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Daniel Pérez-Garín, Patricia Recio, Prado Silván-Ferrero, Encarnación Nouvilas and Maria José Fuster Ruiz de Apodaca

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## **How to cope with disabilities: Development and psychometric properties of the Coping with Disability Difficulties Scale (CDDS)**

Daniel Pérez-Garín<sup>1,2</sup>, Patricia Recio<sup>3</sup>, Prado Silván-Ferrero<sup>1</sup>, Encarnación Nouvilas<sup>1</sup>,  
and María José Fuster-Ruiz de Apodaca<sup>4</sup>

UNED

1. Departamento de Psicología Social y de las Organizaciones, Facultad de Psicología, C/ Juan del Rosal, 10. 28040 - Madrid, Spain.
2. Centro de Enseñanza Superior Cardenal Cisneros, División de Psicología, Calle del General Díaz Porlier, 58, 28006 Madrid
3. Departamento de Metodología de las Ciencias del Comportamiento, Facultad de Psicología, C/ Juan del Rosal, 10. 28040 - Madrid, Spain.
4. Sociedad Española Interdisciplinaria del Sida (Seisida), Calle del Dr. Fleming, 3, 28036 Madrid

Proofs, and any other correspondence concerning this article should be addressed to Daniel Pérez-Garín.

Phone number: 0034913988744

E-mail: [dapgarin@psi.uned.es](mailto:dapgarin@psi.uned.es)

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1  
2  
3 **Abstract**  
4

5 **Purpose/Objective:** The aim of this study is to develop and test the psychometric properties of  
6 the Coping with Disability Difficulties Scale (CDDS), a scale to measure the coping strategies  
7 used by people with disabilities to face the disability-related difficulties (both caused by  
8 disability itself and by stigma) they encounter in their daily lives.

9 **Method/Design:** An initial pool of 110 items was developed based on previous literature and  
10 the results of a qualitative study using semi-structured interviews. The psychometric  
11 characteristics of the CDDS were examined in three samples of people with disabilities (each of  
12 which included participants with physical, visual and hearing impairments; total  $N = 590$ ).

13 **Results:** A final scale of 17 items was obtained. The factor structure of the CDDS was tested  
14 and replicated with an adequate fit ( $RMSEA = 0.056$ ;  $GFI = 0.98$ ;  $CFI = 0.98$ ) using  
15 confirmatory factor analysis. The internal consistency of the four factors (positive thinking,  
16 social sensitization and support, adaptation, and avoidance) were adequate to excellent (with  
17 alphas ranging from .68 to .86).

18 **Conclusions/Implications:** To the authors' knowledge, this is the first coping scale that is  
19 specifically designed for people with disabilities, and it can be highly useful for both research  
20 and applied purposes.

21 **Key words:** coping, disability, scale, stigma, quality of life  
22  
23

24 **Impact and implications**

- 25       • The instrument presented in this paper is, to our knowledge, the first coping scale  
26       specifically designed to assess the coping strategies used by people with disabilities.
- 27       • Results demonstrate that the Coping with Disability Difficulties Scale (CDDS), shows  
28       good psychometric properties to measure the coping strategies used by people with  
29       disabilities in the Spanish context.
- 30       • The Coping with Disability Difficulties Scale (CDDS) can be used both for research  
31       and intervention regarding people with disabilities. Our data reveal a factor structure  
32       that should be tested in different cultural contexts. The CDDS can be used to evaluate  
33       coping strategies, which allows the adaptation and implementation of training  
34       intervention programs to promote the more positive coping strategies.

35

36 In their daily lives, people with disabilities face numerous issues and barriers that arise, directly  
37 or indirectly, from their disabilities. In Spain, a 2017 report by the Spanish National Disability  
38 Observatory showed that 35.7% of people who stated that they faced severe limitations in  
39 performing daily activities were at risk of social exclusion, while this percentage dropped to  
40 29.7% for people who said they had non-severe limitations and 26.1% for those who said they  
41 had no limitations at all (Observatorio Estatal de la Discapacidad, 2017).

42 Another major problem faced by people with disabilities in Spain is unemployment. According  
43 to a report published by the Spanish National Statistical Institute, in 2016, the unemployment  
44 rate was 28.6% for people with disabilities but 19.5% for people without disabilities (Instituto  
45 Nacional de Estadística, 2017).

46 Authors such as Fine and Asch (1998) argue that many of the problems and handicaps that  
47 people with disabilities face are not directly caused by their disabilities but rather are the  
48 product of a *disabling environment* that fails to accommodate their needs and builds both  
49 physical and social barriers that lead to exclusion and discrimination (Fine & Asch, 1988). In  
50 Spain, approximately 18% of people with disabilities claim to have been discriminated against  
51 at some point because of their disability (Observatorio Estatal de la Discapacidad, 2017).

52 However, studies show that differences in the levels of quality of life reported by people with  
53 disabilities tend to be weakly related to their degree of disability or other objective variables.  
54 Most of the variance in quality of life can be attributed to differences in the way that  
55 individuals perceive their situation, themselves, and their opportunities (Albrecht & Devlieger,  
56 1999; Brickman, Coates & Janoff-Bulman, 1978; Sprangers & Schwartz, 1999).

57 The psychological processes that explain why some individuals are better off emotionally than  
58 others afflicted by the same disability have been described in the literature as “coping”. Richard  
59 Lazarus and Folkman (1984) defined coping as the “constantly changing cognitive and  
60 behavioral efforts to manage specific external and /or internal demands that are appraised as  
61 taxing or exceeding the resources of the person”. More recently, coping has been described as

62 “an organizational construct used to encompass the myriad actions individuals use to deal with  
63 stressful experiences” (Skinner, Edge, Altman, & Sherwood, 2003). Thus, coping is not a  
64 unidimensional behavior (Pearlin & Schooler, 1978).

65 As stated in the previous section, many of the barriers encountered by people with disabilities  
66 are a product of social stigma. Social stigma has been identified as a source of stress, and some  
67 authors argue that people cope with this stress by using various strategies to protect or enhance  
68 the personal and social aspects of their identity (Berjot & Gillet, 2011). For instance, people  
69 may attribute their negative experiences to discrimination to protect their personal identity or  
70 decrease the importance of a given social identity to protect the social aspects of their identity,  
71 or they could try to re-evaluate a threatened dimension or affirm their personal qualities to  
72 enhance the social and personal aspects of their identity, respectively (Berjot & Gillet, 2011).

### 73 **Coping scales and disability**

74 Previous research has adopted different approaches in the study of coping among people with  
75 disabilities. Some studies have exclusively used qualitative methodologies (Persson, Lars-  
76 Oloff, & Ryden, 2006; Boerner, & Wang, 2012) to explore coping strategies.

77 Some instruments, such as the Freiburg Questionnaire of Coping with Illness (FQCI, Muthny,  
78 1989), take a quantitative approach in studying coping among patients with physical disability  
79 (Haase, Linenemann, & Faustmann, 2008).

80 Other research has employed general coping scales. Kara and Açikel (2011), in a sample of  
81 patients with physical disabilities, used the Multidimensional Scale of Perceived Social Support  
82 and the Coping Strategy Indicator (Amirkhan, 1990).

83 One of the most widely employed questionnaires has been the Coping Strategies Questionnaire  
84 (CSQ; Rosenstiel & Keefe, 1983), which has been used in different ways and for people with  
85 different kinds of physical disability. Some authors have validated a shortened version of the  
86 original scale, the CSQ 24 (Harland & Georgieff, 2010). Another study (Regier and Parmelee,  
87 2015) combined one subscale of the CSQ that had been shown to be relevant to coping in a

88 sample of patients with physical disability, the Coping Self-Statements (CSS), with the Coping  
89 with Illness Scale (CWI) (Felton & Revenson, 1984) to create a final version composed of 57  
90 items.

91 The brief version of COPE (Carver, 1997) has also been used in research (Pande, & Tewari,  
92 2011; Yuan, Zhang, & Li, 2017). Finally, studies have explored coping by combining  
93 qualitative and quantitative approaches (Pande, & Tewari, 2011; Senthil et al., 2018).

#### 94 **Goals of this study**

95 As stated before, the literature shows that coping is not a unitary construct but rather an  
96 organizational construct used to define several different behaviors that people use to deal with  
97 stressful experiences. Thus, there is no agreement in the classification of the many possible  
98 coping strategies or a universally accepted method of assessment, and there is no consensus on  
99 which types of coping behaviors are most effective and under which circumstances.

100 Therefore, to ensure the relevance of the models and measures of coping, they should be based  
101 on the specific populations and tailored for those contexts in which they will be applied  
102 (Sommerfield, 1997). For this purpose, it is necessary to gather first-hand information about how  
103 people face their disability, as even caregivers' view on what constitutes good coping may not  
104 correspond to that of care receivers (Slöteén, Kreuter, Lampic, & Persson 2005). Different  
105 coping strategies are identified in each context and in connection with different problem areas.  
106 Nonetheless, as described above, studies about coping and disability have used either general  
107 coping scales or scales that were developed for other areas, such as illness.

108 The aim of this study was to develop and validate a scale to measure the coping strategies used  
109 by people with disabilities (physical, visual and hearing impairment) to face daily difficulties  
110 caused by the disability itself as well as social barriers caused by stigma (Persson, Lars-Olof &  
111 Ryden, 2006). Because coping strategies are context specific, items were drawn not only from  
112 the previous literature but also from qualitative interviews conducted with a sample of people  
113 with disabilities.

114

115

## Methods

### 116 Participants

117 For the qualitative study, participants were recruited through several organizations for people  
118 with disabilities to participate in semi-structured in-depth interviews.

119 The sample in the pilot study was composed of UNED (National Distance Education  
120 University) students recruited online through a link at UNIDIS, the assistance service for  
121 students with disabilities at the university.

122 Finally, the sample for the correlational ex post facto study was recruited through two different  
123 sources. Some participants were recruited from the same organizations that were contacted for  
124 the qualitative study. The rest of the sample was recruited through undergraduate students of  
125 two different courses at UNED, who were asked to send the link with the questionnaire to  
126 people with disabilities in exchange of extra course credit. No differences in any of the coping  
127 scores were found between participants recruited from the two sources.

128 Regardless of the recruitment method and type of disability, participants were required to be  
129 over 18 years old and have a certified disability degree of 33% or greater (according to the  
130 Spanish administration), which grants them a Disability Certificate, giving them access to  
131 certain benefits, rights and services. Participants who did not meet these criteria were excluded  
132 from the sample. All studies were conducted in Spanish, and all participants were Spanish  
133 speakers living in Spain. As convenience sampling method was used, we tried to obtain a  
134 sample as large as possible, to alleviate the possible lack of representativeness derived from not  
135 using probabilistic sampling. Items were translated into English for publication purposes, and  
136 then translated back into Spanish. Both Spanish versions were assessed, and no significant  
137 change in meaning was found.

138 Table 1 summarizes the sociodemographic and clinical characteristics of the participants in  
139 each sample. As the table shows, only people with either physical, hearing, or visual



140 impairments were interviewed in the qualitative study, but people with other types of  
141 disabilities were not excluded from the sample in the quantitative studies.

142 INSERT TABLE 1

### 143 **Procedure**

144 This research took place from December 2014 to February 2017. All research procedures were  
145 approved by UNED's Ethics Committee. Participants in all phases read a plain language  
146 statement and signed an informed consent form before proceeding with the research. The  
147 Coping with Disability Difficulties Scale (CDDS) battery was developed through the following  
148 steps (Eignor, 2001; Revicki, et al., 2007).

149 After a review of the literature on coping and disability, a qualitative study using the in-depth  
150 interview technique was carried out to learn about the perspectives of people with disabilities  
151 on the difficulties arising from their condition and how they coped with these difficulties. A  
152 total of 27 individual interviews with lengths of 30 to 60 minutes were conducted. These  
153 interviews used a semi-structured format, which means the interviewer allowed participants to  
154 speak freely and in their own words, while ensuring all the relevant topics were covered  
155 (Minichiello, Aroni, Timewell, & Alexander; 1990). Then, based on the contents of the  
156 interviews and the reviewed literature on coping, (1) five members of the research team defined  
157 the constructs (the coping strategies used by people with disabilities) after deliberation (Lord &  
158 Novick, 1968; Nunnally & Bernstein, 1994). (2) Items were developed to measure each  
159 construct, following psychometric recommendations (Haladyna, Downing, & Rodriguez, 2002;  
160 Osterlind, 1989). (3) A decision on the response format of the items was made. (4) Each item  
161 was rated based on its clarity, representativeness and relevance. (5) Based on the experts'  
162 responses and comments, items were selected and reworded to compile the initial item pool.  
163 Then, a cognitive debriefing study was carried out, in which eight people with different types  
164 of disabilities rated the questionnaire's understandability and accessibility.

165 Third, a pilot study was conducted to assess the initial items' psychometric properties and  
166 select those that would be part of the final scale. This study served to purge the item pool based  
167 on empirical criteria (e.g., missing values, floor or ceiling effects, internal consistency, or  
168 corrected homogeneity index). Participants completed an online questionnaire through  
169 Qualtrics. An adapted version of the questionnaire was developed for participants with visual  
170 impairments using screen readers, but its contents were identical to those of the general version.  
171 Finally, to assess the factor structure and to obtain diverse evidence of validity, a correlational  
172 ex post facto study was performed. The variables were recoded to eliminate participants with  
173 any missing data, which confirmatory factor analysis (CFA) modeling programs cannot  
174 accommodate with ease. The final sample analyzed consisted of 520 participants.

175 Participants were randomly divided into two subsamples: First, an exploratory factor analysis  
176 (EFA) was adopted for subsample 1 ( $N = 260$ ), and second, we tested the validity of the factor  
177 structure derived from the EFA results with subsample 1 using CFA on subsample 2 ( $N = 260$ )  
178 within the framework of structural equation modeling. Evidence of convergent validity was  
179 assessed in the total sample. As in the pilot study, this cross-validation study was conducted  
180 online using Qualtrics. **Measures**

181 In the qualitative study, in-depth semi-structured interviews were conducted. Three questions  
182 addressed coping strategies specifically: a) "How have you adapted to [your disability]?" b)  
183 "To what extent do you feel able to cope with your problems? How do you do it?" and "c) "Is  
184 there something that makes you feel better or makes it easier for you to face this problem?"

185 The online questionnaire used for the pilot study included the 46 items selected after the inter-  
186 rater process and a set of items that collected information about participants' disability (type,  
187 severity and onset) and sociodemographic data (gender, age, educational level, marital status  
188 and employment status). The instructions, for all versions of the scale read: "Please, mark how  
189 often you use each of the following strategies to cope with difficulties derived from your  
190 disability".

191 The questionnaire for the two validation studies included the same sociodemographic items,  
192 along with the 24-item version of the CDDS obtained after the psychometric depuration and a  
193 selection based on substantive criteria. Moreover, this questionnaire includes the following  
194 scales to assess convergent and discriminant validity:

195 *Multidimensional Perceived Discrimination Scale* (Molero, Recio, García-Ael, Fuster &  
196 Sanjuan, 2013). This 16-item scale measures the perception of four different types of  
197 discrimination: blatant group discrimination, subtle group discrimination, blatant personal  
198 discrimination, and subtle personal discrimination. We grouped the four factors into one, which  
199 better served the purpose of our study. In our study, the reliability of the scale was found to be  
200 high (Cronbach's alpha = .94).

201 *The Stigma Scale for Chronic Illness 9-Item Version (SSCI-9)*. We used the Spanish adaptation  
202 of the Internalized Stigma subscale of the SSCI (Rao et al., 2009), which showed good  
203 psychometric properties in people with different types of disabilities (Silván-Ferrero, Recio, &  
204 Nouvillas-Pallejà, 2018). The SSCI-9 was administered with the following response format to  
205 assess frequency: 1 = Never or almost never, 2 = Rarely, 3 = Many times, and 4 = Always or  
206 almost always. In our study, the scale showed good internal consistency (Cronbach's alpha =  
207 .90).

208 *Group Identification*. We measured identification using a previously validated six-item  
209 measure (Ashforth & Mael, 1989; Mael & Ashforth, 1992). Participants indicated their  
210 agreement with each item on a 4-point Likert scale. In our sample, the internal consistency of  
211 the scale was good (alpha = .82).

212 *Activism*. This was measured with four items assessing the perceived effectiveness of collective  
213 action and the intention to engage in it (Pérez-Garín et al., 2017). Participants responded on a  
214 4-point Likert scale, ranging from 1 (totally disagree) to 4 (totally agree). The coefficient alpha  
215 for this scale was .82.

216 *Social Support*. The Spanish adaptation (Bellón, Delgado, Luna & Lardelli, 1996) of the Duke-  
217 UNC Functional Social Support Questionnaire (Broadhead, Gehlbach, Degruy & Kaplan,  
218 1988) was used to measure perceived social support. This 11-item scale showed high internal  
219 consistency (alpha = .91).

220 *Self-esteem*. This construct was measured using the Spanish adaptation (Expósito & Moya,  
221 1999) of the Rosenberg Self-esteem Scale (Rosenberg, 1965). This widely used self-esteem  
222 measure and is composed of 10 items addressing a person's sense of worth and personal value.  
223 Responses are given on a Likert scale from 1 (totally disagree) to 4 (totally agree). Cronbach's  
224 alpha was .85 in the present sample.

225 *Resilience*. This was evaluated using the Connor-Davidson Resilience Scale, 10-item version  
226 (Connor & Davidson, 2003), a self-administered questionnaire. Responses are provided on a  
227 Likert-type additive scale (from 0 = never to 4 = almost always), which had a single dimension  
228 in the original version. We used the Spanish version (Notario-Pacheco et al., 2011), which  
229 showed adequate reliability in our sample (alpha = .90).

## 230 **Data analyses**

231 Qualitative data were analysed using the constant comparison technique based on Grounded  
232 Theory (Glaser & Strauss, 1967). Core categories were taken out by descriptive coding analysis  
233 using the software Atlas Ti.7. Six experts (in qualitative research and research on disability; all  
234 of whom are part of the research team and colleagues within the same faculty, and one of  
235 whom has experience in community work with stigmatized groups) assessed the  
236 methodological and theoretical quality of core categories and subcategories (Przyborski &  
237 Wohlrab-Sahr, 2010).

238 In the pilot study carried out for the depuration of the original item pool, the basic  
239 psychometric properties of the instruments were assessed using SPSS 24.

240 In the correlational ex post facto study carried out to obtain evidence of construct and  
241 convergent validity, the following steps were followed. First, two random subsamples were  
242 extracted. Then, to explore the initial structure of the instrument, an EFA using unweighted  
243 least squares with promin rotation methods was conducted on subsample 1 ( $N = 260$ ). A  
244 polychoric correlation matrix was used because it is particularly suitable for items with a  
245 Likert-type response format (Muthen & Kaplan, 1992). The Factor 10.3 program (Lorenzo-  
246 Seva & Ferrando, 2006) was used for this purpose. A cut-off for saturation of  $\geq .40$  was  
247 established for selecting the items.

248 Then, a CFA was conducted in subsample 2 ( $N = 260$ ) using the unweighted least squares  
249 extraction method (ULS).PRELIS and LISREL 8.7 software were used. To assess the fit of the  
250 models to the data, several absolute and relative fit indexes are reported (Bentler & Hu, 1995),  
251 including chi-square ( $\chi^2$ ), degrees of freedom, incremental fit indexes (CFI, IFI, NFI, GFI and  
252 AGFI), and two residual fit indexes (RMR and RMSEA). Second, to obtain convergent  
253 validity, the second sample was analyzed by calculating the Pearson correlation of each factor  
254 in the CDDS with quality of life, perceived discrimination, internalized stigma, group  
255 identification, activism, social support, self-esteem, and resilience. Approach strategies were  
256 expected to be negatively correlated with internalized stigma and positively correlated with  
257 quality of life, group identification, activism, social support, self-esteem and resilience.  
258 Avoidance strategies, on the other hand, were expected to be negatively correlated with the  
259 latter variables and positively correlated with perceived discrimination and internalized stigma.

260 To compare alternative models we also reported the model CAIC and the significance of the  
261 change in Chi-Square  $\Delta\chi^2(\Delta df)$ . The CAIC is a good fit index for model comparison and the  
262 general rule is that values smaller the better (Schreiber, Stage, King, Nora, & Barlow, 2006).  
263 Significantly changes in Chi-Square indicate there are differences in the fit of the models  
264 compared.

265 Finally, item response theory analysis was used to examine psychometric properties of the  
266 CDDS. IRT is a useful tool for gaining insights that traditional techniques cannot provide. It is  
267 a model-based measurement theory that aims to show the relationship between responses to  
268 items and the ability or trait that each item is supposed to be measuring (Embretson y Reise,  
269 2010). For a trait, CTT provides a single score, which is derived from the scores of the different  
270 items comprising the scale, while IRT provides trait scores at the item level. So, the IRT  
271 approach would allow the identification of items that are functioning differently in terms of  
272 their ability to discriminate and also represent the underlying trait and measure it at different  
273 levels (Vahedi, 2010). This, in turn, can facilitate the development and revision of the  
274 measures.

275 We use the SGR model, appropriate for ordered response categories scales data using IRTPRO  
276 4.2 software for the IRT analysis. After having confirmed that the pertinent assumptions were  
277 met to perform parametric tests on the definite sample (except normal multivariate kurtosis) we  
278 used *t* test and MANOVA to study the differences in CDDS scores according to participant  
279 characteristics. Although the subscales did not exhibit normal multivariate kurtosis, according  
280 to (Finch, 2005) the parametric statistic is robust even when the assumption of normality is  
281 violated, and it slightly outperforms the nonparametric statistic in terms of type I error rate and  
282 power.

## 283 **Results**

### 284 *Development of the CDDS items*

285 The initial item pool was developed through the following steps:

- 286 (a) Definition of the constructs. A theoretical conceptualization of the various coping  
287 strategies analyzed was carried out taking into account the content analysis and the  
288 literature review. Five members of the research team wrote independent definitions and

289 then met to reach an agreement about the definition of each strategy. A total of 23  
290 coping strategies were developed.

291 (b) Development and writing of the items: The same five researchers who defined the  
292 constructs independently wrote three to four items for each coping strategy and met  
293 again to agree on the number of items of the initial battery. The goal of this process was  
294 to have a representative sample of the universe of possible coping strategies.  
295 Psychometric recommendations for the development of items were followed. Criteria of  
296 relevance (i.e., the content should be clearly related to the construct), clarity (i.e., the  
297 items should be written to avoid excessive generality and be written in short, simple and  
298 intelligible sentences), and representativeness (i.e., the items should be representative of  
299 the construct) were taken into account. This process produced an initial pool of 110  
300 items, which were sent to the rest of the team for evaluation.

301 (c) Expert assessment and inter-rater process: Four members of the research team evaluated  
302 the items in terms of their relevance, clarity and representativeness and suggested  
303 rephrasing when necessary. Additionally, each rater chose the best items for each  
304 strategy (a maximum of three) in order to develop a short scale to avoid overburdening  
305 respondents. After this process, a total of 46 items representing the 23 coping strategies  
306 were selected. The entire research team agreed on using a four-point response format  
307 (“never or almost never”, “rarely”, “fairly often”, “always or almost always”).

308 (d) Cognitive debriefing interview: Eight people with different types of disabilities  
309 answered the questionnaire, and they later informed a member of the research team  
310 about possible difficulties in understanding the questionnaire and the accessibility of the  
311 questionnaire’s format. The items were generally regarded as relevant, accessible, and  
312 easy to understand and answer.

313 *Pilot study to analyze the psychometric properties of the items*

314 Eighty-four people with different types of disabilities answered the preliminary version  
315 of the CDDS. Four participants were excluded from the analyses for having missing values  
316 in three or more items in the questionnaire.

317 First, items that demonstrated a ceiling or a floor effect were removed. If more than  
318 25% of participants answered with either the lowest or highest point on the scale, the  
319 removal of the item was considered.

320 Because more than one item per strategy had been developed and the goal was to obtain  
321 a short battery that was accessible for people with disabilities, both internal consistency and  
322 substantive criteria were used to select the final battery of items. After this process, 20 items  
323 were selected, representing 17 coping strategies.

## 324 **Construct and criterion validity of CDDS**

### 325 *Construct validity: Results of the EFA*

326 The factor structure of the remaining items was assessed through EFA in one of the  
327 random subsamples obtained (Table 2). A four-factor structure was found, which explained  
328 55% of the variance. The first factor (F1) included fundamentally cognitive strategies related to  
329 positive thinking and acceptance of the situation, and the second factor (F2) grouped social  
330 sensitization and social support strategies, vindication of rights and social support. The third  
331 factor (F3) comprised strategies to adapt to daily life. The fourth factor (F4) comprised  
332 avoidance strategies. A graphic representation of the model can be seen in Figure 2. The model  
333 fit indexes were Barlett = 1982.5,  $df= 190$ ,  $p < .001$ ;  $KMO = .906$ ,  $GFI = .99$ , and  $CFI: .95$ ,  
334 which indicated a very good fit. Three items did not reach the cut-off saturation criteria  
335 established for selection ( $\geq .40$ ); thus, they were removed.

336 INSERT TABLE 2

337 INSERT FIGURE 2

### 338 *Construct validity: Results of the CFA*



339 To assess the fit of the CDDS to the factor structure obtained in the EFA, CFA was  
340 conducted in the second random subsample ( $n = 260$ ). The results confirmed the four-factor  
341 structure with a good fit to the data: Chatorra-Bentler  $\chi^2 = 206.18$  (113),  $p < .001$ ; *RMSEA* (IC  
342 90%) = 0.056 (0.044; 0.068); *SRMR* = 0.061; *GFI* = 0.98; *AGFI* = 0.97; *CFI* = 0.98; *NFI* =  
343 0.97; *IFI* = .98. Furthermore, all standardized loadings were greater than 0.5, a level considered  
344 acceptable (Green & Carroll, 1978). The results of the fully standardized solution of the model  
345 are displayed in Table . Covariances among the factors are shown in Table 3.

346 INSERT TABLE 3

347 We compared three alternative models to the four-factor proposed model. As can be seen in  
348 Table 5, there are significant differences in chi-square between the three alternative models and  
349 the proposed model. Furthermore, the alternative models showed a poorer fit than the proposed  
350 one.

351 INSERT TABLE 4

352 *Internal consistency* Table 5 shows that the factors with the highest internal consistency were  
353 positive thinking and social sensitization and support. The avoidance and adaptation factors had  
354 Cronbach's  $\alpha$  values below .70, though these values were acceptable considering the small  
355 number of items comprising each factor. Anyway, Jöreskog rho (omega) is a better reliability  
356 measure than Cronbach's alpha in Structural Equation Modeling, since it is based on the  
357 loadings rather than the correlations observed between the observed variables.

358 Estimates of the reliability of the four subscales were slightly higher using omega instead of the  
359 alpha coefficient, as the alpha statistic underestimates reliability in ordinal data (Bentler, 2009).

360 Given that the threshold of acceptability for omega reliability is .70, the results were  
361 satisfactory, ranging from .76 through .90 for all the four factors.INSERT TABLE 5

362 *Convergent validity*

363 Positive correlations were found for the factors positive thinking, social sensitization and  
364 support, and adaptation with quality of life, group identification, activism, social support, self-  
365 esteem and resilience, while their relationships with internalized stigma were negative. The  
366 avoidance factor, on the other hand, showed the opposite pattern (except for group  
367 identification, for which no significant correlation was found) and was also positively related to  
368 perceived discrimination (Table 3).

#### 369 *CCDS Scores*

370 Descriptive results of the factors in CDDS are shown in Table 3. Positive thinking had the  
371 highest score, while avoidance had the lowest, although it was near the theoretical mean of the  
372 scale. The scores for social sensitization and support as well as adaptation were above their  
373 theoretical means.

#### 374 *Differences in CDDS scores according to participant characteristics*

375 Several differences in the CDDS factor scores were found according to participants' type of  
376 disability. Participants with visual impairment scored higher on the three factors related to  
377 approach strategies (positive thinking, social sensitization and support, and adaptation:  $F =$   
378  $4.35, p < .01$ ;  $F = 4.78, p < .01$ ; and  $F = 5.88, p < .01$ , respectively). No significant differences  
379 were found in the avoidance factor.

380 Women scored significantly higher than men in the social sensitization and support and  
381 adaptation factors ( $t = 3.37, p < .01$  and  $t = 2.19, p = .03$ , respectively), and marginal gender  
382 differences were found in avoidance ( $t = -1.89, p = .06$ ). No significant gender differences were  
383 found for positive thinking.

384 Differences were also found in all factors according to education level. The higher the level of  
385 education was, the higher the scores in the approach factors (positive thinking, social  
386 sensitization and support, and adaptation:  $F = 2.82, p = .04$ ;  $F = 3.90, p = .01$ ; and  $F = 5.60, p <$   
387  $.01$ , respectively) and the lower the score in avoidance strategies ( $F = 3.29, p = .02$ ).

388 People who actively participated in non-governmental organizations (NGOs) in the disabilities  
389 field ( $N = 200$ ) scored significantly higher in the approach factors (positive thinking, social  
390 sensitization and support, and adaptation:  $t = 3.05, p < .01$ ;  $t = 8.96, p < .01$ ; and  $t = 2.67, p <$   
391  $.01$ , respectively) and lower in the avoidance factor ( $t = -2.97, p < .01$ ).

392 Significant differences were also found regarding the acquisition of disabilities. Participants  
393 who had a disability at birth scored higher than participants with an acquired disability in all  
394 three approach factors ( $t = 2.20, p = .03$ ;  $t = 4.40, p < .01$ ;  $t = 2.46, p = .01$ ) and scored lower in  
395 the avoidance factor ( $t = -2.33, p = .02$ ).

### 396 *IRT Analyses*

397 We use the SGR model, appropriate for ordered response categories scales. For this model, the  
398 probability of endorsing a response option depends on the discriminating power of the item and  
399 the location of the threshold parameter for that option on the latent trait continuum. For a four-  
400 option measure, the SGR model estimates a unique slope parameter for each item and  $4-1 = 3$   
401 threshold parameters. Each threshold reflects the level of general coping strategies needed to  
402 have equal (.50) probability of choosing to respond above a given threshold.

403 We use a unidimensional model because in its strictest sense unidimensionality is usually not  
404 necessary to take advantage of the benefits of IRT, provided a dominant first dimension is  
405 present (Smith & Reise, 1998) as appears to be the case for the current data. As shown in Table  
406 4, results from a one-factor CFA model found a reasonable fit to the sample data, ( $\chi^2/df =$   
407  $175.34 (6)$ ; CFI = .96, NFI = .94, SRMR = .086) although it was not the best possible fit to the  
408 data. Essential unidimensionality was confirmed using EFA, in which the ratio of eigenvalues  
409 of the first and second factors was approximately 6.2:1.5 and the variance accounted for by the  
410 dominant factor was 36%.

411 The SGR model was fit to each item on the CDDS scale (see Table 6). Slope parameters ranged  
412 from .62 (item 12) to 3.10 (item 16). Threshold parameters ranged from -4.20 to -1.15 for  $b_1$ , -  
413 1.90 to 0.52 for  $b_2$ , and -0.23 to 3.87 for  $b_3$ .

414 INSERT TABLE 6

415 We use the Pearson's Chi-square ( $S\text{-}\chi^2$ ) fit statistics (Orlando & Thissen, 2000) to assess the  
416 degree of similarity between predicted and observed response frequencies for each item  
417 response category (see Table 6). Results showed a satisfactory fit in that only 4 of the 17 items  
418 showed misfit using the .01 criteria (items 7, 10, 16 and 20).

419 As Figure 3 shows, the response category system is operating as expected for each item,  
420 because each increasing category is more likely to be selected than previous response  
421 categories as one moves along the latent trait continuum.

422 INSERT FIGURE 3

423 Figure 4 refers to the total information curve, which is represented by the sum of the  
424 information from all the items. It demonstrates that this scale presents greater precision in low  
425 and intermediate levels of the latent trait in order to measure coping strategies used by people  
426 with disabilities. From trait levels of  $\theta = 1$  the information function decays and the standard  
427 error increases.

428 INSERT FIGURE 4

429

430

## 431 Discussion

432 In the present study, we provided a psychometric analysis of a new measurement tool, the  
433 CDDS, which is based on previous literature about coping and on findings from a preliminary

434 qualitative study. After the semi-structured interviews and the inter-rater agreement process, an  
435 initial 48-item scale was obtained.

436 The results of the three quantitative studies enabled us to validate a 17-item scale (see Table 2)  
437 whose psychometric characteristics were globally satisfactory. The internal structure of the  
438 CDDS was analyzed via EFA, which revealed that a four-factor solution provided the best fit  
439 for this instrument. CFA confirmed this structure. It would be desirable for future research to  
440 test the factorial invariance across different groups of disability. With respect to the marker  
441 items and their content definition, we named the factors positive thinking, social sensitization  
442 and support, adaptation, and avoidance.

443 Although some of these factors, or similar ones (such as avoidance, cognitive coping and  
444 reinterpreting), emerged in prior research, this structure does not match previous results on  
445 different groups and instruments<sup>1</sup> (Harland & Georgieff, 2010; Kara & Açikel, 2011; Regier &  
446 Parmalee, 2015; Skinner et al., 2003). This lack of concordance can be consistent with Skinner  
447 et al.'s (2003) claim that coping is an organizational construct used to encompass the many  
448 different strategies people use to deal with stressful events. Since coping strategies may vary by  
449 context, the studies carried out to develop and validate the CDDS may have identified the  
450 coping strategies that are relevant for facing the difficulties that arise from having a disability,  
451 at least in the Spanish context. To our knowledge, this is the first coping scale that is  
452 specifically designed for people with disabilities, and we think it can be highly useful for both  
453 research and applied purposes.

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<sup>1</sup> Harland and Georgieff (in a sample of chronic back pain patients) found four factors: Catastrophizing, Diversion, Reinterpreting, and Cognitive coping. No equivalent to the first two was found in the present study, while the two latter are similar to our Positive thinking factor.

In their interviews with people with physical disabilities, Kara and Açikel found three factors: Problem solving, Avoidance, and Seeking social support. This is the most similar to our structure, which includes Adaptation, Avoidance and Social sensitization and support.

Perhaps the most different is the structure found by Regier and Parmalee in a sample of older adults with osteoarthritis. They found five factors: Stoicism, Refocusing, Problem-Solving, Wishful Thinking, and Emotion-Focused. Only Refocusing and Problem-Solving are similar to factors found in the CDDS: Positive thinking and Adaptation.

454 Analyses regarding sociodemographic variables reveal significant differences in the four  
455 factors. The greater use of approach strategies reported by blind participants might be specific  
456 to the Spanish context, which is characterized as a traditionally well-organized community  
457 (ONCE, the National Organization of Blind Persons of Spain is among the oldest and most  
458 recognized NGOs in Spain; it provides blind people with occupation, education, and resources).  
459 In this sense, activism is associated with a greater use of approach strategies and a lower use of  
460 avoidance strategies. Similarly, educational level might provide personal resources that help  
461 individuals cope with daily difficulties (and might also be associated with a higher economic  
462 level, which was not controlled for), which may also be the reason that people with disabilities  
463 at birth seem to use more positive coping strategies.

464 The results reflect significant differences in coping strategies between men and women.  
465 Women scored higher in social sensitization, support and adaptation. This result was similar to  
466 findings of previous studies (Guszkowska, Zagórska-Pachucka, Kuk & Skwarek, 2016; Rose &  
467 Rudolph, 2006; Tamres, Janicki, & Helgeson, 2002). Additionally, in a Spanish context, two  
468 studies that focused on gender differences found that women focused on emotional and  
469 support-seeking strategies (Mataud, 2004; Meléndez, Mayordomo, Sancho, & Tomás, 2012).  
470 These results have been regarded by different authors as the effect of socialization (Gattino,  
471 Rollero, & De Piiccoli, 2015; Mataud, 2004.; Meléndez et al., 2012; Ptacek, Smith, & Zanas,  
472 1992). Traditionally, women are taught to use more passive and emotionally and socially  
473 focused behavior. Future studies on the role of gender in coping strategies should expand on  
474 this topic.

475 The present study provides evidence that the CDDS has a high internal consistency and is able  
476 to distinguish between respondents who perceive themselves with more or less level of coping  
477 strategies, with good item discrimination both from the TCT and from the TRI perspective.

478 The scale is useful for measuring low and intermediate levels of the general trait that the CDDS  
479 scale measures, that is, the ability to use coping strategies to face the challenges posed by their

480 disability. So, if estimates are needed outside this range, then more items with thresholds above  
481 1 are needed to measure the high levels of coping strategies. In sum, the findings of reliability  
482 and validity indicate that CDDS is a reliable and useful scale to measure the coping strategies  
483 used by people with disabilities to face daily difficulties.

484 The main limitation of this scale is that it was developed based on the responses of people with  
485 visual, hearing and physical disabilities. Thus, before it can be used with people with different  
486 types of disabilities (such as intellectual disability), it should be validated for those populations.

487 Moreover, this scale was developed and tested in the Spanish context. Thus, the scale, and its  
488 factor structure, should be tested in samples from other cultures in order to ensure its  
489 applicability in different context.

490 Correlations found between each factor and other scales point to the relevance of the scale for  
491 both theory and intervention. The case of avoidance is perhaps most interesting, as the use of  
492 this strategy is associated with lower quality-of-life scores, higher levels of internalized stigma,  
493 and lower levels of activism, perceived social support, self-esteem and resilience. Confirming  
494 these relationships and identifying people who most frequently use this type of coping might  
495 allow the implementation of training interventions to promote more positive coping strategies  
496 (which, as seen in Table 3, show almost the reverse relationships with the other variables).

497

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684

Table 1  
*Sociodemographic and clinical data of the three samples*

Sample	<i>N</i>	Mean age	<i>SD</i>	Men	Women	Physical disabilities	Hearing impairments	Visual impairments	Other disabilities	Inborn disability	Acquired disability
Qualitative study	27	40.66	11.32	11 (40.74%)	16 (59.26%)	10 (37.04%)	10 (37.04%)	7 (25.92%)	0	14 (51.85%)	13 (48.15%)
Pilot study	80	47.67	9.12	36 (45%)	33 (41.3%)	40 (50%)	13 (16.3%)	9 (11.2%)	18 (23.6%)	18 (22.5%)	54 (67.5%)
EFA and CFA sample	590	44.76	12.78	269 (45.6%)	316 (53.6%)	354 (60%)	106 (18%)	96 (16.3%)	34 (5.8%)	207 (35.1%)	378 (64.1%)

*Notes.* Except for the mean and *SD* of age, all data are frequencies. Some participants did not indicate their gender or the origin of their disabilities.



Table 2

*Results of the Exploratory Factor Analysis and descriptive statistics of the items*

Items	F1	F2	F3	F4	Lambda ( $\lambda$ )	Mean	Median	Kurtosis	Skewness
1. I try to look at the bright side of what happens to me and enjoy life	.59				.81	3.03	3.00	-0.50	-0.32
4. I keep my sense of humor	.72				.78	2.88	3.00	-0.73	-0.32
7. I value myself for what I have achieved	.59	.34			.70	3.08	3.00	-0.47	-0.44
8. Whenever I encounter a difficulty, I tell myself “come on, you can do it”	.59	.43			.80	3.11	3.00	-0.50	-0.42
13. Making fun of myself helps me go on	.60	.30			.67	2.77	3.00	-1.01	-0.21
16. I try to be as positive as possible	.57	.30			.91	3.13	3.00	-0.39	-0.51
2. I try to solve people’s doubts about my disability		.79			.73	2.95	3.00	-0.61	-0.39
9. I speak publically about my disability to raise public awareness about the issue		.58			.66	2.36	2.00	-1.09	0.17
10. I ask other people for help when I need it		.30			.51	2.78	3.00	-0.85	-0.01
14. I try to make people see that people with disabilities are like everybody else		.49			.86	3.17	3.00	-0.23	-0.80
19. I join other people to defend the rights of people with disabilities		.67			.58	2.24	2.00	-1.12	0.34
3. I organize my daily life in order to cope with the limitations arising from my disability in the best possible way			.61		.80	3.11	3.00	0.181	-0.51
15. I plan my daily activities			.73		.55	2.95	3.00	-0.58	-0.49
17. If I need any kind of resource, I look for it			.40		.79	3.20	3.00	-0.20	-0.50
5. I avoid attending social gatherings to spare myself difficulties				.79	.72	2.08	2	-0.79	0.46
12. I avoid situations which are difficult for me				.54	.60	2.64	3.00	-0.59	-0.12
20. I avoid interacting with other people				.69	.83	1.69	1.00	0.29	1.07

*Note.* Values  $< .30$  are not shown in the table.

Table 3.

*Scores, covariances and correlations of the CDDS factors*

	M ± SD	Covariances ( $\phi$ )				Pearson's Correlations ( $r$ )							
		PT	SSS	AD	AV	Quality of Life	Perceived Discrimination	Internalized stigma	Group identification	Activism	Social Support	Self-esteem	Resilience
PT	3.00±.64	1	.69	.80	-.65	.57**	-.09*	-.44**	.12**	.21**	.37**	.68**	.73**
SSS	2.71±.67		1	.72	-.58	.37**	.08	-.22**	.38**	.39**	.44**	.36**	.38**
AD	3.08±.61			1	-.60	.48**	.00	-.26**	.19**	.23**	.31**	.50**	.49**
AV	2.14±.68				1	-.51**	.31**	.55**	.02	-.13**	-.40**	-.52**	-.42**

*Note.* The scale has a range of four points. PT = Positive Thinking; SSS = Social sensitization and support; AD = Adaptation; AV = Avoidance.

\*  $p < .05$ , \*\*  $p < .01$

Table 4

*Fit indexes of the proposed model and the alternative models*

	RMSEA [90% CI]	SRMR	GFI	AGFI	CFI	NFI	NNFI	IFI	CAIC	Satorra-Bentler $\chi^2$	df	$\Delta\chi^2 (\Delta df)^1$
Model 1. (four factors)	.056 [044 ; .068]	.061	.98	.96	.98	.97	.98	.98	468.17	206.18 ( $p < .001$ )	113	
Model 2. (two factors grouping the three approach factors)	.085 [0.75 ; 0.96]	.078	.97	.96	.96	.94	.96	.96	569.75	339.99 ( $p < .001$ )	118	133.81 (5) ( $p < .001$ )
Model 3. (three factors grouping PT+AD in factor 1)	.061 [049 ; 0.072]	.066	.98	.97	.98	.96	.98	.98	469.60	226.71 ( $p < .001$ )	116	20.53 (3) ( $p < .001$ )
Model 4. (one single factor)	.092 [.082 ; .10]	.086	.96	.95	.96	.94	.95	.96	604.71	381.52 ( $p < .001$ )	119	175.34 (6) ( $p < .001$ )

<sup>1</sup>Change in chi-square between the proposed model (Model 1) and the rest of the proposed alternative models.

Model 1. The four-factor proposed model. Model 2. Two factors (Approach (PT+SSS+AD) and Avoidance). Model 3: Three factors. We have tested the model grouping PT and AD in factor 1 because the high covariance between the two factors Model 4: one single factor.

Table 5

*Fully standardized solution of the model, construct and reliability statistics*

Factors	Cronbach's Alfa	Average Variance Extracted (AVE)	Jöreskog rho (Omega)
<b>Positive thinking (PT)</b>	.86	.60	.90
<b>Social sensitization and support (SSS)</b>	.75	.50	.80
<b>Adaptation (AD)</b>	.69	.61	.76
<b>Avoidance (AV)</b>	.68	.61	.76

Table 6

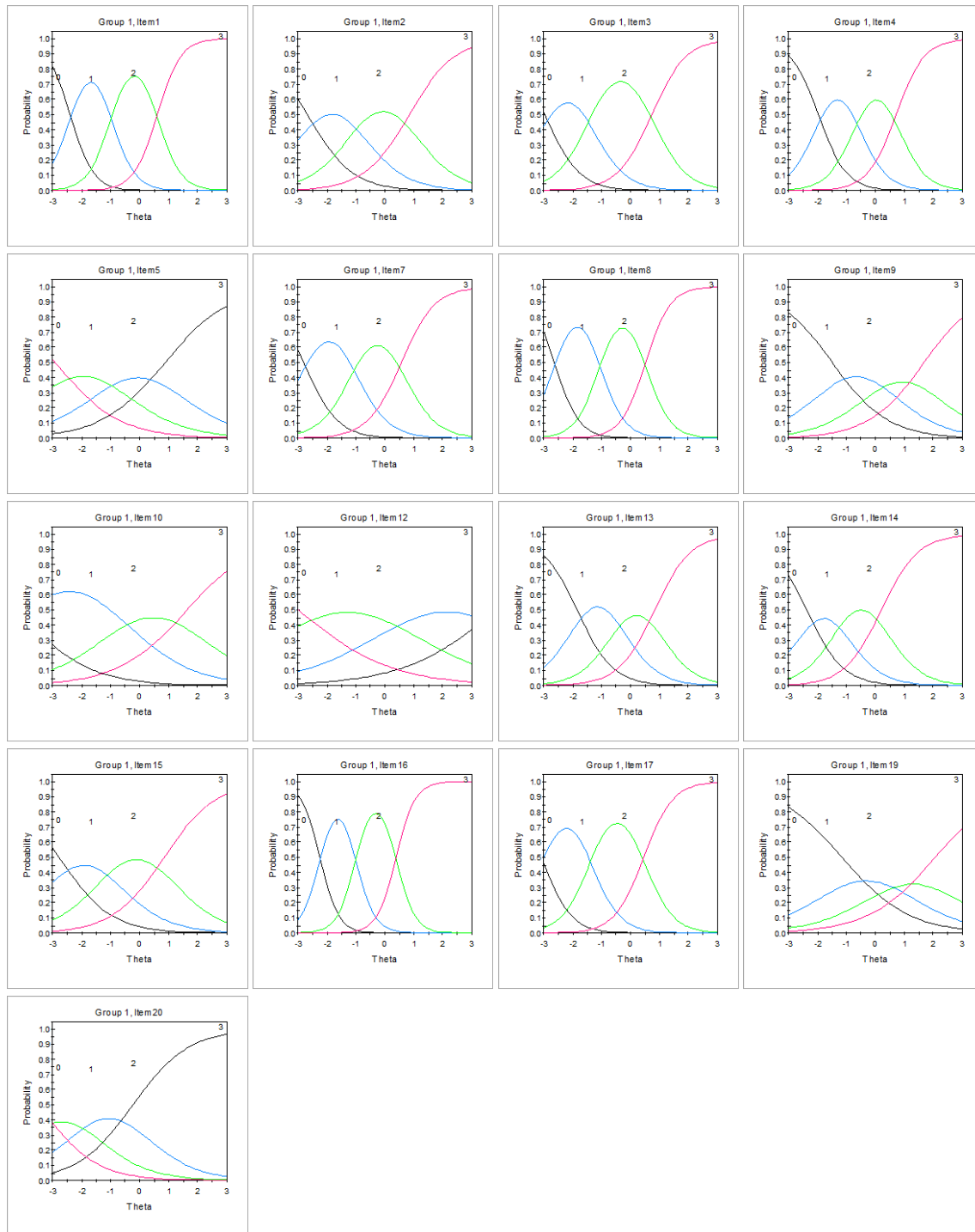
*SGR model item parameter estimates and Item-Fit Statistics for the Coping with Disability Difficulties Scale (CDDS)*

Items	<i>a</i>	<i>b</i> <sub>1</sub>	<i>b</i> <sub>2</sub>	<i>b</i> <sub>3</sub>	<i>S</i> - $\chi^2$	<i>p</i>
Item 1	2.49 (.20)	-2.40 (.16)	-0.97 (.07)	0.60 (.08)	59.71	.1402
Item 2	1.28 (.12)	-2.68 (.23)	-0.96 (.10)	0.84 (.12)	87.94	.0841
Item 3	1.69 (.15)	-2.96 (.24)	-1.40 (.10)	0.73 (.10)	77.31	.0379
Item 4	2.05 (.16)	-1.98 (.13)	-0.63 (.07)	0.71 (.09)	84.50	.0202
Item 5	0.90 (.10)	-2.91 (.31)	-0.99 (.13)	0.87 (.15)	86.07	.3571
Item 7	1.74 (.15)	-2.81 (.22)	-1.07 (.09)	0.56 (.09)	91.03	.0016
Item 8	2.36 (.20)	-2.64 (.19)	-1.05 (.07)	0.51 (.08)	67.45	.0268
Item 9	1.04 (.10)	-1.49 (.15)	0.17 (.10)	1.68 (.19)	105.01	.0376
Item 10	0.83 (.10)	-4.20 (.49)	-0.69 (.13)	1.64 (.22)	106.71	.0077
Item 12	0.62 (.09)	-3.00 (.43)	0.42 (.16)	3.87 (.56)	111.42	.0288
Item 13	1.61 (.13)	-1.85 (.14)	-0.42 (.07)	0.83 (.10)	79.91	.2190
Item 14	1.58 (.14)	-2.39 (.19)	-1.18 (.10)	0.20 (.08)	77.21	.1424
Item 15	1.12 (.11)	-2.77 (.26)	-1.05 (.12)	0.84 (.13)	97.06	.0373
Item 16	3.10 (.29)	-2.25 (.14)	-1.00 (.06)	0.38 (.07)	68.59	.0078
Item 17	2.01 (.18)	-3.07 (.27)	-1.38 (.09)	.45 (.08)	65.91	.0439
Item 19	0.86 (.10)	-1.15 (.15)	0.52 (.13)	2.07 (.25)	110.22	.0245
Item 20	1.05 (.12)	-3.46 (.37)	-1.90 (.19)	-0.23 (.10)	125.93	.0001

*Note.* *a* = item slope (discrimination) parameter; *b* = item threshold (location) parameter; *S*- $\chi^2$  = item fit statistic; *p* = *p* value associated with item-fit statistic. Values in parenthesis are item parameter standard error estimate.

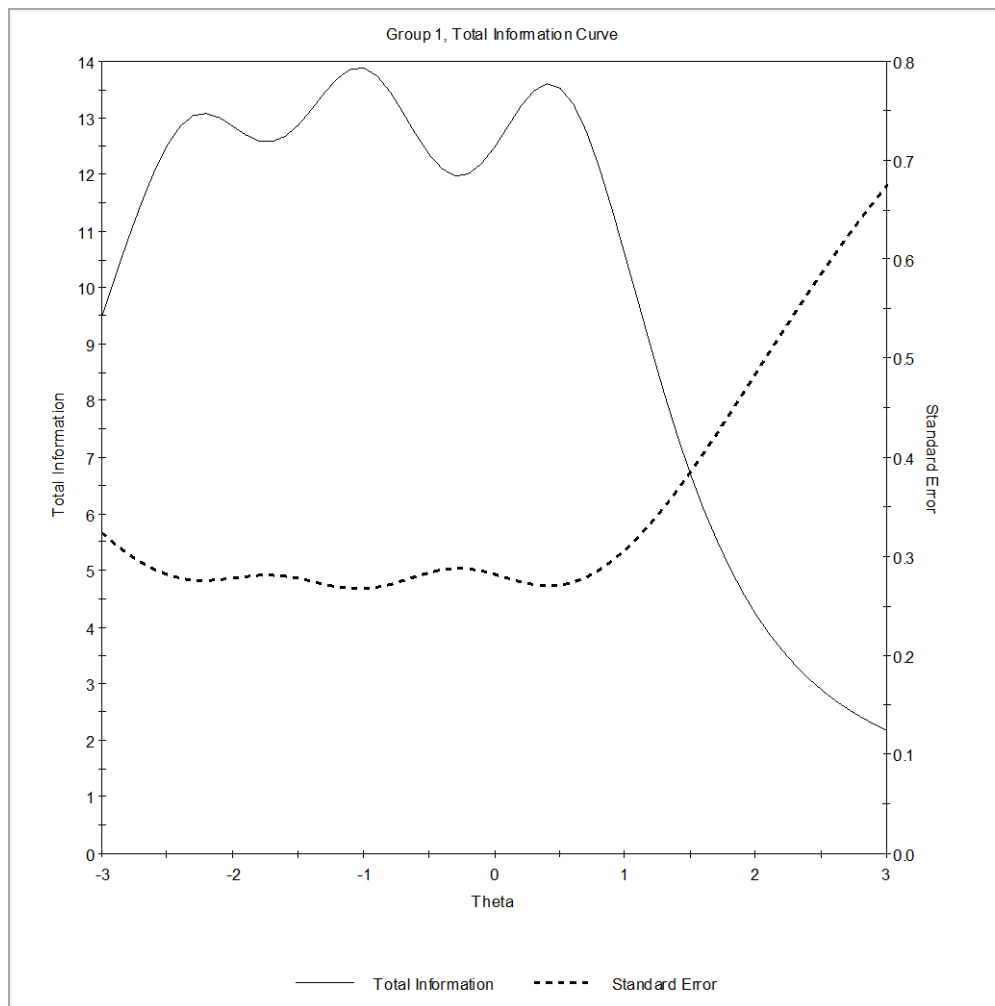
Steps in the research	Procedure	Participants
<b>Step 1</b>		
Literature review	Identification of the initial contents and domains.	Research team.
<b>Step 2</b>		
Qualitative study	Discourse analysis for the identification of the initial contents and domains.	<i>N</i> = 27 people with disabilities (physical, visual and hearing).
<b>Step 3</b>		
Development of initial item pool (110 items)	Construct definition and item development Inter-rater agreement process.  Cognitive debriefing.	Research team.   <i>N</i> = 8 people with disabilities of different types and severity.
<b>Step 4</b>		
Pilot study (46 items)	Analysis of the items' psychometric properties.	<i>N</i> = 80 people with disabilities (physical, visual and hearing).
<b>Step 5</b>		
Validation studies (20 items)	Construct validity analysis for the instrument.  Cross-validation of factorial structure and convergent validity analysis of the instrument.	<i>N</i> = 520+ people with disabilities (physical, visual and hearing).

Figure 1. Steps of the process of development of the Coping with Disability Difficulties Scale.



*Figure 3.* Option Response Functions (ORF) for items of the CDDS scale fit by the GRS model.





*Figure 4.* Total information curve for the CDDS scale (function test information: continuous line; standard error of measurement: dotted line).