in 38th position). Participants perceived their own preferences regarding AT as less influential (46th position) than that of the child or family.

Assessment

Six of the seven top ranked items pertained to assessment. This may be expected, as the assessment is typically the point at which different aspects considered in the AT selection process come together. The needs of the child (as perceived by the participants) was ranked in first position overall. In second position was the child's current abilities, with the match between the child and the AT in third position overall. The participant's therapy goals for the child (fourth position), the activities that the child would like to participate in (seventh position) as well as the needs of the family (eighth position) were all highly ranked. The RP's approach to assessment (33rd

position) was the only factor pertaining to assessment that was not placed in the top 10 items.

AT

Six of the seven factors pertaining to the AT itself were ranked within the first twenty factors. The characteristics of the AT (e.g. portability or ease of maintenance) was ranked in sixth position overall in terms of its influence on the AT provision process. The ability of the AT to grow with the child was ranked in 10th position. Furthermore, the cost of the AT (14th position) as well as the ability of the AT for the child to try out (16th position) was viewed as relatively influential. The availability of AT on the South African government tender or from AT suppliers was placed in 19th position and the availability of materials to make AT in 20th place.

Discussion

The data illustrate the complexity of factors that have an influence on the selection and provision of AT to young children in the South African context. All the different factors were identified as most influential in certain instances, confirming their proposed inclusion in the ATD Selection framework.

Environmental influences on the selection and provision of AT in a resource-limited context is often described as substantial (6,26–28) and is typically viewed as a barrier to the provision of any rehabilitation services (25,29,30). Although factors such as the crime rate in the community and the availability of electricity were mentioned as influential by RPs in the focus groups conducted in the second phase of the overall study (8), these factors were viewed as relatively less influential by survey respondents when compared to other factors. Factors pertaining to assessment and the assistive

technology itself were generally regarded as more influential than environmental factors.

Contrary to what may have been expected, the ability of the family to support the implementation of the AT was viewed as the most influential resource. While financial and other resources may be limited, RPs seem to recognise the family as an important strength. The recognition of the important influence of the family suggests that RPs subscribe to a strengths-based perspective. Partnering with the family has long been described as vital in order to ensure implementation of AT (e.g. 28,29).

As the worldwide focus has shifted towards doing more with less, the results of this study may provide RPs in well-resourced contexts with insight into the mind-set of professionals that are used to working with limited resources. RPs in the South African context are used to an environment where creativity and resourcefulness are essential. Versatile AT that can adapt and grow with the child is selected to ensure the longest possible usefulness.

Although the results indicated that RP find the attitudes and preferences of children highly influential, these aspects may easily be overlooked during formal AT assessment. Tools to guide RPs in determining child preference and attitudes towards AT should be developed. Additionally, children may be involved in the design of AT to ensure it matches their preferences (33–35).

Interestingly, the perspectives of the RPs regarding the influence of their own attitudes, their own preferences and priorities, as well as their own expectations were all ranked lowest in their respective categories (social context, priorities and preferences and expectations). Although these aspects are influential on any task requiring professional reasoning (12,36), this did not seem to be reflected in the responses of the participants. This may, at least in part, be attributed to the absence of the pertinent

inclusion of the RP themselves in several of the commonly used theoretical frameworks (often utilised in training) pertaining to AT selection. RPS may therefore not be encouraged to reflect on the influence that their own perspectives, attitudes, and possible biases may have on AT selection. This may point towards the importance of adapting theoretical frameworks for AT selection so that they pertinently include the influence of the RP, thereby encouraging more reflective practice (37).

While this study provides insight as to the perceptions of RPs regarding the factors that influence AT selection, it does not provide data on the actual AT selection practices of RPs. This is a limitation, because perceptions and actual practices may not always coincide. Furthermore, the perceived relative importance of different factors may be influenced by case-specific information that was not included in this study. Further studies may focus on identifying how the relative influence of different factors may change depending on different cases. In addition to these aspects, the low response rate and challenges experienced with determining the exact population size and drawing a representative sample of the target population may limit the generalisability of the results.

Conclusions

The findings from this study illustrate the complexity of the AT selection process and provide insight into how South African RPs quantify the influence of different factors on their AT selections. The results may be useful to RPs in different contexts by expanding awareness of influencing factors and shedding light into how RPs providing services in contexts with limited resources conceptualise AT selection. Additionally, the study illustrates the need to adapt the ATD Selection Framework (11) for application to young children in a resource limited context.

Declaration of interest

The authors report no conflict of interest.

References

1. Bernd T, Van Der Pijl D, De Witte LP. Existing models and instruments for the selection of assistive technology in rehabilitation practice. *Scand J Occup Ther.* 2009;16(3):146–58.
2. Henderson S, Skelton H, Rosenbaum P. Assistive devices for children with functional impairments: Impact on child and caregiver function. *Dev Med Child Neurol.* 2008;50(2):89–98.
3. Friederich A, Bernd T, De Witte L. Methods for the selection of assistive technology in neurological rehabilitation practice. *Scand J Occup Ther.* 2010;17(4):308–18.
4. Webb EJD, Lynch Y, Meads D, Judge S, Randall N, Goldbart J, et al. Finding the best fit: Examining the decision-making of augmentative and alternative communication professionals in the UK using a discrete choice experiment. *BMJ Open.* 2019;9(11):1–12.
5. Visagie S, Eide AH, Mannan H, Schneider M, Swartz L, Mji G, et al. A description of assistive technology sources, services and outcomes of use in a number of African settings. *Disabil Rehabil Assist Technol.* 2016;0(0):1–8.
6. Matter R, Harniss M, Oderud T, Borg J, Eide AH. Assistive technology in resource-limited environments: a scoping review. *Disabil Rehabil Assist Technol* [Internet]. 2017;12(2):105–14. Available from: <http://www.tandfonline.com/doi/full/10.1080/17483107.2016.1188170>
7. Eide AH, Øderud T. Assistive technology in low-income countries. In: MacLachlan M, Swartz L, editors. *Disability & international development:*

- Towards inclusive global health. New York: Springer; 2009. p. 149–60.
8. van Niekerk K, Dada S, Tönsing K. Influences on selection of assistive technology for young children in South Africa: perspectives from rehabilitation professionals. *Disabil Rehabil* [Internet]. 2017;41(8):1–14. Available from: <https://doi.org/10.1080/09638288.2017.1416500>
 9. van Niekerk K, Dada S, Tönsing K, Boshoff K. Factors perceived by rehabilitation professionals to influence the provision of assistive technology to children: A systematic review. *Phys Occup Ther Pediatr*. 2018;38(2):168–89.
 10. Van Niekerk K. Perspectives of rehabilitation professionals on assistive technology provision for young children with disabilities in South Africa. University of Pretoria; 2019.
 11. Scherer M, Jutai J, Fuhrer M, Demers L, Deruyter F. A framework for modelling the selection of assistive technology devices (ATDs). *Disabil Rehabil Assist Technol* [Internet]. 2007 Jan 9;2(1):1–8. Available from: <http://www.tandfonline.com/doi/full/10.1080/17483100600845414>
 12. Boyt Schell B. Professional reasoning in practice. In: Blesedell Crepeau E, Cohn E, Boyt Schell B, editors. *Willard & Spackman's Occupational Therapy*. 11th Ed. Baltimore: Wolters Kluwer Health/Lippincott Williams & Wilkins; 2009. p. 314–27.
 13. Auger P, Devinney TM, Louviere JJ. Using best-worst scaling methodology to investigate consumer ethical beliefs across countries. *J Bus Ethics*. 2007;70(3):299–326.
 14. Webb EJD, Meads D, Lynch Y, Randall N, Judge S, Goldbart J, et al. What's important in AAC decision making for children? Evidence from a best–worst scaling survey. *AAC Augment Altern Commun* [Internet]. 2019;35(2):80–94.

Available from: <https://doi.org/10.1080/07434618.2018.1561750>

15. Lee JA, Soutar G, Louviere J. The best-worst scaling approach: An alternative to Schwartz's values survey. *J Pers Assess.* 2008;90(4):335–47.
16. Marley AAJ, Louviere JJ. Some probabilistic models of best, worst, and best-worst choices. *J Math Psychol.* 2005;49(6):464–80.
17. Wilcox MJ, Guimond A, Campbell PH, Weintraub Moore H. Provider perspectives on the use of assistive technology for infants and toddlers with disabilities. *Topics Early Child Spec Educ.* 2006;26(1):33–49.
18. Lahm EA, Sizemore L. Factors that influence technology decision making. *J Spec Educ Technol.* 2002;17(1):15–26.
19. Ali S, Ronaldson S. Ordinal preference elicitation methods in health economics and health services research: Using discrete choice experiments and ranking methods. *Br Med Bull.* 2012;103(1):21–44.
20. Mühlbacher AC, Zweifel P, Kaczynski A, Johnson FR. Experimental measurement of preferences in health care using best-worst scaling (BWS): theoretical and statistical issues. *Health Econ Rev* [Internet]. 2016;6(1):5. Available from: <http://healtheconomicsreview.springeropen.com/articles/10.1186/s13561-015-0077-z>
21. Collins D. Pretesting survey instruments: An overview of cognitive methods. *Qual Life Res.* 2003;12(3):229–38.
22. Krefting LH, Krefting DV. Cultural influences on performance. In: Christiansen C, Baum C, editors. *Occupational therapy.* Thorofare, New York: SLACK; 1991.
23. Cook AM, Polgar JM. *Cook & Hussey's Assistive Technologies.* 3rd ed. St. Louis, Missouri: Mosby Elsevier; 2008.

24. Neille J, Penn C. Beyond physical access: A qualitative analysis into the barriers to policy implementation and service provision experienced by persons with disabilities living in a rural context. *Rural Remote Heal.* 2015;15(3):1–15.
25. van Stormbroek K, Buchanan H. Novice occupational therapists: Navigating complex practice contexts in South Africa. *Aust Occup Ther J.* 2019;66(4):469–81.
26. Van Niekerk K, Tönsing K. Eye gaze technology: A South African perspective. *Disabil Rehabil Assist Technol.* 2015;10(4).
27. Schlünz GI, Gumede T, Wilken I, Van Der Walt W, Moors C, Calteaux K, et al. Applications in accessibility of text-to-speech synthesis for South African languages: Initial system integration and user engagement. In: *ACM International Conference Proceeding Series.* 2017.
28. Tönsing KM, van Niekerk K, Schlünz GI, Wilken I. AAC services for multilingual populations: South African service provider perspectives. *J Commun Disord [Internet].* 2018;73:62–76. Available from: <http://www.sciencedirect.com/science/article/pii/S002199241730062X>
29. Wegner L, Rhoda A. The influence of cultural beliefs on the utilisation of rehabilitation services in a rural South African context: Therapists' perspective. *African J Disabil.* 2015;4(1):1–8.
30. Ned L, Cloete L, Mji G. The experiences and challenges faced by rehabilitation community service therapists within the South African primary healthcare health system. *African J Disabil [Internet].* 2017;6(0):1–11. Available from: <http://www.ajod.org/index.php/ajod/article/view/311>
31. Judge S, Parette HP. Family-centered assistive technology decision making. *transdisciplinary J.* 1998;8(2):185–205.

32. Bailey R, Stoner JB, Parette Jr HP, Angell ME. AAC team perceptions: Augmentative and alternative communication device use. *Educ Train Dev Disabil* [Internet]. 2006;41(2):139–54. Available from: <http://www.jstor.org/stable/23880176>
33. Allsop MJ, Holt RJ, Levesley MC, Bhakta B. The engagement of children with disabilities in health-related technology design processes: identifying methodology. *Disabil Rehabil Assist Technol*. 2010;5(1):1–13.
34. Light J, Page R, Curran J, Pitkin L. Children's ideas for the design of AAC assistive technologies for young children with complex communication needs. *AAC Augment Altern Commun*. 2007;23(4):274–87.
35. Magnier C, Thomann G, Villeneuve F. Seventeen projects carried out by students designing for and with disabled children: Identifying designers' difficulties during the whole design process. *Assist Technol*. 2012;24(4):273–85.
36. Chapparo C, Ranka J. Clinical reasoning in occupational therapy. In: Higgs J, Jones M, Loftus S, Christensen N, editors. *Clinical reasoning in the health professions*. 3rd ed. Philadelphia: Elsevier Ltd; 2008. p. 265–77.
37. Jayatilleke N, Mackie A. Reflection as part of continuous professional development for public health professionals: A literature review. *J Public Health (Bangkok)*. 2013;35(2):308–12.