

Exploratory Factor Analysis of the Chilean Deafness Attitude Scale.

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Abstract: Negative attitudes mean a barrier for People with Disability (PwD), but attitudes towards Deaf people are structurally different from the rest of the PwD. The aim of this study is to evaluate the factorial structure and internal reliability of the Attitudes towards Deafness Scale (ADS) applied in health professionals from Concepcion, Chile. The ADS was translated to Spanish and back-translated to English, then reviewed by public health experts, and a pilot application was carried out to 15 health professional to make final modifications. The Chilean ADS version was applied to 182 health professional from primary care centers and academics working in health schools. Reliability analysis with estimation of the Cronbach's alpha coefficient, and exploratory factor analysis were made. The data presented adequate values to perform exploratory factor analysis (KMO=0.73; Bartlett's sphericity test $p < 0.00001$). A maximum likelihood extraction method and a Quartimax rotation method with Kaiser standardization were used for a four-factor model, in which 11 items presented loads of less than 0.5, so the final model was left with 11 items. A Cronbach's alpha coefficient of 0.70 was determined in the final model, with an alpha of 0.77 for the first factor, 0.55 for the second, 0.77 for the third, and 0.61 for the fourth. The exploratory factor analysis suggested a four-dimensional structure for ADS Chilean version. The four subscales and the scale in general presented an adequate Cronbach's alpha, suggesting acceptable internal consistency

Keywords: Attitudes, Deafness, Scale, Chile.

INTRODUCTION

There are currently 360 million people with hearing disabilities; in Chile, this represents 8.2% of the adult population with disabilities (WHO, 2015; Ministerio de Desarrollo Social, 2015). This disability is defined as a reduction or loss in the ability to perceive or process sounds (WHO, 2015, Shearer et al., 2018). Generally, people who were born deaf or lost their hearing at an early age are not assumed to be part of a group associated with disability, but as part of a linguistic minority. They participate in the Deaf community, which corresponds to a world with its own language and culture, customs, and values arising from its auditory condition. They use sign language as a means of communication of choice to interact and they call themselves "Deaf" with a capital "D". Within this area, sign language (SL) is the most significant cultural element of the Deaf community. SL presents a linguistic organization different from that of the spoken languages. SL is not universal, but varies according to the country or geographic region (Campos, 2016; Padden & Humphries, 2005; Humphries & Humphries 2010; Ladd P, 2003; De Meulder, 2015), and is recognized in more than 30 countries (De Meulder, 2015).

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Deaf people have particularities in the way they relate to the rest of society, especially due to differences in aspects of communication (Kuenburg et al., 2016; Merten et al., 2015; Emond et al., 2015). This represents a great barrier in healthcare centers, affecting the quality of healthcare delivered to these individuals, and therefore harming their health outcomes. On the other hand, health professionals have limited competencies to meet the specific needs of this population, which results in user dissatisfaction, barriers to access at different levels of prevention, and communication problems (Kuenburg et al., 2016; Merten et al., 2015; Emond et al., 2015).

Negative attitudes mean a barrier to the inclusion and personal development of People with Disabilities (PwD), with perceptions of abandonment and apathy on the part of society, with a consequent isolation, lack of self-esteem, and depression (Erting et al., 1994). These attitudes have also been evaluated in health professionals, where negative attitudes have been described, hindering the attention given to these people (Eagly & Chaiken, 2007; Patka et al., 2013). Specifically, Meadow-Orlans and Erting (Hindley & Kitson, 2000) described negative attitudes towards people with hearing disabilities. Hindley and Kitson (2000) described attitudes in which deafness generates pity and efforts to make deaf children as close as possible to hearing children.

Several instruments have been reported to measure attitudes toward PwD (Power et al., 2010; Stevens et al., 2013; Palad et al., 2016). However, according to Kiger (1997), attitudes towards Deaf people are structurally different from the rest of the PwD community. In view of this, in 2004, an instrument was created and validated to specifically measure the attitude of health professionals towards Deafness, i.e. the Deafness Attitude Scale (Cooper et al., 2004).

The aim of this study was to evaluate the factorial structure and internal reliability of the Attitudes towards Deafness Scale (ADS) applied to health professionals from Concepcion, Chile.

MATERIALS AND METHODS

The target population was comprised of 182

health professionals from the province of Concepción. The sample was obtained from: a) academics from the University of Concepción (UdeC); and b) personnel from different public primary healthcare centers (PHC). We excluded primary healthcare staff who do not perform clinical duties, and foreign professionals or native speakers of a language other than Spanish.

There is no exact number for validation studies of scales, but between 2 to 20 participants per item are recommended, with a minimum of 100-250 participants (Beaton et al., 2000). The Attitude Towards Deafness Scale is composed of 22 items, so the estimated sample size ranges from 44-440.

The ADS was developed in England by Cooper, Rose & Mason, and is composed of 22 items scored using a Likert scale of 1 to 6 points (Cooper et al., 2004). After the instrument is applied, the answers are rated 1-6 or 6-1, depending on whether the statement reflects a positive or negative attitude. A score of 6 indicates the most positive response to the affirmation and a score of 1 indicates the most negative response. This instrument has shown adequate psychometric properties with a Cronbach's alpha of 0.71. The application of the instrument takes around 10 minutes.

The translation and adaptation process was carried out according to Beaton (2000) and Sousa & Rojjanasrirat (2011). Two native Spanish-speaking professionals competent in English translated the English version into Spanish independently. The versions were coded as TE1 (translation performed by a dentist) and TE2 (translation performed by a professional translator without knowledge in the health area). Then, consensus was reached between both versions, with the support of a third bilingual professional (MPH/PhD psychologist). The translated version was back-translated by the same method, generating TI1 and TI2, respectively. Subsequently, four Chilean public health experts reviewed the process for obtaining a preliminary version of the Spanish version of the ADS. Throughout the process, feedback was maintained with the lead author who developed the scale. A pilot was carried out with 15 professionals from the University of Concepción School of Dentistry. The difficulties and problems of understanding

the scale were evaluated, and small modifications were made. The last evaluation was carried out by a group of experts, and the main author who developed the scale was consulted.

The data collection was carried out in the same PHC centers and in the health schools of the University of Concepción. There was no monetary compensation associated with participation. The professionals were selected based on accessibility. Each participant was informed of the study aim and their voluntary participation was obtained through signed informed consent. Prior to receiving informed consent from the participant, the survey was conducted anonymously, and was delivered to a mailbox by the participant, ensuring confidentiality. For the data collection in PHC, the authorization of each Director of the PHC centers was requested. Once authorized, between one and two visits were made to each health center, previously agreed with its director. For data collection at the University of Concepción, authorization was requested from each Dean of the schools. Once authorized, between one and two visits were made to each school, previously agreed with the Dean.

Data were tabulated in an Excel spreadsheet by a researcher. The analysis of the data consisted of: (i) characterization of the sample, (ii) a reliability analysis with estimation of the Cronbach's alpha coefficient and the calculation of correlations between elements and item correlations with the total score; (iii) an exploratory factor analysis, including measures of adequacy (KMO and Bartlett's sphericity test), extraction methods (principal components, maximum likelihood and main axes), and rotation (Varimax and Promax). SPSS v.23 for Windows (IBM, USA) was used for the analysis.

RESULTS

The sample consisted of 182 health professionals; the sociodemographic characterization is shown in Table 1. A Cronbach's alpha coefficient of 0.67 was determined (Table 2).

The data presented adequate values to perform exploratory factor analysis (KMO=0.73; Bartlett's sphericity test $p < 0.00001$). Through the criterion of

eigenvalues, eight dimensions were suggested (Table 3). The criterion of the sedimentation graph suggested three dimensions (Figure 1).

Different extraction and rotation methods were tested. Finally, a maximum likelihood extraction method and a Quartimax rotation method with Kaiser standardization were chosen. For this, we worked with a four-factor model according to self-explained variance criteria, sedimentation graph and eigenvalues. (Table 4)

In this model, 11 items presented loads of less than 0.5, so the final model was left with 11 items. A Cronbach's alpha coefficient of 0.70 was determined in the final model, with an alpha of 0.77 for the first factor, 0.55 for the second, 0.77 for the third, and 0.61 for the fourth.

TABLE 1. Sample characterization.

Male (%)	25.3
Female (%)	74.7
Age (years, mean, min-max)	39 (23-79)
Years on service (mean, min-max)	
Years on service for healthcare staff (mean, min-max)	10.5 (1-50)
Years on service for faculty staff (mean, min-max)	11.5 (1-47)
DDS (%)	35.2
Paramedic (%)	26.4
Nurse (%)	10.4
MD (%)	9.3
Midwife (%)	6
Nutritionist (%)	3.8
Physical therapist (%)	3.3
PsyD (%)	3.3
PharmD (%)	1.1
Speech therapist (%)	0.5
They have training on Deafness (%)	12.6
They delivered healthcare to Deaf patients	82.4

TABLE 2. Internal consistency of ADS (items in Spanish).

Items	Scale mean if item deleted	Scale variance if item deleted	Corrected item-total correlation	Cronbach's alpha if item deleted
Las personas sordas deben aprender a hablar más que aprender lengua de señas	78.4867	129.549	.599	.624
Los niños sordos deben aprender a hablar para comunicarse con sus padres oyentes.	79.4913	128.009	.491	.630
Las personas sordas son discapacitadas	79.1899	130.507	.459	.635
Las parejas de personas sordas deberían recibir consejería genética para evitar tener hijos sordos.	80.4759	137.186	.410	.646
El tener un colega sordo podría causar problemas en el lugar de trabajo.	78.9021	133.993	.362	.647
Hijos oyentes de padres sordos están en riesgo de carencia emocional.	78.1262	139.665	.358	.651
Los colegios para sordos y asociaciones de sordos crean guetos de sordos.	79.3188	137.384	.357	.650
Debe ser difícil tener un amigo sordo.	78.5654	139.085	.334	.653
Capacitar a más profesionales de la salud mental para trabajar con clientes sordos sería una pérdida de tiempo.	78.7633	139.681	.332	.653
Las personas sordas son fisiológicamente discapacitadas.	77.8847	140.224	.313	.655
Me gustaría tener más colegas sordos.	78.5518	141.256	.255	.660
Me gustaría ver más personas sordas en los clubes/sociedades a las que asisto.	80.1169	142.256	.254	.661
A todas las personas sordas se le debería ofrecer cirugía correctiva.	80.4093	141.732	.245	.661
Se debería realizar más investigación para encontrar la cura a la sordera.	81.0081	144.133	.221	.664
Las personas sordas son conductores seguros.	80.6053	145.124	.181	.668
Las personas sordas deben recibir automáticamente ayuda en su entorno familiar.	81.0710	146.773	.166	.669
Las personas sordas no deberían ser consideradas como "discapacitadas".	79.4600	144.064	.163	.670
Me gustaría tener más amigos sordos.	79.6256	150.562	.031	.681
Los niños sordos deberían ser educados en lengua de señas	77.7963	156.471	-.133	.690
Debe haber disponibilidad de intérpretes de lengua de señas para las personas sordas en el trabajo.	78.0097	157.307	-.155	.693
Las personas sordas tienen su propia cultura.	80.6052	166.680	-.382	.718

TABLE 3. Total explained variance of the scale.

Component	Eigenvalues	% Variance	% Accumulated	Total	% Variance	% Accumulated
1	4.157	18.897	18.897	4.157	18.897	18.897
2	2.506	11.390	30.287	2.506	11.390	30.287
3	1.585	7.204	37.491	1.585	7.204	37.491
4	1.393	6.334	43.825	1.393	6.334	43.825
5	1.212	5.510	49.335	1.212	5.510	49.335
6	1.111	5.048	54.489	1.134	5.154	54.489
7	1.011	4.593	59.537	1.111	5.048	59.537
8	.955	4.341	64.131	1.011	4.593	64.131
9	.793	3.606	68.472			
10	.768	3.490	72.078			
11	.746	3.391	75.568			
12	.690	3.136	78.959			
13	.653	2.969	82.095			
14	.592	2.311	85.064			
15	.508	2.068	87.755			
16	.455	2.017	90.066			
17	.444	1.851	92.135			
18	.444	2.017	94.152			
19	.407	1.851	96.003			
20	.324	1.475	97.478			
21	.291	1.323	98.800			
22	.264	1.200	100.000			

Extraction method: analysis of main components.

FIGURE 1. Sedimentation graph.

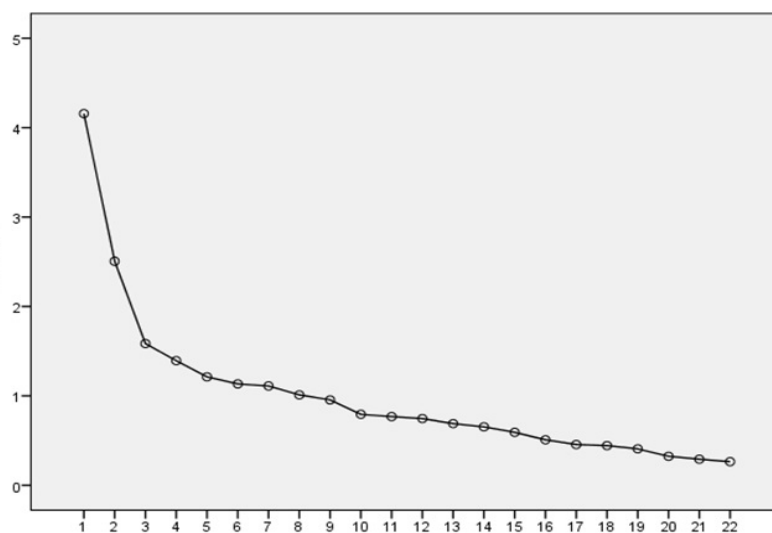


TABLE 4. Rotated Factor Matrix (items in Spanish).

Items	1	2	3	4
Me gustaría tener más amigos sordos.			.611	
Los niños sordos deberían ser educados en lengua de señas.				
Las personas sordas son conductores seguros.				
Me gustaría tener más colegas sordos.			.827	
Debe haber disponibilidad de intérpretes de lengua de señas para las personas sordas en el trabajo.				
Las personas sordas no deberían ser consideradas como “discapacitadas”.				
Me gustaría ver más personas sordas en los clubes/sociedades a las que asisto.			.630	
Las personas sordas tienen su propia cultura.				
Las parejas de personas sordas deberían recibir consejería genética para evitar tener hijos sordos.	.659			
Los niños sordos deben aprender a hablar para comunicarse con sus padres oyentes.	.716			
Los colegios para sordos y asociaciones de sordos crean guetos de sordos.				
Las personas sordas deben aprender a hablar más que aprender lengua de señas	.749			
Las personas sordas son discapacitadas.				.506
Se debería realizar más investigación para encontrar la cura a la sordera.				
Hijos oyentes de padres sordos están en riesgo de carencia emocional.				
Las personas sordas deberían aprender a leer labios	.664			
Las personas sordas deben recibir automáticamente ayuda en su entorno familiar.				
A todas las personas sordas se le debería ofrecer cirugía correctiva.				
Capacitar a más profesionales de la salud mental para trabajar con clientes sordos sería una pérdida de tiempo.				
El tener un colega sordo podría causar problemas en el lugar de trabajo		.606		
Las personas sordas son fisiológicamente discapacitadas.				.729
Debe ser difícil tener un amigo sordo.		.576		

DISCUSSION

The exploratory factor analysis suggested the elimination of 11 items of the original ADS. The remaining 11 items were adjusted to a four-dimensional structure. The four subscales and the scale in general presented an adequate Cronbach's alpha, suggesting acceptable internal consistency (Oviedo & Campo-Arias, 2005).

This study is the first to determine the internal consistency of the Spanish version of the ADS and to examine its factorial structure in a Chilean sample. The internal consistency of this adapted version of the ADS is similar to

that obtained in its original version (Cooper et al., 2004). The authors of the EAS do not mention a defined factor structure, but in this study, through exploratory analysis, four factors were identified. In the factor analysis of the Spanish version of the Multidimensional Attitudes Scale to Persons with Disabilities (MAS), they identified four factors, unlike the three initially proposed by their authors (Stevens et al., 2013; Findler et al., 2007). When performing the exploratory factorial analysis, we found a KMO different from the one reported by Laat (2013), in which a modified version of the Chedoke-McMaster Attitudes Toward Children with Handicaps scale (CATCH) was used.

According to the groups suggested in the four-factor model, the following names are proposed.

Dimension 1: "Oralism", since this covers items related to the oralist model. This model is characterized by focusing on the development of oral language in auditory PwD, where the Deaf person must speak and/or adapt to hearing people, ruling out the use of SL (Ladd, 2003; Lissi et al., 2012). Currently, it has been shown that the oralist model, which was used for years in Chile and different countries, has failed to achieve inclusion, because it has a spirit of "normalization" of Deaf people, instead of recognizing them as part of human diversity (Ladd, 2003; Lissi et al., 2012). This factor also includes item 1, which suggests that Deaf people should identify their risk of having Deaf children, which is in accordance with Middleton's findings (Middleton et al., 1998), where 55% of Deaf adults believe that genetic testing would do more harm than good. However, it contrasts with that reported by Brunger (2000), where hearing parents would agree with this type of genetic testing, as long as it is supported by counseling. Furthermore, as reported by Stern (2002), hearing parents have a more positive vision towards genetic testing than Deaf parents. In Chile, although there are various formal and informal initiatives of a sociocultural approach where the Deaf person is recognized as part of a linguistic minority, these are recent approaches, and thus the oralist model prevails (Ladd, 2003; Cuevas, 2013).

Dimension 2: "Awkward interaction", since it covers items related to the difficulty that could be experienced when interacting with Deaf people. This coincides with that reported in the international literature, where the interaction of Deaf people and health teams has been explored, revealing that health professionals report discomfort and difficulty in maintaining fluid communication with a Deaf patient (Ralston et al., 1996). In addition, they report difficulty understanding and being understood by the Deaf patient (Emond et al., 2015; Ralston et al., 1996; Iezzoni et al., 2004), who are the most complex PwD to attend due to communication barriers (Suhani et al., 2015; Bachman et al., 2006). In particular, health professionals do not feel prepared to meet their needs (Velonaki et al., 2015; Ahmad et al., 2015). On the other hand, Deaf people feel dissatisfied with access to health services due to communication barriers and lack of awareness in health service professionals

regarding the Deafness, stating that they must use a relative as interpreter, which limits their autonomy (Emond, 2015; Iezzoni et al., 2004; da Silva et al., 2011).

Dimension 3: "Social acceptance" because it refers to the ability to recognize human diversity. The items are related to the approval of the social and labor participation of Deaf people. These items would be related to the implementation of the Law on Disability (Ministerio de Planificación, 2010) and the Law on Labor Inclusion (Ministerio de Desarrollo Social, 2017) in Chile. Although it corresponds to an important dimension, many people tend to perform socially correct responses in explicit questionnaires where high social acceptability is expected. This is contrasted with what was previously reported, where the results of the Implicit Association Test (IAT) do not correlate generally with the results of the implicit scales (Wilson & Scior, 2014; Hein et al., 2011).

Dimension 4: "Vision of disability", since most people associate Deaf people as persons with disabilities, ignoring the existence of the Deaf community and the sociocultural approach with which they identify. There is extensive literature regarding the recognition of the Deaf culture and its elements, especially SL as the first language (Ladd, 2003; Lane et al., 1996). Although Chile and most of the countries currently recognize Deaf culture (De Meulder, 2015; Ministerio de Desarrollo Social, 2017), the majority of health professionals do not know about it, which is why they dominate the medical model that reduces Deaf people to a disability (Velonaki, 2015; Chaveiro, 2010).

One of the limitations of this study is the large number of professionals who refused to participate in the study, and the small sample size. Future research is proposed in order to generate an instrument that evaluates the attitudes of health professionals towards Deafness, which is adapted to the Chilean reality.

CONCLUSION

The exploratory factor analysis suggested a four-dimensional structure for ADS Chilean version. The four subscales and the scale in general presented an adequate Cronbach's alpha, suggesting an acceptable internal consistency.

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