THE RELATIONSHIP BETWEEN THE LEVEL OF PARTICIPATION AND THE USE OF ASSISTIVE DEVICES BY PHYSICALLY DISABLED ZAMBIAN ADOLESCENTS AND YOUNG ADULTS (10-24 YEARS): AN EXPLORATORY STUDY

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Abstract

Purpose: The objective of this research is to determine the participation of physically disabled Zambian adolescents and young adults (10-24 years) with and without assistive devices and provide insight in their experienced barriers and facilitators towards that participation.

Design: A three-months during cross-sectional and quasi-experimental study was conducted in Zambia. Adolescents and young adults with different physical disabilities at their lower extremities (i.e., paralysis, amputation or deformity of congenital or traumatic nature) were divided into two groups. The participants that use assistive devices were assigned to the assistive device group (AD-group) whereas participants that do not use assistive devices were assigned to the non-assistive device group (non-AD-group). For both groups, the participation was determined in a quantitative part of the study using the Child and Adolescent Scale of Participation (CASP), which were extended with demographic information and sample characteristics. In order to interpret the participation scores, open-ended questions (i.e., qualitative part of the study) were asked about the experienced barriers and facilitators towards participation.

Results: In total, 42 participants completed the questionnaire, of which most were female (57%) students (93%) going to secondary school (55%). The age of the participants range from 10-26 years (*Mean*=17.6, *SD*=4.3). The level of participation, on average, of the non-AD-group (n=8, *Mean*=85.0, *SD*=13.9, *CI*=73.4-96.7) was 3.2 points higher than that of the AD-group (n=34, *Mean*=81.8, *SD*=10.5, *CI*=78.2-85.5). The most frequently reported barriers towards participation were body limitations (n=20) and stigma (n=10), whereas participants reported assistive devices (n=15) and positive environmental attitudes (n=17) to be facilitators.

Conclusion: This study was the first to ever be conducted in a developing country that focused on the relationship between assistive devices and participation. In contrast to prior research in high-income country, this study shows a higher level of participation in the non-AD-group. Research design, selection bias and small sample size are probably the underlying causes of this result. Nevertheless, assistive devices were reported as facilitators towards participation and figure as a precondition for positive environmental attitude.

KEYWORDS: Participation – Adolescents – Young Adults - Assistive devices – Zambia – Child and Adolescent Scale of Participation (CASP).

1. INTRODUCTION

This study is established with collaboration of the Liliane Foundation, a Dutch non-governmental organisation, in order to gain insight in the effect of assistive devices on the level of participation. The Liliane Foundation's core value is participation and they are trying to improve the level of participation of children and adolescents in developing countries by all means. Historically, they provided, based on the medical model of disability, assistive devices that were designed to fix, reduce or replace bodily function and thereby reduce one's impairment of physical and psychosocial conditions, therefore increasing the opportunity to participate. Recently, however, the World Health Organisation (WHO) published a new perspective on disability, which lays more attention on the role of the social environment. In a more social approach stated that it is not someone's physical limitation, but the environment that makes someone

disabled. In the light of the new perspective on disability the Liliane Foundation is interested which strategy (i.e, based on the medical or social model of disability) results in the highest level of participation. Therefore this study is conducted to provide insights in the effect of assistive devices on the level of participation.

Approximately 150-200 million children and adolescents have a disability and constantly experience barriers such as social isolation, poverty and discrimination, which effect their enjoyment of their basic human rights[1–3]. Even though their rights are included throughout the Convention of the Rights of the Child (CRC) and the Convention of the Right of People with a Disability (CRPD), they are expelled of meaningful participation because of their age, background or disability[4]. Furthermore stigma, beliefs and prejudices contribute as barriers to education, employment, health care and participation[7]. Unfortunately, the ability of adolescents with disabilities are overlooked, their capacities underestimated and their needs given lower priority[1,5–7]. All these reasons result in a decline in the development of adolescents[8,9].

In order to improve the health, well-being and development of adolescents, they need to participate[10]. Increasing the participation in education, work and community life reduces the poverty and vulnerability of peo ple in developing countries[11]. For adolescents with a disability whose needs are not met within child or adult programs, this participation is complicated because during this important period of development they feel ashamed and have difficulties to make contact or stay in relationship with peers[12].

Participation is defined by the World Health Organisation (WHO) as: 'involvement in a life situation' and is an important indicator of health and well-being and is increasingly defined as the key outcome of rehabilitation. The lack of consensus in the definition of participation results in a scattering of different concepts and meanings and generated difficulties to operationalization and measuring participation[13,14]. In literature, the most agreed way to operationalize participation is with use of the International Classification of Functioning, Disability and Health (ICF). The ICF is a biopsychosocial model that uses a standardized, neutral language to describe 'every health condition'. This broad and extensive model is difficult to use and requires special training in order to make use of its full potential. Alternatively, a questionnaire that does not require special training but has a good correlation and covering of the elements of the ICF can be selected and used to measure participation.

A solution for disabled adolescents with reduced participation can be assistive devices that critically bridge the disparity between adolescents with and without disabilities [15]. The purpose of assistive devices is to compensate for, relieve or neutralize impairment, activity limitations and participation restrictions[16]. It is beneficial to classify the various types of assistive devices based on the product intended use. This can be done with the ISO 9999 and creates opportunity to conclude if certain classes of product intended use contribute to higher levels of participation.

According to findings from studies in high-income countries, assistive devices have been reported to reduce the need for formal support services[1], reduce

Zambian Healthcare system

The Republic of Zambia is a lower middle income country in Southern Africa. It has a population of 14 million with an average life expectancy at birth of 57 years[29]. Of this population 60% is living below the poverty line of one dollar a day[24]. The Zambian health care system is decentralised on a district level and has a cost sharing system through users fees with exemptions for children under five, elderly over 65 and for certain priority services. Zambia ratified the CRPD on the 9-5-2008 and thereby acknowledges the rights of people with a disability and should improve the provision of assistive devices. Nevertheless most assistive devices are paid by charity based organisations, disabled people organisations or out of pocket [29].

the time and physical burden for caregivers[17], reduce the difficulties of task performance[17] and create opportunities for education and work[14]. Investment in provision of assistive devices can reduce health-care costs and economic vulnerability, prevent falls, injuries, further impairments and premature death[18,19] as well as increase productivity and quality of life[20].

Presumably some of these positive effects will hold true in developing countries but the access to assistive devices is very restricted. Only 5-15% of people who require assistive devices in low and middle income countries have access to them[19,21]. As a consequence of ratifying the CRPD countries have the responsibility to ensure the development, supply and support of assistive devices[19,22]. This is often not the case and when there are assistive devices they lack quality, replacement parts, production facilities, trained personnel, support and services delivery systems [19]. Furthermore, supply and provision to rural areas are difficult to realize because of the infrastructure. Normally, in developing countries there is no individual assessment, selection, fitting, training or follow-up to ensure safe and efficient use [11]. This situation is aggravated by the fact that cultural, social, environmental and personal factors and beliefs are not taken into consideration. This, combined with the infrastructure and reduced accessibility of the environment, which is a prerequisite for assistive devices such as wheelchairs, increases the probability of mismatch and abundance of the product[11,23]. Thereupon the rapidly changing body of adolescents' results in a constant need of adjustment making the situation even more harrowing.

Although, as suggested in the medical model, assistive devices try to reduce one's physical and psychosocial limitation, it centres attention on what is lacking, eroding the humanity of the person and disregarding the person's right[24]. Because of the lack of provision and the unknown positive relationship in developing countries, it seems better to adopt a more social approach towards disability. In the social model, disability is seen as an outcome of the interaction between a person with a disability and attitudinal and environmental barriers that hinder their full and effective participation in society[24]. The social model tries to contribute to removing negative notions attached to persons with a disability, drawing attention to the disabling environment instead of the personal limitations.

All in all, there is lack of knowledge on the prevalence, severity and impact of adolescents with a disability in developing countries and the effect of assistive devices on their level of participation. Therefore, the objective of this study is to determine the level of participation of physically disabled adolescents and obtain insights in the experienced barriers and facilitators towards participation. This study is carried out in Zambia and can be seen as a case study for developing countries. Zambia was chosen because the official language is English, it was politically stable and the Liliane Foundation has a good, long-term relationship with their local partner organisation Cheshire Homes of Zambia. Because the Cheshire Homes were initiated to help children and adolescents with a disability, it was assumed that Zambia would be the best country to figure as a case study.

2. METHODS

2.1. LITERATURE REVIEW

Prior to this research a literature review was conducted to find a validated questionnaire that measures the level of participation (see Appendix I). Ideally, the questionnaire was freely available, had a sufficient number of items, was strongly correlated with the ICF and was specifically designed for developing countries. Unfortunately the last requirement could not be met, but based on the other requirements the *Child and Adolescent Scale of Participation* (CASP) was selected to measure the level of participation by the target group.

2.2. STUDY DESIGN

A three-month cross-sectional and quasi-experimental study was conducted in Zambia. In order to determine the effect of assistive devices, the study sample was divided into two groups whereof in one group the

participants used assistive devices (AD-group) and in the other group the participants did not use assistive devices (non-AD-group).

2.3. THE QUESTIONNAIRE

The questionnaire used in this study can be divided in a quantitative part, with only closed questions that contained demographic information, condition characteristics and the CASP and a qualitative part, with open-ended questions about the experienced barriers and facilitators towards participation. The complete questionnaire can be seen in Appendix II but the main parts are listed in the following paragraphs.

Demographic information included ten questions about the participant's place of residence, sex, age, occupation, level of education and if they were institutionalized. Furthermore, questions about the occupation and educational level of the parents were asked in order to determine the poverty social economic status of the household[25]. A detailed view of these questions can be found in Appendix II, question number 2-12.

Condition characteristics included six questions, defining the different disabilities (paralysis, amputation or deformity of congenital or traumatic nature) into three variables: 'Ability to Stand', 'Number of Leg(s) Affected' and 'Treatment'. The participants of the AD-group needed to specify their (most important) assistive devices by pointing to one of the eight illustrated assistive devices. If the assistive device was not illustrated the option 'others' was selected and specified. The participants of the non-AD-group were asked if they had a history with assistive devices. If this was true, they needed to clarify which type of assistive device they had had and why they stopped using it. On the other hand if they did not report to have a history with assistive devices the participants were asked if they had a desire to have a certain type of assistive device and explain why they had that desire. Because none of the participants of the non-AD-group had a history with assistive device or had a desire to have one, these questions were not taken into further consideration.

The *Child and Adolescent Scale of Participation* (CASP) was used to measure the level of participation. The scale consists out of 20 items, which compares the participants of the target group with same-age peers without a disability. The participant's level of participation is scored on a 4-point scale: (4) Age-expected full participation, (3) Somewhat limited participation, (2) Very limited participation and (1) Unable to participate. The 'not applicable' option was selected if items were not relevant considering the age of the participant.

To create a deeper understanding of the level of participation all CASP items were extended with two questions. The first question asked if there was a desire to change their level of participation. Participants had three answer possibilities: (1) Yes, do it more often; (2) Yes, do it less often or (3) No, desire to change. The second question asked how often the participants were performing the activity. This question contained eight answer possibilities: (0) 'Never', (1) 'Once in last 4 months', (2) 'Few times in the last 4 months', (3) 'Once a month', (4) 'Few times a month', (3) 'Once a week', (2) 'Few times a week', (1) 'Daily'.

In order to gain insight in closed questions, the participants were asked to share their experiences by answering the open-ended questions. Besides these questions, participants were asked to name activities in which they could not participated but others without a disability can. Because these answers were similar to the answers given by the question addressing the experienced barriers, they were merged into one answer during analyses.

2.4. PILOT

Prior to the actual study the complete questionnaire was handed out in a pilot study (n=21) in order to pre-test the responses. Based on the number of unanswered questions and irrelevant answers it was concluded that participants had great difficulty with the design and extent of the questions. Furthermore it was concluded that a lot of the participants exceeded the upper age limit of adolescents (>19 years). Therefore the scope of the research was extended to young adults (19-24 years) in order to improve the age range. Hereby it was

assumed that disabled young adults experience similar barriers and facilitators towards participation. In order to improve the design and quality of the data all open-ended questions were, where possible, transformed into multiple-choice questions. Instead of a written questionnaire, an interview approach was adopted.

2.5. POPULATION

The target population in this study were Zambian adolescents and young adults (10-24 years) with disabilities in their lower extremities varying from paralysis, amputation or deformity of congenital or traumatic nature. Participants with clear visible comorbidities or mental disorders were excluded from this study.

2.6. PROCEDURE

Participants were recruited with convenience sampling from eight different institutions and organisations in four provinces of Zambia: Copperbelt, Lusaka, Eastern province and Southern province. After informed consent was obtained from the participant, caregiver or by the organisation, the data collection started with a standardized introduction to the questions in which it was highlighted that quitting was an option at all times. In the face-to-face structured interview it was possible to listen and read the questions simultaneously. The whole structured interview took about 20-30 minutes.

2.7. DATA ANALYSES

Descriptive analyses were conducted with IBM Statistics SPSS 22 for the study sample and specified for the non-AD-group and AD-group. The groups within in the independent variables, such as male for gender, were expressed in absolute numbers and by means of the percentage of the total group.

Calculating the total participation score the founder of the CASP, Gary Bedell[10], suggests merging the individual items into seven participation constructs in order to provide a deeper understanding of participation in different situations. The seven participation constructs were distinguished in four domains mainly based on environment (‘Home Participation’, ‘Neighbourhood and Community Participation’, ‘School Participation’ and ‘Home and Community Living Activities’) or three factors mainly based on the activities degree of difficulty (‘Basic Daily Living/Mobility’, ‘Advanced Daily Living’, ‘Social, Leisure and Communication’). These participation constructs were examined on reliability by determining the Cronbach alpha which was found acceptable above 0.7[26]. On the condition that the participation constructs were reliable, the participation scores of the constructs were determined to be similar to the total participation score.

The total and construct participation scores were determined by summing the applicable item responses, and divided by the maximum possible score from the applicable items. Finally this number was multiplied by 100 to conform to a 100-point scale. Higher scores indicate a greater extent of age-expected participation. A Mann-Whitney U test was used, with $p = 0.05$, to statistically examine the difference in participation scores between participants of AD-group and non-AD-group as well as the following independent variables of the demographic information and condition characteristics: ‘Sex’, ‘Occupation’, ‘Institutionalized’, ‘Ability to Stand’, ‘Number of Leg(s) Affected’. For the other variables: ‘Age groups’, ‘Residences’, ‘Education’ and ‘Treatment’ the participation scores were examined statistically with a Kruskal-Wallis H Test**.** Test assumptions of both statistical tests were examined on violation.

The qualitative part with the open-ended questions about the experienced barriers and facilitators towards participation were coded with an open coding approach by one researcher in ATLAS.ti 7 (version7.5.3) and categorized on topic and frequency.

3. RESULTS

Overall, a total of 42 participants with a physical disability in their lower extremities were included in this study. The ages of the participants range from 10-26 years (*Mean*=17.6, *SD*=4.3). Table 1 shows absolute numbers and in means of percentages of the total group for the background characteristics of all

participants, and specified the groups with and without an assistive device. Table 2 is similar to Table 1, but provides the participation scores measured with the Child and Adolescent Scale of Participation (CASP) of all groups, in terms of the mean, standard deviation and 95%-confidence interval.

3.1. PARTICIPANTS' BACKGROUND CHARACTERISTICS

Background characteristics consisting of demographic information and condition characteristics were obtained to provide information about the study sample of the target group. In general more females (57%) than males were included in the study. The majority of the participants were students (97%) going to secondary school (55%), were residences in Copperbelt (45%) and lived inside an institution (67%). Physiotherapy (74%) was the treatment provided most often. The majority of the participants had both legs affected (74%) and were unable to stand on their legs (52%).

In order to determine if the non-AD-group and AD-group are equal in distribution a comparison was made between the background characteristics of both groups (see Appendix III). The distributions differ on four independent variables: 'Sex', 'Residences', 'Institutionalized' and 'Ability to Stand'. These are flagged (*) in Table 1. Males were more strongly represented in the non-AD-group (n=6, 75%) than the AD-group (n=12, 55%). Also there were more participants out of the Copperbelt providences in the non-AD-group (n=5, 63%) than the AD-group (n=12, 35%). Furthermore, the non-AD-group was mainly represented by participants that were not institutionalized (n=5, 63%) which is in contrast with the AD-group where there were more institutionalized participants (n=25, 74%). The last different variable was 'Ability to Stand' which was a majority in the non-AD-group (n=6, 75%) but a minority in the AD-group (n=14, 41%). Notable is that there are no participants in the non-AD-group from the Southern and Eastern provinces or that received surgery or surgery and physiotherapy. The remaining variables, which are listed in Table 1, differ in absolute numbers but have similar distribution in both groups.

3.2. LEVEL OF PARTICIPATION

The 20 CASP items were used to determine the participation scores for all independent variables, specified in the non-AD-group or AD-group and can be seen in Table 2.

3.2.1. RELIABILITY PARTICIPATION CONSTRUCTS

The reliability of the participation constructs was determined with the Cronbach alpha and were found reliable if they exceed the threshold value of 0.7 [26]. The seven participation constructs were distinguished in four domains: 'Home Participation' (0.546), 'Neighbourhood and Community Participation' (0.479), 'School Participation' (0.940) and 'Home and Community Living Participation' (0.671) as well as for the three factors: 'Basic Living and Mobility' (0.609), 'Advanced Daily Living' (0.697) and 'Social, Leisure and Communication' (0.639). Six of the seven participation constructs were not found reliable and therefore no comparison was made between the participation constructs.

3.2.2. THE STUDY SAMPLE

The participation score, on average, in the study sample was 82.4 (SD=11.1) with a 95% confidence interval of 79.0-85.9. No floor effects (number of lowest possible score) were identified. However, ceiling effects (number of highest possible score) were identified twice in the non-AD-group, whereas the lowest participation score was found in the AD-group.

3.2.3. THE NON-AD-GROUP AND AD-GROUP

An objective of this research was to determine the difference in participation score between the non-AD-group and AD-group and therefore the participation score of both groups are compared with a Mann-Whitney U test. Unfortunately it was concluded that the test assumptions were violated because the distributions had different shapes and spreads(see Appendix III). Consequently, no statistical test could be performed and only the mean participation score could be compared. From analyses, it was concluded

Table 1 Background characteristics (absolute numbers and percentage) of the study sample, and specified for the non-AD-group and AD-group

	Non-AD-group (n=8)		AD-group (n=34)		Study sample (n=42)	
	N	%	N	%	N	%
Demographic information						
Sex						
*Male**	6	75	12	35	18	43
Female	2	25	22	65	24	57
Age Groups						
10-19 years	5	62	24	70	19	69
≥ 20 years	1	13	9	26	10	24
Unknown	2	25	1	3	3	7
Residences						
Copperbelt	3	38	16	47	29	45
*Lusaka**	5	63	12	35	17	40
Eastern Provinces	0	0	3	9	3	7
Southern Provinces	0	0	3	9	3	7
Occupation						
Student	6	75	33	97	39	93
Employed	2	25	1	3	3	7
Education						
Primary School	3	38	13	38	16	38
Secondary School	4	50	19	56	23	55
College	1	13	1	3	2	5
Unknown	0	0	1	3	1	2
Institutionalized						
Yes	3	38	25	74	28	67
*No**	5	63	9	26	14	33
Condition Characteristics						
Ability to stand						
*Yes**	6	75	14	41	20	48
No	2	25	20	59	22	52
Number of Leg(s) Affected						
One Leg	3	38	8	24	11	26
Both Legs	5	63	26	76	31	74
Treatment						
No Treatment	1	13	1	3	2	5
Surgery	0	0	2	6	2	5
Physiotherapy	6	75	25	74	31	74
Surgery & Physiotherapy	0	0	5	15	5	12
Unknown	1	13	1	3	2	5

** The distribution between the non-AD-group and AD-group was unequal in these independent variables. The * marks the majority in the non-AD-group, in terms of percentages of the total group.*

Table 2 The CASP participation scores of the study sample, the non-AD-group and AD-group, and specified according to background characteristics of the participants in these groups

Participation score	Non-AD-Group		AD-Group		Study sample	
	Mean ± SD	95% CI	Mean ± SD	95% CI	Mean ± SD	95% CI
Total	85.0 ±13.9	73.4-96.7	81.8 ±10.5	78.2-85.5	82.4 ±11.1	79.0-85.9
Demographic Information						
Sex						
Male	89.2 ±10.4	78.3-100.1	82.6 ±10.6	75.9-89.3	84.8±10.7	79.5-90.1
Female	72.5±20.2	-108.5-253.7	81.4 ±10.7	76.7-86.1	80.6 ±11.3	75.9-85.4
Occupation						
Student	88.4 ±10.3	77.5-99.2	82.0 ±10.6	78.3-85.8	83.0 ±10.7	79.6-86.5
Employed	75.0 ±23.6	-136.8-286.8	-	-	75.0 ±16.7	33-116.4
Age Groups						
10-19 years	88.2 ±11.5	73.8-102.4	83.5 ±11.1	78.8-88.3	84.3 ±8.3	80.1-88.6
> 20 years	-	-	78.1 ±7.9	72.0-84.2	79.2 ±8.3	73.3-85.1
Unknown	75.0 ±23.6	-136.8-286.8	-	-	75.0 ±16.7	33.5-116.4
Residences						
Copperbelt	92.1 ±7.0	74.8-109.4	83.7 ±8.2	79.3-88.1	85.0 ±8.4	80.9-89.0
Lusaka	80.8 ±16.0	60.9-100.6	80.9 ±13.0	72.6-89.1	80.7 ±13.4	73.9-87.8
Eastern Provinces	-	-	86.3 ±5.7	72.0-100.6	86.3 ±5.7	72.1-100.6
Southern Provinces	-	-	71.2 ±10.9	44.1-98.2	71.2 ±10.9	44.1-98.2
Education						
Primary School	88.2 ±11.2	60.2-116.1	84.5 ±9.5	78.7-90.2	85.1 ±9.5	80.1-90.2
Secondary School	81.6 ±18.3	52.4-110.8	81.7 ±8.4	77.7-85.78	81.7 ±10.2	77.3-86.1
College	-	-	-	-	86.8 ±3.7	53.4-120.3
Unknown	-	-	-	-	-	-
Institutionalized						
Yes	92.1 ±7.0	74.8-109.4	82.9 ±9.5	79.0-86.9	83.9 ±9.6	80.2-87.6
No	80.8 ±16.0	60.9-100.6	78.8 ±12.9	68.9-88.8	79.5 ± 13.5	71.7-87.3
Condition Characteristics						
Ability to stand						
Yes	86.2 ±15.9	69.4-102.9	85.2 ±6.7	81.3-89.0	85.5 ±9.8	80.8-90.1
No	81.6 ±7.4	14.7-148.4	79.5 ±12.1	73.8-85.2	79.7 ±11.7	74.5-84.8
Number of Leg(s) Affected						
One Leg	82.6 ±21.6	28.8-136.4	81.4 ±15.4	68.5-94.3	81.7 ±16.1	70.9-92.5
Both Legs	86.5 ±9.9	74.2-98.8	82.0 ±8.9	78.4-85.5	82.7 ±9.0	79.4-86.0
Treatment						
No Treatment	-	-	-	-	98.7 ±1.8	82.0-115.4
Surgery	-	-	76.4 ±0.05	75.9-76-8	76.4 ±0.05	75.9-76.8
Physiotherapy	81.8 ±14.5	66.6-97.0	82.7 ±10.4	78.4-87.0	82.5 ±11.0	78.5-86.6
Surgery & Physiotherapy	-	-	76.0 ±11.8	61.4-90.6	76.0 ± 11.8	61.4-90.6
Unknown	-	-	-	-	86.8 ± 3.7	53.4-120.2

that in general the CASP score in the non-AD-group (*Mean*=85.0, *SD*=13.9) was 3.2 points higher than in the AD-group (*Mean*=81.8, *SD*=10.5).

3.2.4. TYPE OF ASSISTIVE DEVICE

In order to determine if different types of assistive devices had an effect on the level of participation, a Mann-Whitney U Test between 'Wheelchair' and 'Prosthesis/Walkers/Crutches' users was performed. The Mann-Whitney U test indicated that the level of participation of the 'Prosthesis/Walkers/Crutches' group (n=15, *Mean Rank* = 22.50) was significantly higher than the level of participation of the wheelchair users (n=19, *Mean Rank* = 13.55), $U = 67.5$, z=-2.603, p = 0.008, (not corrected for ties). The effect size of this difference was medium to large ($r = 0.4$).

3.2.5. INDEPENDENT VARIABLES

Also the participants' participation scores for the different background characteristics were statistically compared, for example, to determine if males participate more than females. Before performing a statistical test, the test assumptions were examined on violation (for details of the examination see Appendix III). The results showed that the samples of three independent variables had similar distribution in the means of shape and spread, therefore not violating the test assumptions. The statistical tests were therefore executed for the following three variables: 'Education' (p=0.195), 'Residences' (p=0.178) and 'Number of Leg(s) Affected' (p=0.672, not corrected for ties). All variables did not report statistical significant results. The other variables reported violation of the test assumption and therefore it was not valid to perform a Mann-Whitney U test or Kruskal-Wallis H test.

Furthermore, it is notable that Table 1 shows more cells that contained zero participants in the non-AD-group compared with the AD-group. Similar observation can be seen in Table 2. When a cell is equal or less than two participants (Table 1), the participation scores of the independent variable have no or large confidence intervals and standard deviations (Table 2).

3.3. BARRIERS AND FACILITATORS TO PARTICIPATION

Results from the open-ended question about the experienced barriers and facilitators towards participation are provided in Table 3-4. The 11 barrier categories of which 'Body Limitations' (n=20), 'Stigma' (n=10) and 'Being in need of help' (n=9) were the most mentioned by the participants. Body limitations covered balance problems, loss of strength, pain, fatigues or difficulties with performing activities whereas stigma covered discrimination and the negative attitude towards participants with a disability. The 'Being in need of help' category merged all answers such as: "I need someone to push me", "I can't reach the top self" and "People need to lift me".

Besides barriers, information was also obtained about the facilitators towards participation and 'Positive Environmental Attitude' (n=17), 'Assistive Devices' were the most reported (Table 4). Getting help, being pushed or lifted as well as acceptation of the disability were answers that were covered within the 'Positive environmental attitude' category. Five participants expressed that being at a boarding school (i.e., modified living environment), with ramps and wheelchair access, made it easier for them to participate. Assistive devices covered all aid that reduced or replaced bodily functions such as wheelchairs or prosthesis.

3.4. EXCLUDED FROM ANALYSES

During analyses of the data it became clear that not all questions had enough distinctive power and therefore these questions were excluded for analyses. This was applicable on the questions considering the social economic status of the parents, the two extended questions on the CASP items which questioned the desire to change and how often the activities were performed and the last question of the CASP considering participation at work.

DISCUSSION

This exploratory study is unique and the first to explore the relationship between assistive devices and

Table 3 The open-coding results of the open-ended questions about experienced barriers towards participation

Barriers towards participation	N	Answers
Assistive Device	2	My artificial leg is not strong enough for jumping My wheelchair in rainy season is a challenge
Constrains	3	Money (3)
Stigma	10	People look down on me (4) People laugh at me (4) Stigma (2)
Positive Environment Attitude	3	People are helping/pushing/ lifting me (3)
Building structure	6	No access (3) Stairs(3)
Infrastructure	4	Bumps in the road (3)
Being in need of help	9	I need someone to push me (2) Help in general (4) Performing activities (3)
Body limitations	20	Body (13), such as balance (2), standing (2), tired (2), pain (2), strength (2). Activities (7) such as time(2), performing(5)
Social Exclusion	6	No friends or friends don't come visit (5) Transportation not available (1)
To Far	4	Distance is to far (3)
Transport	7	They ignore me (1) I don't fit in the bus/can't go independent (6)

Table 4 The open-coding results of the open-ended questions about the experienced facilitators towards participation

Facilitators towards participation	N	Answers
Assistive devices	15	My wheelchair is helping (9) My crutches are helping me (4) My artificial legs are helping me (2)
Positive environment attitude	17	People are helping/pushing/lifting me (12) People come to me (1) People accept me (4)
Building structures	2	At home they made a bigger doorway, no stairs and build a ramp so I can move more freely. (1) Modifications such as ramps are helping me (1)
Inclusion activities	4	Singing in a band (1) Playing wheelchair basketball (1) Working with computers (2)
Modified Living Environment	5	Being at institution with peers with disabilities (5)
Modifications	3	Special desk (1) Special lower cocking seat (1)
Treatment	4	Treatment is improving my condition (4)
Work	3	Having work makes me independent (3)

the level of participation in a developing country. After a literature review it became clear that the Child and Adolescent Scale of Participation (CASP) was the best available and suitable validated questionnaire to. measure the level of participation. The CASP was enriched with questions about the demographic information and condition characteristics of the study sample. Together, all these questions were used to determine the level of participation by Zambian adolescents and young adults with physical disability in their lower extremities with and without assistive devices. In order to interpret the participation scores, participants were asked open-ended questions about their experienced barriers and facilitators towards participation. The main result of this study showed that, on average, the participation was higher in the non-AD-group than the AD-group. There are several explanations that may explain why these result are contradicting with the findings of prior research in high-income countries. These findings stated that assistive devices are positive contributors towards participation[10]. First, the design of this study (i.e., cross sectional and quasi experimental) does not produce the ideal data that is needed to be able to measure the effect of assistive devices on the level of participation. Ideally, a prospective experimental design would have been used whereby there is a baseline participation measurement, followed by a randomly assigned assistive devices to participants and after adoption of the assistive device the study closes with another participation measurement.

Secondly, because randomisation is lacking in this study it seems very likely that it coupes with selection bias. Although this study is performed on a grass-roots level with cooperation of an extensive network with multiple local partner organisations and native Zambian people it seems that this study was not able to find the 90-95% of the people who are in need of an assistive devices but do not have access to them[27].It seems ambiguous that the eight participants of the non-AD-group represents the 90-95% group because all participants were found within a network of organisations and institutions that work with or for people with a disability. Furthermore is seems very likely that the condition of these eight participants was not severe enough to be in need of an assistive device. This may clarify the why the non-AD-group had ceiling effects and, on average, had higher participation scores compared with the AD-group. In this study the condition of the participants was only determined in terms of: 'Ability to Stand', 'Number of Leg(s) Affected' and 'Treatment'. If there were good medical records available, which is mostly the case in high-income countries, it would have been possible to precisely determine the medical condition of the participants. With this additional data it would have been easier to compare both groups on the degree of severity of the medical conditions and thereby determine if selection bias has accrued.

A timeframe of three months was set to complete the study. Besides the actual interviews used in this study, time was spent to pre-test the questionnaire in a pilot, find suitable participants and travel to the institutions, organisation and (special) boarding schools of interest. Despite the effort this timeframe was too short to include large sample size. Many man hours has been put in the convenience sampling to find suitable participants but probably it would have been easier if there were good, reliable and easy to access medical records.

Consequently, due to the small sample size, the accuracy of the measured level of participation resulted in a broad range of confidence levels and high standard deviations. This is the third possible explanation why the participation scores of the non-AD-group are lower than the AD-group. When combining Table 1 and 2 with each other, it becomes clear that when a group within an independent variable, such as males within gender, is equal or less than 1 it is not possible to determine the average participation score. This results in a blank cell in Table 2, for example the group female within the independent variable gender.

Despite that the AD-group had lower participation scores, 15 participants stated that assistive devices

helped them to participate. Even more mentioned they are a facilitator towards participation was the positive environmental attitude. Therefore it may seem more important to focus on positive environmental attitude. However, it is important to realize that assistive devices are preconditions for the environment to behave positively. In other words, people with a disability will need to have a wheelchair to be able to get pushed. Although, it has been reported in high income countries that assistive devices simplify activities and contribute positively towards participation in work, education and maintenances in health [14] this could not confirmed in this study. Due to the results of unreliable participation constructs, the comparison between 'Basic daily living/mobility' versus 'Advanced daily Living' and 'School Participation' for the non-AD-group versus the AD-group could not be made. Although it seems very likely that some of the positive effects of assistive devices will hold true in developing countries, environmental aspects need to be considered. Besides, as mentioned before, the lack of quality, services, supply and trained personnel may all affect the usability of assistive devices in developing countries.

CONCLUSION

The purpose of this study was to determine the level of participation in relationship with assistive devices and gain insight in the experienced barriers and facilitators towards the participation of adolescents and young adults with a physical disability in their lower extremities. In contrast to prior research in high-income country, this study shows a higher level of participation in the non-AD-group. Research design, selection bias and small sample size are probably the underlying causes of this result. Nevertheless, assistive devices were reported as facilitators towards participation and figure as a precondition for positive environmental attitude. Furthermore, the most mentioned barriers towards participation were body limitations and stigma and the most mentioned facilitators were positive environmental attitude and assistive devices

RECOMMENDATIONS

In order to be conclusive about the (positive) role of assistive devices on the level of participation by physically disabled adolescents and young adults in Zambia, more research will be needed. Therefore it is needed, a suggested in discussion, to adopt a prospective experimental study design. Cultural differences need to take into account when the results are extrapolated to developing countries in general. Furthermore, it is advisable for further research to take into account the effect of cross-cultural communication, language barriers and social desirable answers. Ideally, the research is carried out by Zambian researchers who speak the local languages, and are familiar with the cultural values. Besides including larger number of participants more attention should be paid to obtain good, reliable medical records. This would make it easier to compare if both groups have similar distribution. Finally, more research on the organisational structure (i.e., quality, supply, services and trained personnel), environmental aspect and personal factors (i.e., individual assessments, fitting and preferences) is advisable to gain insights in the relationship between the person with or without an assistive device and the social and environment aspects.

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APPENDIX I

THE LITERATURE REVIEW CONDUCTED IN ORDER TO FIND VALIDATED PARTICIPATION QUESTIONNAIRES

Prior to this study a literature review was conducted to find validated questionnaires that claim to measure participation. Therefore different search strategies were used to identify generic and validated instruments measuring participation for adults and children with disabilities. Both target population were used to make sure all measurements that existed could be considered when selecting the proper measurement for adolescents. The search queries were designed to first identify the questionnaires that measure participation in lower and middle income countries and then those designed for international use.

ELECTRONIC SEARCHING

Different databases were used with different combination of the following search terms: 'participation', 'impact', 'rehabilitation', 'disability', 'children', 'adolescents', 'adults', 'Asia/Africa/Latin America' and a range of synonyms for each of these terms were used. The search terms where selected to make an as broad as possible search query that was capable to capture all questionnaires and instrument developed.

Questionnaires were included if they were generic, quantitative measures of disability, activities and/or participation, quality of life (QoL), activities of daily living (ADL), wellbeing, health status or functional status, targeting adult or child populations. Instruments were eligible if they had standardised content and were self-reported by adults or children with disabilities, or a close family member or caregiver (proxy). Tools that were excluded were: disease or condition-specific, individualised tools with non-standardised content (including qualitative). Based on reliability, validity and responsiveness (sensitivity to change) only a few instrument (eight) made it through the selection phase, see Tabel 1 on the next page.

FINAL SELECTION FOR TOOL PARTICIPATION

Unfortunately no questionnaire was specially developed for a lower or middle income country. Therefore a broader international research scope was needed. The target population in the study were adolescents and because English is the official language in Zambia it was assumed that their level of English would be sufficient to fill-in a self-report questionnaire. Therefore the Child and Adolescent Scale of Participation (CASP) was selected. The CASP is a very brief, easy-to-complete questionnaire with good coverage with the International Classification Functioning of Disability and Health (ICF). The lesser is important because the ICF is arguably the best model that captures participation[28].

Table 1 An overview of the results of the literature review

#	Acronym	Concept	Purpose	Items	Rater	Total/ subscale scores	Target popin (years)	Country of origin (language)	Content	Validity
1	PEDI	Functioning	Functional assessment	≥187	Parent / clinician	Y/Y	Generic (0.5-7)	Canada	(0)	(+)
2	CASP	Participation	Intervention needs, effects program improvement and policies	20	Parent/ self-report	Y/Y	Generic, parent (3-22), self (11-17)	USA	(+++) ICF	(+)
3	CPQ	Participation	Setting goals, implement treatment program , evaluate interventions	44	Parent	Y/Y	Generic (4-6)	Israel	(++)	(+)
4	LIFE-H for children	Social participation	Design research or service implementation	64	Parent	N/Y	CWDs (5-13)	Canada	(++)	(+)
5	CHORES	Participation in household task	Clinical and research tool	33	Parent	Y/Y	Generic (6-11)	USA	(++)	(+)
6	CAPE and PAC	Participation	Information for the design and implementation of interventions	55	Self/ self with parent	Y/Y	Generic (6-21)	Canada	(++)	(++)
7	LAQ-G	Participation of children and their families	Information on impact of disability for registers, epidemiological & clinical use	46	Parent	N/Y	Generic (5-7)	UK	(+++) ICF	(+)
8	PEM-CY	Participation	examines participation in home, school and community settings and environmental factors	69	Parent		Generic (5-17)	USA & Canada		(++)

APPENDIX II

Child & Adolescent Scale of Participation (version 4.1)

Interview Rapport

1. This questionnaire is designed to create an understanding of your level of participation in comparison with others of you age **without disabilities.** Your name and answers will be used in anonymity and only for this research only.
2. This questionnaire asks questions about your participation in activities and events at home, school and community. There are also a few questions that ask about the assistive products or modifications that are used or have been done to help you participate if this is needed.
3. There are no right or wrong answers. You will have to choose and in some cases write, the answer that best describes your participation and things that help or are barriers with your participation. If you are not sure about how to answer a question, give your best guess.

Thank you!

1. Your name:……

2. Your age (in years):……..

3. Gender: ☐ Male ☐ Female

4. In which provinces do you live (most of the year)?

☐ Central (Kabwe) ☐ Copperbelt (Ndola), ☐ Eastern (Chipata)
☐ Luapula (Mansa) ☐ Lusaka (Lusaka) ☐ North-Western (Solwezi)
☐ Northern (Kasama) ☐ Southern (Livingstone) ☐ Western (Mongu)

5. Date today (dd/mm/year):……

6. What is your occupation[1]?

☐ Student, I go to school
☐ Employed, I am a ……..
☐ Unemployed, I am applying for jobs but I didn't find anything
☐ None, at the moment I am doing nothing

[1] Your occupation is what you are doing during the day

7. How long have you been in school? (in years):……
……..

8. What is your educational level?

- ☐ Primary school
- ☐ Secondary school
- ☐ College
- ☐ I do not know
- ☐ Bachelors (undergraduate degree)
- ☐ Masters (graduate degree)
- ☐ PhD
- ☐ None

9. What is your mother's highest education?

- ☐ Primary school
- ☐ Secondary school
- ☐ College
- ☐ I do not know
- ☐ Bachelors (undergraduate degree)
- ☐ Masters (graduate degree)
- ☐ PhD
- ☐ None

10. What is your mothers' occupation?
My mother is….

- ☐ A student, she goes to school
- ☐ Employed, she is a ……..
- ☐ Unemployed, she is applying for jobs but she hasn't find anything
- ☐ None, she is doing nothing
- ☐ My mother past away

11. What is your father highest education?

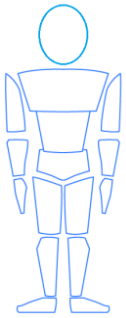
- ☐ Primary school
- ☐ Secondary school
- ☐ College
- ☐ I do not know
- ☐ Bachelors (undergraduate degree)
- ☐ Masters (graduate degree)
- ☐ PhD
- ☐ None

12. What is your father occupation:
My father is….

- ☐ A student, he goes to school
- ☐ Employed, he is a ……..
- ☐ Unemployed, he is applying for jobs but he hasn't find anything
- ☐ None, he is doing nothing
- ☐ My father past away

The next questions are focused on your disability. Please be as specific as possible

- Are you born with your condition? No? How and when did it happen?
- Do you know what your condition is called?
- Can you move your legs? Can you stand on them?



13. What is your impairment/condition at your LEFT leg?

- ☐ I have no impairment at my LEFT leg
- ☐ Amputee above the knee
- ☐ Amputee below the knee
- ☐ My LEFT leg is shorter than my right leg
- ☐ Others, namely.....
  .....
- ☐ Polio
- ☐ Crippled leg
- ☐ Paralysed
- ☐ I don't know I just cannot move it

14. What is your impairment/condition at your RIGHT leg?

- ☐ I have no impairment at my RIGHT leg
- ☐ Amputee above the knee
- ☐ Amputee below the knee
- ☐ My RIGHT leg is shorter than my left leg
- ☐ Others, namely.....
  .....
- ☐ Polio
- ☐ Crippled leg
- ☐ Paralysed
- ☐ I don't know I just cannot move it

15. Do you received in physiotherapy or medication at this moment?

- ☐ **No**
- ☐ **Yes**, namely
  - ☐ Physiotherapy,
    - ☐ How long do you receive physiotherapy (month/years)……..
    - ☐ What was the intensity
      - ☐ Every day,
      - ☐ Few times a week
      - ☐ Once a week
      - ☐ Once a month
      - ☐ Others……
  - ☐ Medication/drugs

16. Did you receive physiotherapy, medication or surgery in the past?

- ☐ **No,** skip question **17 and 18**
- ☐ **Yes**, namely
  - ☐ Physiotherapy,
    - ☐ How long did you receive physiotherapy (month/years)……
      ……
    - ☐ What was the intensity
      - ☐ every day,
      - ☐ few times a week
      - ☐ once a week
      - ☐ once a month
      - ☐ Others……
  - ☐ Medication/drugs

17. How do (or did) you go to your therapy centre?

- ☐ walking or crawled all by myself
- ☐ walking with help of assistive products such as crutches or walking frame
- ☐ with use of my wheelchair
- ☐ I was carried by someone how was walking
- ☐ public transport
- ☐ private driver
- ☐ I do not (or did not) go to my therapy
- ☐ I do have therapy, I only use medication/drugs

18. How long do (or did) you approximately need to travel to your therapy centre? (in time and kilometers)

Time.....

Kilometers.....

The next question will focus on in which activities you participate in at home, school and in the community.

You will be asked about your current level of participation in activities as compared to others of your age without a disability.

PARTICIPATION in this questionnaire is defined as: involvement in a life situation, meaning being involved and taking meaningful part in everyday activities

For each item, choose one of the following responses:

- ☐ Full participation: you participate in the activities the same as more than others of your age **without a disability**.
- ☐ Somewhat limited: you participate in the activities somewhat less than others of your age **without a disability**
- ☐ Very limited: you participate in the activities much less than others of your age **without a disability**
- ☐ Unable: you cannot participate in the activities, although others of your age do participate **without a disability**
- ☐ Not applicable: others of your age would not be expected to participate in the activities

Please select the answers by filling out an X in the right box of your answer. If you are not sure choose your best guess.

19. In general how would you describe you level of participation?

- ☐ Full participation: you participate in the activities the same as more than others of your age **without a disability**.
- ☐ Somewhat limited: you participate in the activities somewhat less than others of your age **without a disability**
- ☐ Very limited: you participate in the activities much less than others of your age **without a disability**
- ☐ Unable: you cannot participate in the activities, although others of your age do participate **without a disability**

Questions about Home participation

			Compared to others your age, what is your current level of participation in the following activities?					Would you like to change your participation in this type of activity			How often do you participate in one or more of these activities?							
			Unable	Very limited	Somewhat limited	Full participation	Not applicable	No, Change desired	Yes, Do less often	Yes, do more often	Never	Daily	Few time a week	Once a week	Few times a month	Once a month	Few time in last 4 months	Once in last 4 months
Home participation	**20.**	Social, play or leisure activities with family members at home (e.g. , games, hobbies, "hanging out")																
	21.	Social, play or leisure activities with friends at home (can include conversations on the phone or internet)																
	22.	Family task or duty, responsibilities and decisions at home (e.g., involvement in household chores and decisions about family activities and plans)																
	23.	Self-care activities (e.g., eating, dressing, bathing, using the toilet)																
	24.	Moving about in and around the home																
	25.	Communicating with others at home																

Questions about Neighborhood & Community participation

			Compared to others your age, what is your current level of participation in the following activities?					Would you like to change your participation in this type of activity			How often do you participate in one or more of these activities?							
			Unable	Very limited	Somewhat limited	Full participation	Not applicable	No, Change desired	Yes, Do less often	Yes, do more often	Never	Daily	Few time a week	Once a week	Few times a month	Once a month	Few time in last 4 months	Once in last 4 months
Neighborhood & Community participation	**26.**	Social, play, or leisure activities with friends in the neighborhood and community (e.g., casual games, "hanging out," going to public places like a movie theatre, park or restaurant)																
	27.	Structured events and activities in the neighborhood and community (e.g., team sports, clubs, holiday or religious events, concerts, parades and fairs)																
	28.	In general moving around the neighborhood and community by yourself to for example: public buildings, parks, restaurants, movies																
	29.	Communicating with others in the neighborhood and community																

Questions about School Participation

			Compared to others your age, what is <u>your current level</u> of participation in the following activities?					Would you like <u>to change</u> your participation in this type of activity			How <u>often</u> do you participated in one or more of these activities?							
			Unable	Very limited	Somewhat limited	Full participation	Not applicable	No, Change desired	Yes, Do <u>less</u> often	Yes, do <u>more</u> often	Never	Daily	Few time a week	Once a week	Few times a month	Once a month	Few time in last 4 months	Once in last 4 months
School Participation	**30.**	Educational (academic) activities with other students in your classroom at school (e.g. studying together)																
	31.	Social, play and recreational activities with other students at school (e.g., "hanging out," sports, clubs, hobbies, creative arts, lunchtime or recess activities)																
	32.	Moving around at school (e.g., to get to and use bathroom, playground, cafeteria, library or other rooms and things that are available to other students your age)																
	33.	Using educational materials and equipment that are available to other students in your classroom/s or that have been modified for you (e.g., books, computers, chairs and desks)																
	34.	Communicating with other students and adults at school																

		Questions about Home and Community living activities	Compared to others your age, what is your current level of participation in the following activities?					Would you like to change your participation in this type of activity			How often do you participated in one or more of these activities?							
			Unable	Very limited	Somewhat limited	Full participation	Not applicable	No, Change desired	Yes, Do less often	Yes, do more often	Never	Daily	Few time a week	Once a week	Few times a month	Once a month	Few time in last 4 months	Once in last 4 months
Home and Community living activities	**35.**	Household activities (e.g., preparing some meals, doing laundry, washing dishes)																
	36.	Shopping and managing money (e.g., shopping at stores, figuring out correct change)																
	37.	Managing daily schedule (e.g., doing and completing daily activities on time; organizing and adjusting time and schedule when needed)																
	38.	Using transportation to get around in the community (e.g., to and from school, work, social or leisure activities) [Driving vehicle or using public transportation]																
	39.	Work activities and responsibilities (e.g., completion of work tasks, punctuality, attendance and getting along with supervisors and co -workers)																

40. Please describe activities in which you cannot participate and others without a disability can. *Which activities would you want to be able to do?*

……

……

……

41. Please describe the type of things that are barriers why you cannot participate and that others without a disability can. *What is the main reason why you cannot participated*

……

……

……

42. Please describe the type of things that help with your participation in activities. *Think about modification that are made for you or (special) devices and products you use.*

……

……

……

43. Do you currently use any assistive product or equipment to help you participate *(for example. wheelchair, crutches, prostheses, orthoses, walking stick)*

☐ **Yes,** go to question **47 and skip question 44- 46**

☐ **No**

44. Did you have an assistive product in the past?

☐ **Yes,**

☐ **No,** go to question **47 and skip question 48-51**

45. What kind of assistive product did you have?

(9) Others namely……

46. Why did you stop using your assistive product? *More answers are possible*

☐ People made fun of me when I am wearing/using it ☐ It didn't fit properly

☐ It was hurting when I was wearing it ☐ I don't need it any more

☐ It is broke and needs to be repaired ☐ I did not like it

☐ Others namely,……

47. Would you like an assistive product?

☐ **No, b**ecause……

☐ **Yes,** *Please identify on the next page what kind of assistive products you would like. More answers possible.*

(9) Others namely……

48. What kind of assistive products <u>do you use</u>?

More answers are possible. Please identify by choice by encircle the right number. If the correct assistive product is not within these 8 examples please describe your assistive product by number 9

(9) Others namely……

49. Which assistive product is the <u>most important</u> for you?

Please encircle <u>ONE</u> number

(9) Others namely……

50. Why is this assistive product important for you? *(for example your assistive product helps you around, you are more independent, can visit friends, you can stand up like others)*

……

……

……

……

51. How often are you using <u>the most important</u>t assistive product?

- ☐ (mostly) for training or therapy
- ☐ (mostly) I wear /use it at night
- ☐ (mostly) I wear/use it during the day
- ☐ <u>Only</u> for transport to go from one place to another
- ☐ Always (during night and day)
- ☐ Other namely……

APPENDIX III

THE STATISTICAL TEST RESULTS OF THE PARTICIPANTS' PARTICIPATION SCORES FOR THE INDEPENDENT VARIABLES

Statistical tests were performed to determine the relationship between the independent variables and the participation scores. Because the data in this study was not normal distributed two non-paramedic test were used: Mann-Whitney U test and the Kruskal-Wallis H test.

MANN-WHITNEY U TEST

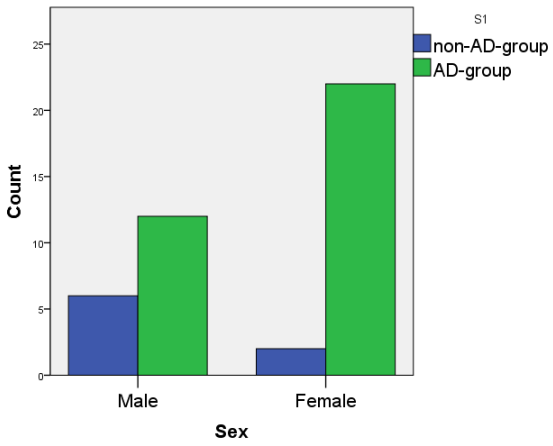
The Mann-Whitney U test was used to compare two independent samples of ordinal (ranked) data because, due to violations of the normality assumption, it was not possible to use the independent samples *t* statistic tests. Prior conduction the statistical tests, all independent variables within the background characteristics were examined on test assumption violation.

There are three assumptions that should be met when using the Mann-Whitney U test[26]. First the data of each participant should be independently obtained. This means that each participant should participate only once in the research and should not influence the participation of others. Secondly the scale of measurement of the depended variable should be at least ordinal. Third, the distributions of the data samples should look the same in shape and spread. The first two assumptions are dealt with during the research but for the third assumption histograms were generated for both groups of the independent variable, for example male and female, in the non-AD-group or AD-group. If the two distributions similar, the Mann-Whitney U test was used to compare statistically the medians of both two groups. However, if the two distributions were different, the Mann-Whitney U test was only used to compare the mean ranks[26].

KRUSKAL-WALLIS H TEST

Similar procedure as the Mann-Whitney U test was the Kruskal-Wallis H test (or Kruskal-Wallis one-way ANOVA). This test compares three or more independent samples of ordinal (ranked) data. Because the normality assumptions was violated in this study no regular one-way between groups ANOVA could be performed an instead the Kruskal-Wallis H test was used. The Kruskal-Wallis H test has the same test assumptions as the Mann-Whitney U test. If the test assumptions were not violated and the distributions are similar, the Kruskal-Wallis H test compared the medians of the participation score for the different groups within the independent variable. However, if the distribution were different, the Kruskal-Wallis H was used to compare mean ranks.

The results of the examination of the test assumptions is shown in the histograms and tables on the next pages. Herein is the information of the first seven variables were conducted with the Mann-Whitney U Test and the others with the Kruskal-Wallis H Test. The following variables differ in distribution: 'Sex', 'Institutionalized', 'Type of Assistive Device', 'Ability to stand', 'Residences' and the comparison between the non-AD-group and AD-group. For those variables it was only possible to compare the mean ranks. For the other variables; 'Occupation', 'Number of Leg(s) Affected', ; Age groups', 'Education' and 'Treatment' the means of the participation score of both group were compared.

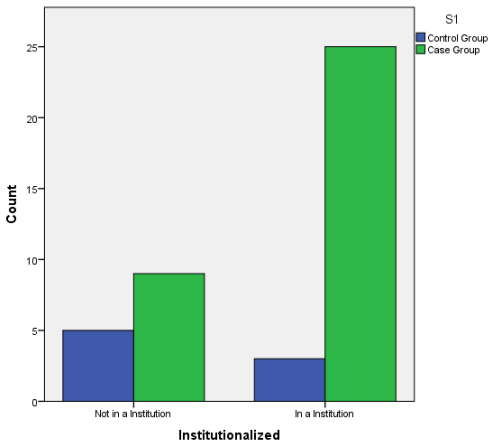


Sex	N	Mean Rank	Sum of Ranks
Male	18	23.81	428.5
Female	24	19.77	474.5
Total	42		

	Participation
Mann-Whitney U	174.5
Z	-1.056
Asymp. Sig. (2-tailed)	0.291

Occupation	N	Mean Rank	Sum of Ranks
Student	39	22.03	859.0
Employed	3	14.67	44.0
Total	42		

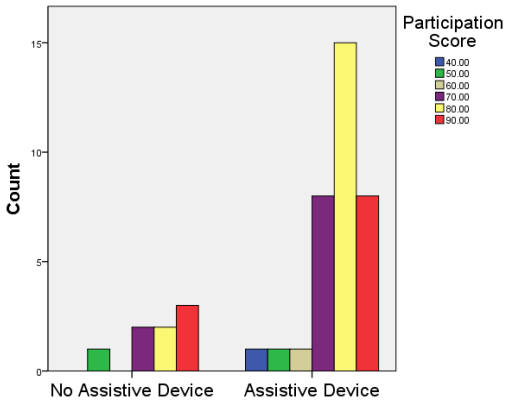
	Participation
Mann-Whitney U	38
Z	-1.002
Asymp. Sig. (2-tailed)	0.316
Exact Sig. [2*(1-tailed Sig.)]	0.345[b]



Institutionalized	N	Mean Rank	Sum of Ranks
No	14	19.14	268.0
Yes	28	22.68	635.0
Total	42		

	Participation
Mann-Whitney U	163
Z	-0.881
Asymp. Sig. (2-tailed)	0.378
Exact Sig. [2*(1-tailed Sig.)]	0.390[b]

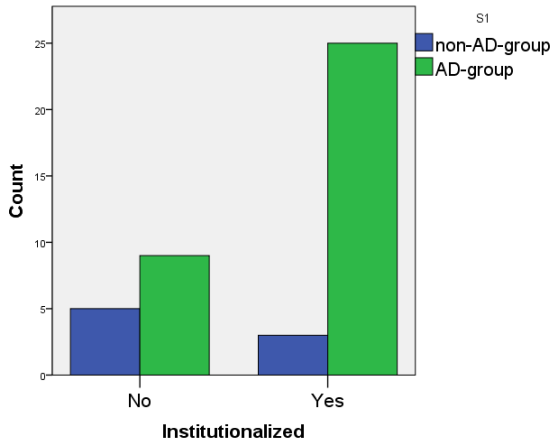
b = Not corrected for ties



	N	Mean Rank	Sum of Ranks
non-AD-group	8	25.13	201
AD-group	34	20.65	702
Total	42		

	Participation
Mann-Whitney U	107
Z	-0.930
Asymp. Sig. (2-tailed)	0.353
Exact Sig. [2*(1-tailed Sig.)]	0.368[b]

b = Not corrected for ties

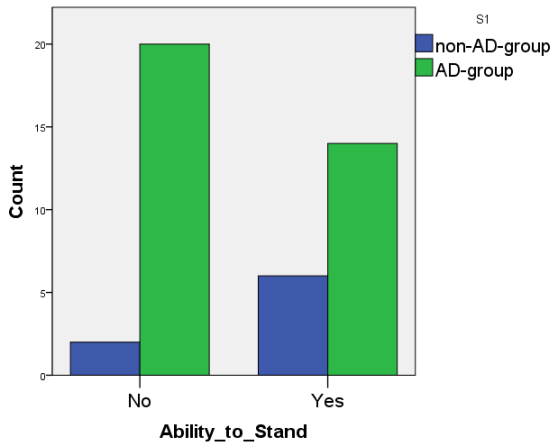


Type of assistive device	N	Mean Rank	Sum of Ranks
Wheelchairs	19	13.55	257.5
W/C/P	15	22.50	337.5
Total	42		

	Participation
Mann-Whitney U	67.5
Z	-2.603
Asymp. Sig. (2-tailed)	0.009
Exact Sig.[2*(1-tailed Sig.)]	0.008[b]

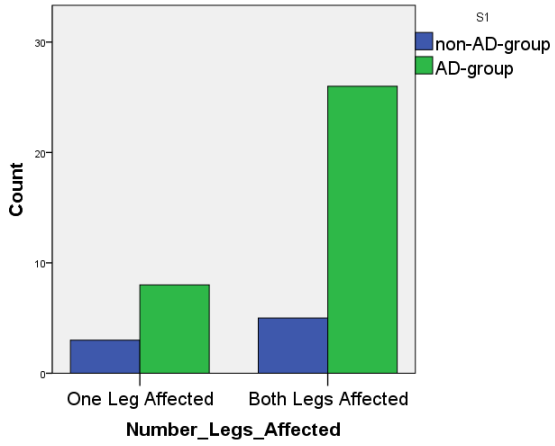
b = Not corrected for ties

Effect size	-0.446



Ability to stand	N	Mean Rank	Sum of Ranks
No	22	18.36	404.0
Yes	20	24.95	499.0
Total	42		

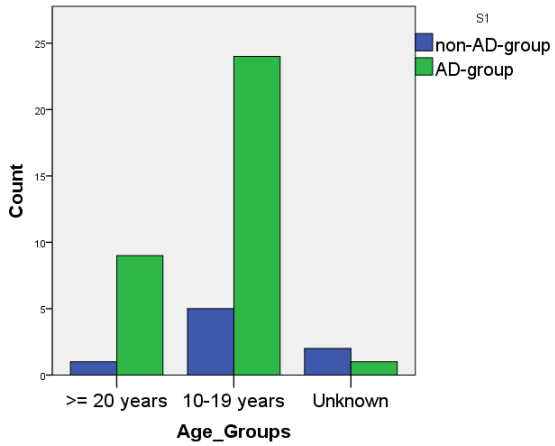
	Participation
Mann-Whitney U	151.0
Z	-1.739
Asymp. Sig. (2-tailed)	0.082



Number of Legs Affected	N	Mean Rank	Sum of Ranks
One Leg	11	22.91	252
Both Legs	31	21.00	651
Total	42		

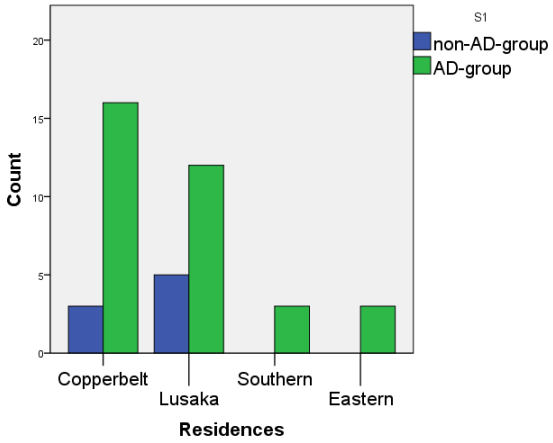
	Participation
Mann-Whitney U	155.0
Z	-0.444
Asymp. Sig. (2-tailed)	0.657
Exact Sig. [2*(1-tailed Sig.)]	0.672[b]

b = Not corrected for ties



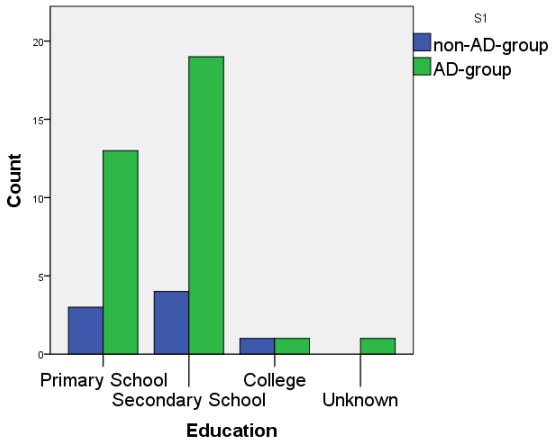
Age Groups	N	Mean Rank
10-19 years	29	23.88
≥ 20 years	10	16.65
unknown	3	14.67
Total	42	

	Participation
Chi-Square	3.591
Df	2
Asymp. Sig	0.166



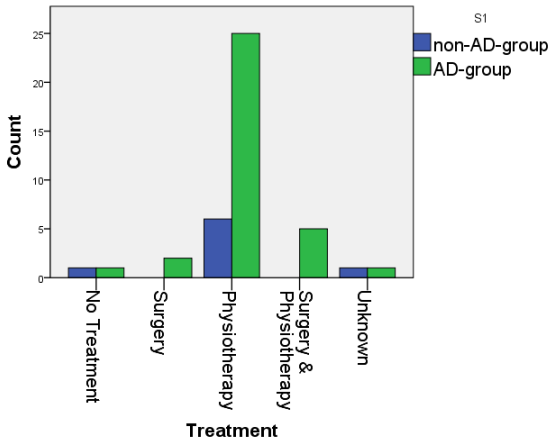
Residences	N	Mean Rank
Copperbelt	19	23.92
Lusaka	17	20.29
Southern provinces	3	8.17
Eastern provinces	3	26.33
Total	42	

	Participation
Chi-Square	4.922
Df	3
Asymp. Sig	0.178



Education	N	Mean Rank
Primary School	16	24.47
Secondary School	23	19.78
College	2	27.75
Unknown	1	1
Total	42	

	Participation
Chi-Square	4.708
Df	3
Asymp. Sig	0.195



Treatment	N	Mean Rank
No Treatment	2	40.25
Surgery	2	10.00
Physiotherapy	31	21.90
Surgery & Physiotherapy	5	13.60
Unknown	2	27.75
Total	42	

	Participation
Chi-Square	9.072
Df	4
Asymp. Sig	0.059