Exploring the Multicomponent Structure of Acceptance Attitudes in Portuguese Children Using the Modified Chedoke-McMaster Attitudes toward Children with Handicaps scale

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Abstract: Social participation represent one of the major outcomes of inclusive education. Students with additional support needs often encountered negative attitudes of social acceptance exhibited by their typically developing peers hindering their social participation in the educational context. This study explored the multicomponent structure of Portuguese children's attitudes toward their peers with disabilities using a modified short form of the Chedoke-McMaster Attitudes toward Children with Handicaps scale (CATCH). In particular, this study aimed to (a) determine the factor structure of the CATCH and (b) evaluate the measurement invariance across age and gender. To identify the CATCH factor structure, exploratory and confirmatory factor analyses were conducted on data collected from 1,038 children aged 8–18 years. Analyses revealed that a modified short form of the CATCH consisting of a 20-item measure with a three-factor structure displayed acceptable fit and internal consistency indices. This model proved to be invariant across groups. The Portuguese-modified short form of the CATCH, in which cognitive, affective, and behavioral dimensions are represented, has acceptable psychometric properties and the potential to evaluate the effectiveness of educational programs designed to improve children's attitudes.

Keywords: *Children with disabilities, attitudes, CATCH, confirmatory factor analysis, measurement invariance.*

Introduction

Social participation and academic success of students with additional support needs depend on attitudes of social acceptance exhibited by their typically developing peers (Koster et al., 2010). Negative attitudes often assume the form of social interaction avoidance, bullying, and teasing behaviors (Dillenburger et al., 2017; Llewellyn, 2000), which have been found to be associated with reduced feelings of belonging, security, and acceptance experienced by children with disabilities, leading to the development of maladaptive social skills and problems in school participation (Georgiadi et al., 2012; Hogan et al., 2000; Koster et al., 2010). Therefore, increasing students' positive attitudes toward their peers with disabilities is a central issue in the current educational effort to develop inclusive schools (Dillenburger et al., 2017; Sanches-Ferreira et al., 2019). In this context, the study of the structure of attitudes represents a contribution for understanding how attitudes are formed and how can be modified towards the development of a positive climate in schools fostering the acceptance of all students.

Literature Review

Attitudes are conceived as a multidimensional construct, including the cognitive domain of ideas and beliefs, affective domain of emotional feelings, and behavioral domain of intended actions (Triandis, 1971). Attitudes are also described as *"learned predispositions reflecting how favorable or unfavorable people are toward other people, objects, or events"* (Triandis, 1971, p. 266). As learned predispositions, attitudes are subject to change. Thus, international efforts have been

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made to understand and measure attitudes of students toward peers with disabilities (Bossaert et al., 1997; Yu et al., 2012).

A number of tools for assessing children's attitudes already exist, albeit they differ in terms of techniques used by encompassing direct (in which respondents are clearly asked to describe their own attitudes) and indirect methods (in which participants remain unaware that they are being evaluated) (Antonak & Livneh, 2000). Instruments for assessing attitudes also differ in terms of configuration by regarding attitudes as one-, two-, or three-dimensional constructs. For instance, some assessment tools represent attitudes as a construct of three factors obeying the three-dimensional structure proposed by several authors (Findler et al., 2007; Morin et al., 2013; Triandis, 1971; Zanna & Rempel, 1988), in which attitudes are represented as the cognitive domain of ideas and beliefs, affective domain of emotional feelings, and behavioral domain of intended actions. Other instruments regard attitudes as a two-dimensional or even a one-dimensional construct (e.g., Brook & Galili, 2000; Roberts & Lindsell, 1997). A literature review conducted by Vignes et al. (2008) of self-completion instruments for measuring children's attitudes toward peers with disabilities focused on 19 widely used tools, from which 16 measured only one attitude component, one measured two components, and the remaining two measured all three components.

One of the large existing measures to evaluate the multidimensional concept of attitudes endorsed by typically developing children toward their peers with disabilities consists of the Chedoke-McMaster Attitudes toward Children with Handicaps scale (CATCH) (Rosenbaum et al., 1986). Since its development, the CATCH has been among the most widely used measures of children's attitudes (e.g., Bossaert et al., 2011; Demellweek et al., 1997; Holtz & Tessman, 2007; McDougall et al., 2004; Tirosh et al., 1997; Vignes et al., 2009). In their literature review, Vignes et al. (2008) appraised the CATCH as one of the most complete instruments since it includes all three attitude components: cognitive, affective, and behavioral. The CATCH, which is a reliable and valid assessment tool, has already been used in countries such as France (Vignes et al., 2009), the Netherlands (de Boer et al., 2012a), Belgium (Bossaert et al., 2011), and Israel (Tirosh et al., 1997). More recently, the CATCH has been subjected to modifications based on the confirmatory factor analysis (CFA) technique, suggesting a reduced version of this instrument, specifically with the withdrawal of all items from the cognitive component (Bossaert & Petry, 2013).

The current state of the art shows that the multidimensional structure of attitudes is still debatable, and this goes beyond the CATCH instrument, covering the general discussion on children's attitudes toward their peers with disabilities. The identification of factors that form the structure of children's attitudes may have important theoretical and practical implications. For instance, by identifying the meaningful components of attitudes, teachers may embed them into children's everyday routines to foster disability awareness.

Methodology

Research Goal

This study aimed to explore the multicomponent structure of Portuguese children's attitudes toward their peers with disabilities using a modified short form of the CATCH. In particular, this study intended to (a) determine the factor structure of the CATCH and (b) evaluate the measurement invariance across age and gender.

Sample

Data were collected from a total of 1,038 children from third to ninth grade attending 71 classes from 8 schools within the region of Porto. The children's average age was 11.60 years (SD=2.11), ranging from 8 to 18 years, and 48.1% (n=499) were female.

Instrument

Originally, the CATCH has 36 items and measures three dimensions: cognitive, affective, and behavioral. The total items are equally distributed among three dimensions. Each participant completed the CATCH (Rosenbaum et al., 1986). Items were rated on a 5-point scale, ranging from 0 (*strongly disagree*) to 4 (*strongly agree*). Items were multiplied by 10 according to the computation formula used by the CATCH authors. Therefore, final rates could range between 0 and 40, with higher scores indicating more positive attitudes. Half of the items were negatively worded; therefore, they were reversed.

Despite its three-dimensional structure, the CATCH authors, as other researchers who have investigated children's attitudes using the CATCH, advocated a two-factor structure: affective/behavioral and cognitive dimensions (Rosenbaum et al., 1986; Tirosh et al., 1997). Bossaert and Petry (2013) performed a CFA analysis (N=1,196) to replicate the findings from their exploratory factor analysis (EFA) (N=1,196). First, EFA was performed using principal axis factoring with direct oblimin rotation. The authors removed items that loaded below 0.60 and determined that factors had to consist of at least three items. This procedure resulted in seven remaining items structured in a one-factor solution (five items from the affective component and two items from the behavioral component). The CFA results indicated that fit indices of the one-factor solution were acceptable (RMSEA=0.036, CFI=0.997, SRMR=0.026, BIC=200.728). Thus, the authors

concluded that this one-factor structure of the CATCH was supported and served to measure children's attitudes toward their peers with disabilities. In this one-factor structure, all references about the cognitive component were removed.

The CATCH was translated into Portuguese by two researchers with knowledge of both the English language and the area of special education and inclusion, followed by a back translation carried out by a specialized translator. Small adjustments were subsequently made to the first translation to maximize semantic equivalence.

The children also completed a brief demographic form on which they indicated their sex, date of birth, educational grade, awareness of having a classmate with disabilities, contact with a person with disabilities (outside the school), and subjective knowledge on disabilities.

Procedure

Data were collected after obtaining written consent from the parents of each child. To maintain anonymity, the children were asked not to put any personal identifiable information on the scale. The authors went to schools to administer the scale, providing instructions about its filling and explaining that there were no right or wrong answers and that their opinion was the core issue. The instruction to respond as honestly as possible was repeated. A single stimulus description was read to the class group before having the children completed the questionnaire, which concerned the meaning of "having an impairment" and estimated time for the completion of the questionnaire. The administration of the questionnaire took an average of 15 minutes. In the case of younger children from the third and fourth grades, the authors read aloud each item, allowing time for responses to be recorded after each one.

Analyzing of Data

Analyses of the construct validity of the CATCH were conducted in three stages using EFA and CFA to evaluate, modify, and confirm the underlying factor structure of the Portuguese version of the CATCH. The analytical strategies employed in the current study are described in detail below. Data were analyzed using SPSS 24.0 for descriptive statistics and EFA and AMOS 24.0 for CFA.

Univariate and multivariate outliers were checked before proceeding with analyses. Normality tests were applied to each of the 36 items evaluating their skewness and kurtosis. None of the items exceeded the recommended cutoff values - skewness $|3.00|$ and, kurtosis $|7.00|$.

In the first stage, a CFA was conducted to test the fit of the data from the entire sample to the original three-factor CATCH structure. When the original structure failed to support data obtained in Portugal – due to a poor fit of the data to the original model – a viable factor structure was searched. In this search, data were randomly split into two identical groups, *test data* (n=539) and *hold data* (n=499).

In the second stage, an EFA was conducted on the test data with a view to modify, as necessary, the factor structure of the CATCH. A principal component analysis with subsequent orthogonal rotation (VARIMAX rotation with Kaiser Normalization) was performed, forcing all 36 items to a three-factor solution. Three criteria were used to determine the factor structure: (1) retain items with a factor loading equal to or greater than 0.60, (2) exclude items with double loadings, and (3) consider factors with a minimum of three items belonging to the same attitude dimension (Costello & Osborne, 2005).

In the third stage, a further CFA was conducted with the remaining 499 participants—the hold data—to verify the factor structure that arose in the previous stage. Three models were tested: (1) a correlational structure with three related factors (three-dimensional model including cognitive, affective, and behavioral dimensions of attitudes); (2) a correlational structure with two related factors (two-dimensional model including cognitive and affective dimensions of attitudes); and (3) a one-dimensional model with one general factor (attitudes).

Finally, using the total sample, the CATCH was tested for measurement invariance across demographic variables: sex and age. For this, a multigroup analysis was performed to ensure that differences between groups were due to the construct under evaluation and not due to the measurement instrument (Jekauc et al., 2013). Cross-group constraints were automatically created in a way consistent with the recommendations of Byrne (2001) and Kline (1998). Therefore, for each of the three multigroup analyses, a model was fit that simultaneously imposed constraints on all factor loadings and covariance, forcing the values to be equal across groups. The resultant model was subsequently compared with a baseline model in which none of the factor loadings and covariance were constrained. In these analyses, the absence of observed statistical differences between constrained and unconstrained models is an indicator of factorial invariance, reflecting that the construct is constant across different groups (Dolan & Molenaar, 1994).

To assess the goodness of fit of the three models tested by the CFA procedure, we used multiple goodness-of-fit indices pertaining to different fit classes (absolute, comparative, and parsimony), as recommended by several authors (Brown, 2015; Jaccard & Wan, 1996). This strategy was used to overcome the limitations of each index and establish whether the model was acceptable. The considered goodness-of-fit indices included: (i) as absolute fit indices, the standardized root mean square residual (SRMR), a standardized summary of the average covariance residuals with well-fitting models

obtaining values close to zero as possible, and the root mean square error of approximation (RMSEA) assesses the amount of error of approximation per model degree of freedom, considering the sample size. RMSEA values near or below 0.06 indicate a close fit: (ii) as a comparative fit index (CFI), it is relatively independent of the sample size and compares the hypothesized model to the null or worst-fitting model, indicating an acceptable model with values higher than 0.90; (iii) as a parsimony goodness-of-fit index (PGFI), it estimates the proportion of variance that is accounted for by the estimated population covariance by adjusting for loss of degrees of freedom, with values greater than 0.70, suggesting an acceptable fit. Finally, when comparing the fit of the three models, we specifically examined the Consistent Akaike Information Criterion (CAIC), with smaller values indicating a better fit of the hypothesized model (Brown, 2015; Little, 2013).

Results

First, based on the original conceptualization of the CATCH (Rosenbaum et al., 1986), a three-factor model was tested using CFA. However, in the Portuguese sample, the fit indices for the full model (the three-dimensional scale as originally proposed) show a poor fit of the data to the model (χ^2 =3,074.128; χ^2/df=5.202; RMSEA=0.064; SRMR=0.059; CFI=0.850; PGFI=0.726), indicating the need for considerable improvement in the fit between the model and data to establish a feasible theoretical structure.

Second, an EFA was performed using the test data (n=539). The Kaiser-Meyer-Olkin (KMO) value was 0.956, indicating the sampling adequacy for the analysis. Fifteen items with factor loadings lower than 0.6 were deleted for subsequent analyses. These were items 8, 14, 17, 19, 30, and 36 from the original cognitive dimension; items 6, 10, 18, and 26 from the affective dimension; and items 2, 4, 11, 22, and 35 from the behavioral dimension. The three-factor solution retained only three items on Factor 3, two from the cognitive dimension, and one from the affective dimension; therefore, it was not considered in the subsequent analysis. The retained items from the original affective and behavioral dimensions fitted on Factor 1. Although disregarding the original three-dimensional structure, this result is in line with previous studies (de Boer et al., 2012a, 2012b), including the CATCH authors (Rosenbaum et al., 1986), stating that affective and behavioral dimensions of children's attitudes are structured in one solely factor. This solution explained 53.49% of the total variance, and the eigenvalues for the two factors were 9.21 and 2.03. The first factor consisted of 15 items (from affective and behavioral dimensions), explaining 43.84% of the total variance; and the items had a Cronbach's alpha of 0.94, with a mean inter-item correlation of .52. The average score was 27.67. The second factor consisted of six items (belonging to the original cognitive dimension), explaining 9.64% of the total variance. This factor included items 5, 27, 24, 3, 12, and 33, which had a Cronbach's alpha of 0.78, with a mean inter-item correlation of .38. The average score was 32.38.

Third, the hold data with 499 cases were used in CFA to test the fit of the reduced version of the scale with 21 items. The fit indices showed that this model, with 21 items, was good (χ^2 =520.038; χ^2/df=2.796; RMSEA=0.060; SRMR=0.040; CFI=0.940; PGFI=0.725; CAIC=844.605). Modification indices were examined for the awareness of the caution needed for any modification introduced in the model to be theoretically underpinned (MacCallum et al., 1992). The largest decrease in model χ^2=39.324 was between items 1 ("I would not worry if a handicapped child sat next to me in class") and 20 ("In class I would not sit next to a handicapped child"). Although the subject in action within each statement differs, the implicit meaning of each one is quite similar. The correlation matrix from EFA conducted with the test data already showed an association between items 1 and 20, r(539)=.629, p<0.001, which is categorized as moderate to strong correlation according to Dancey and Reidy's categorization (2004). The option was for deleting from the model item 1, which had the lowest factor loading in the model (λ_{Item1}=.68; λ_{Item20}=.79). Thus, the model was tested again by deleting item 1. In this CFA model (Figure 1), the new fit indices (χ^2=450.909; χ^2/df=2.700; RMSEA=0.058; SRMR=0.0402; CFI=0.945; PGFI=0.722; CAIC=761.051) displayed a better fit when compared to the previous analysis.
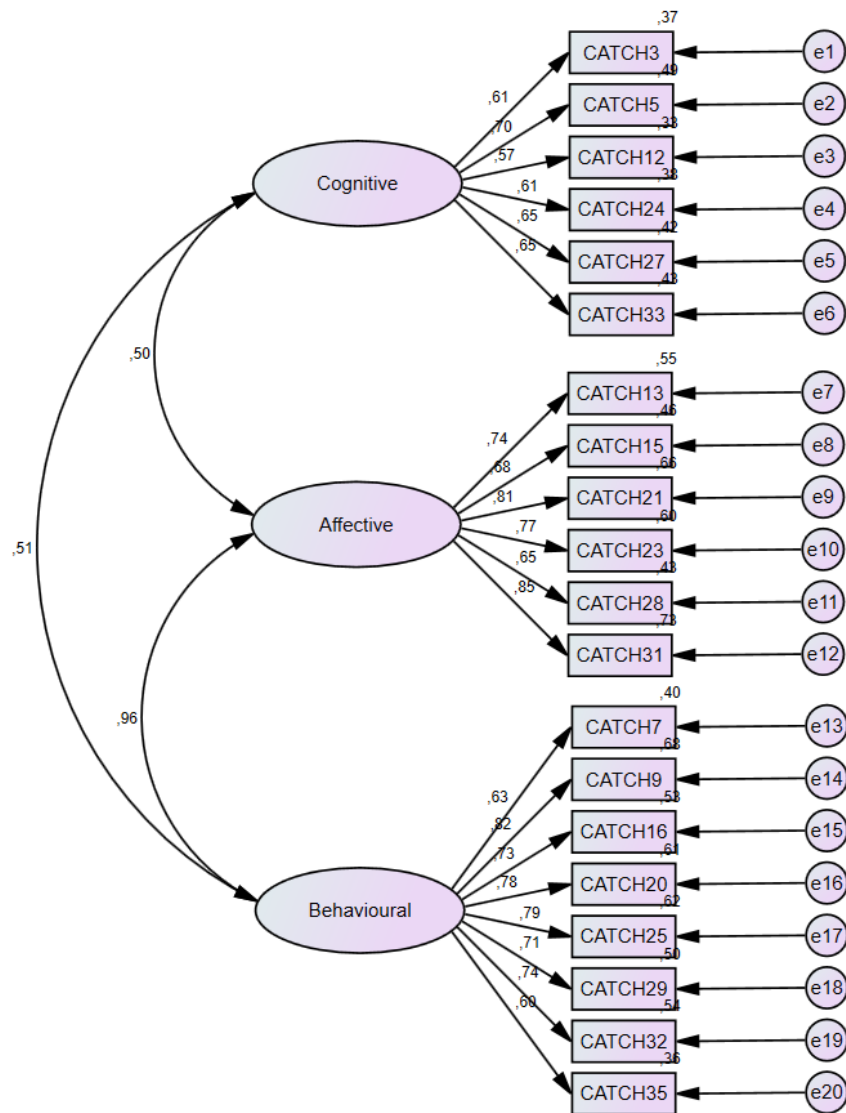
Figure 1. Confirmatory factor model for the 20-item three-factor solution

At this point, we analyzed possible configurations of students' attitudes toward their peers with disabilities to test whether different approaches to the construct of attitudes that have been presented in other studies fit CATCH data. The parameters were estimated, and both absolute and partial goodness-of-fit indices for each model were analyzed (Table 1).

Table 1. Comparison of the CFA indices of fit for different models

Fit indexes Model	χ^2/df	$\Delta\chi^2$	df	RMSEA	SRMR	CFI	PGFI	CAIC
Three-dimensional model (20 items)	2.700	-	167	0.058	0.040	0.945	0.722	761.051
Two-dimensional model (20 items)	2.808	23.648***	169	0.060	0.041	0.941	0.728	770.274
One-dimensional (20 items)	5.688	516.045***	170	0.097	0.084	0.847	0.643	1255.459

The findings showed that the data obtained with the CATCH scale did not fit the one-dimensional model in hypothesis. However, there were good results for both the two-factor and three-factor hypotheses when absolute, comparative, and PGFI were considered. The model fit indices suggested that these two models presented an acceptable fit. In light of these results, we analyzed which of the two models represented a better fit model to the data in the analysis through a chi-square difference test. The results ($\Delta\chi^2$=23.648> $\chi^2_{0.99;(2)}$) demonstrated that there are significant differences, allowing us to reject the null hypothesis and conclude that one of these two models was significantly better than the other. In other

words, the three-dimensional configuration of students' attitudes toward their peers with disabilities appears to be a defensible model, thus justifying our option to proceed with testing this structure.

For all latent variables, the composite reliability (i.e., the overall reliability of a collection of heterogeneous but similar items within underlying traits) and average variance extracted (i.e., accuracy with which the construct is measured) were evaluated. Table 2 displays both indices indicating that values were within a satisfactory interval (above .50, Hair et al., 2011).

Table 2. Composite reliability and average variance extracted from the three-factor model

Dimensions	Composite reliability	Average variance extracted
Cognitive	.845	.500
Affective	.958	.684
Behavioural	.948	.644

Finally, considering the total sample, a multigroup structural analysis was used to investigate whether the three-factor structure consisting of 20 items was invariant across sex and age. Age was treated as a binary variable, with the overall sample divided into children above (n=526) or below (n=512) the mean of 11.6. The other variable was already in a binary format: sex (n_{boys}=499; n_{girls}=539).

Table 3 displays the fit indices for the multigroup-tested measurement invariance. For each tested variable, the baseline model provided a very good fit of the data, and goodness-of-fit indices for the subsequent models with restrictive constraints did not substantially worsen. Thus, significant differences were not found between the models in chi-squared value, given the change in degrees of freedom. As such, the three-factor solution from the CFA was invariant across gender and age.

Table 3. Multigroup analysis fit indices by groups – sex and age – by factor loading constraints for the three-factor solution

Model	χ^2/df	$\Delta\chi^2$	Δdf	p($\Delta\chi^2$)	RMSEA	SRMR	CFI	PGFI
Multigroup Analysis – sex								
No constraints	2.542	-	-	-	0.039	0.042	0.951	0.730
Measurement weights	2.490	25.246	17	.089	0.038	0.042	0.950	0.766
Structural covariance	2.468	32.052	23	.099	0.038	0.046	0.950	0.779
Multigroup Analysis – age								
No constraints	2.557	-	-	-	0.039		0.950	0.729
Measurement weights	2.490	20.121	17	.268	0.038		0.949	0.765
Structural covariance	2.479	31.167	23	.119	0.038		0.949	0.777

Discussion

The present study sought to investigate the factor structure of Portuguese children's attitudes toward their peers with special needs using the CATCH scale. In fact, the CATCH scale has been reported as one of the most complete measures of children's attitudes toward their peers with disabilities, although its multidimensional structure appears an unresolved issue. Our results support the originally hypothesized three-factor structure (i.e., cognitive, affective, and behavioral components), despite the withdrawal of 16 items. Hence, a reduction of the original CATCH is suggested based on a three-factor measurement model, which has shown good overall fit using 20 of the original CATCH items. We further investigated whether the latent constructs under analysis were identically measured across groups, specifically with regard to sex and age. The factor loadings and covariance did not significantly differ, indicating that the constructs appeared to have the same meaning across groups.

This study provides empirical evidence that children's attitudes toward their peers with disabilities can be described in accordance with a three-dimensional model. In this regard, two major issues are noteworthy. First, regardless of what has been found in other European studies (e.g., Bossaert et al., 2011; de Boer et al., 2012a), our data showed that the independence between affective and behavioral dimensions still appears to be defensible. However, the existing strong correlation between both dimensions cannot be masked and points for the difficulty in distinguishing children's views about *how they feel about* from *how they intend to behave toward* their peers with disabilities. The original authors of the CATCH have already remarked on the problem of identifying "*pure behavioral intent items that are independent of affect*" (Rosenbaum et al., 1986, p. 116). The semantic analysis of items associated with each of these dimensions already

heralded the difficulty of dissociating emotions from the intention to act toward peers with disabilities, especially considering that, often, the difference between items is in the nature of the verb used in the item but not in the overall sense/meaning of the item. Considering that a bi- or three-dimensional structure may not have significant implications since the results indicated that the merging of affective and behavioral dimensions in one sole factor also revealed acceptable fit indices. However, at the analytical level, our findings revealed that such a two-dimensional structure did not present a better adjustment than the three-dimensional solution.

Second, the cognitive dimension was clearly differentiated in the short form of the CATCH used in this study. Most theorists that conceive attitudes as a multidimensional concept recognize the centrality of the cognitive dimension in attitude formation (e.g., Ajzen & Fishbein, 1980). Thus, the assessment of the cognitive component appears fundamental in intervention programs aimed at changing students' attitudes toward their peers with disabilities. The more an attitude object is viewed as fundamental to obtain valued goals (e.g., equity in human rights, contribution for a better society) and block negative events (e.g., reduction of discrimination conflicts), the more favorable the person's affects and actions toward the object (Ajzen, 2005). Further, negative attitudes stem from a lack of knowledge about disability (Ison et al., 2010). As remarked by Antonak and Livneh (1988), attitudes are relatively stable and, hence, can be resistant to change. Albarracin et al. (2005) presented a processing framework for attitudes, described in three phases: (1) initial spontaneous activation of memory contents, (2) deliberation phase, and (3) response phase. By analogy, if applied to attitude change toward persons with disabilities, we can consider that before observing changes in affective and, mainly behavioral dimensions, changes can be detected in the cognitive dimension. Therefore, its inclusion in attitude evaluations is rather important in increasing the sensitivity to identify minor and major changes resulting from attitude-changing interventions.

Although most tools designed to assess children's attitudes toward peers with disabilities present a one-factor configuration (Vignes et al., 2009), the results of this study suggest that considering the independence between cognitive, affective, and behavioral is more conceptually consistent.

Furthermore, the translation and adaptation of a measurement tool to a new culture is a complex process that requires the analysis of the appropriateness of the items to the population. The Portuguese reduced version of the CATCH-scale obtained after its administration to 1,038 students includes 20 of the 36 original items. The reduction of this number of items indicates that the inclusion of children with disabilities in regular schools substantially evolved since the date the CATCH-scale was developed in 1986. Nevertheless, the study of attitudes, acceptance and social participation of children and youth with disabilities has been an area of growing interest as the concept and practice of inclusive education has gained momentum, followed by worldwide efforts of national governments to develop inclusive education (Ainscow et al., 2019).

Conclusion

This study suggests that a three-factor solution, in which cognitive, affective, and behavioral dimensions are represented, is a viable option for using the CATCH with Portuguese children from third to ninth grades and has the potential to evaluate the effectiveness of educational programs designed to improve children's attitudes. This three-factor model was consistent across age and sex.

The worldwide efforts towards the implementation of inclusive educational systems place the focus on creating positive environments in schools where all students feel they are accepted and part of the community. These efforts include promoting the social participation of all students and making the school and each class a community, based on values such as respect and tolerance for diversity and where positive attitudes prevail. Therefore, understanding the conceptual structure of attitudes is crucial due to its potential to support a better comprehension of how attitudes are formed, strengthened, or modified. Within this context, our results may have a high practical value for designing successful attitude change programs. In particular, the inclusion of cognitive, affective, and behavioral dimensions within the structure of attitudes applies for the use of both strategies of promoting positive contact experiences with persons with disabilities and providing information and knowledge about disability issues. In this sense, modifying the cognitive dimension of attitudes is a prerequisite to modifying the affective and behavioral dimensions in the long-term, characterized as more stable and difficult to change.

Recommendations

Based on these results, the reduced version of the CATCH should be employed in samples from other countries to test its equivalence in different contexts and examine its properties of measurement invariance. Further, exploring the association of the CATCH with other measures of children's behaviors toward peers with disabilities (e.g., interactions' observation) may prove beneficial, specifically in exploring the association between attitudes and actual behaviors. Another area for further research consists of using the reduced version of the CATCH to analyze attitude stability over time and their potential for change through teachers' instruction.

Limitations

The main limitation of the current study is that the sample was recruited from selected schools in one region of Portugal; hence, the generalization of results can be limited. Taking into account this limitation, the research team developed efforts to achieve a large sample, enhancing the chances to include a wide diversity of students' characteristics representative of the population.

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Authorship Contribution Statement

Alves: Conceptualization, design, data acquisition, analysis, writing. Lopes-dos-Santos: Conceptualization, statistical analysis, writing. Sanches-Ferreira: Editing/reviewing. Silveira-Maia: Editing/reviewing.

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