

Psychometric Analysis of a Scale of Empathy in Mexican children Análisis Psicométrico de una Escala de Empatía en niños mexicanos

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Abstract: Empathy is an affective response that allows establishing healthy relationships, generating a better coexistence between individuals, therefore, it is important to have valid and reliable instruments to measure that construct. The main goal of the present research was the adaptation and translation of an empathy scale for children. The scale has 28 items, it was applied to 293 children between 8 and 12 years old in Mexico City. Results showed a Cronbach's alpha of .753 on the overall scale, leaving 10 items. The validity of the construct was confirmed through the exploratory factorial analysis of principal components with varimax rotation, from that analysis three factors were obtained that explain 36.86% of variance. A confirmatory factorial analysis was also carried out, showing good indexes of adjustment of the model.

Key words: children, empathy, pro-sociality, scale, sympathy

Resumen: La empatía es una respuesta afectiva que permite establecer relaciones saludables, generando una mejor convivencia entre los individuos, por ello, es importante contar con instrumentos válidos y confiables para medir dicho constructo. El objetivo del presente trabajo fue la adaptación y traducción de una escala de empatía para niños. La escala cuenta con 28 reactivos, se aplicó a 293 niños de entre 8 y 12 años en la Ciudad de México. Los resultados mostraron un alfa de Cronbach de .753 en la escala total, quedando de 10 reactivos. Se confirmó la validez de constructo, a través del análisis factorial exploratorio de componentes principales con rotación varimax, del cual se obtuvieron tres factores que explican 36.86% de varianza, a su vez se realizó un análisis factorial confirmatorio mostrando buenos índices de ajuste del modelo.

Palabras clave: empatía, escala, niños, pro-socialidad, simpatía

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Introduction

Empathy is a key concept in several studies about social behavior in humans (Demetriou, 2018; Szanto & Krueger, 2019) and non-human animals (Pérez-Manrique & Gomila, 2018). Cuff, Brown, Taylor & Howat (2016) define empathy as

...emotional response (affective), dependent upon the interaction between trait capacities and state influences. Empathic processes are automatically elicited but are also shaped by top-down control processes. The resulting emotion is similar to one's perception (directly experienced or imagined) and understanding (cognitive empathy) of the stimulus emotion, with the recognition that the source of the emotion is not one's own (p. 7).

This definition highlights two important dimensions in the study of empathy: the affective dimension and the cognitive dimension. Both dimensions possess their own particular characteristics and have been related with different brain regions and cerebral activity (e. g., Shamay-Tsoory, 2009, 2011). The affective dimension, also called emotional empathy, is an automatic emotional response that implies a contagion of the affective states from one individual to another. "I feel the same as the other person feels" (Mafessoni & Lachman, 2019). The cognitive dimension implies the recognition of the emotional state and the comprehension of why the emotional response was generated, which means that the individual is capable of explaining his or her emotions and why these emotions are generated by another person, which is commonly called theory of mind (de Waal & Preston, 2017).

Empathy is a fundamental trait in many psychological disorders. In the literature it has been proved that people diagnosed with autistic spectrum disorder (ASD) show poor performances in verbal and behavioral tasks of theory of mind (Baron-Cohen, 2000; Begeer, et al., 2011; Meyza, Ben-Ami Bartal, Monfils, Panksepp & Knapska, 2017) but their performance in emotional empathy tasks is normal (Mazza, et al., 2014). In patients with antisocial personality disorder, the studies

show normal scores during theory of mind tasks (Dollan & Fullam, 2004), but show emotional impairment (Cigna, Guay & Renaud, 2017) which is associated with emotional empathy disorders.

Empathy has been related to different behavioral and personality traits like:

Prosociality: an individual behavior that produces a benefit in another individual. This behavior is costless for the individual (e. g., Decety, Bartal, Uzefovsky & Knafo-Noam, 2016; Hepach & Warneken, 2018).

Cooperation: an activity in which two or more individuals work to reduce effort and increase income (e. g., Melis & Warneken, 2016).

In studies about social dynamics in school, empathy has been related with larger and more cohesive social circles, and children with higher scores on empathy scales were more efficient at dealing with social problems (Warden & MacKinnon, 2003; Warneken, 2017).

Empathy is also related to:

Extraversion: an individual tendency to interact with new people and in situations that imply high social interaction (Song & Shi, 2017).

Sympathy: an affective response consisting of sad feelings and concern about others (Thompson, Uusberg, Gross, & Chakrabarti, 2019).

Altruism: a behavior which usually consists of solving the needs of another individual before one's own needs, which generates a detriment in the issuer of altruistic behavior (Bernal-Gamboa, 2019).

In other cases, like therapeutic adherence, it has been shown that physicians with higher levels of empathy get their patients to be more precise and constant during their treatment (Hojat, Louis, Markham, Wender, Rabinowitz & Gonella, 2011).

Empathy has been associated negatively with other variables, such as:

Aggression: an intentional behavior in which one individual directly or indirectly damages or tries to damage another individual (Estévez, Jiménez, & Segura, 2019)

Machiavellianism: a personality with traits like interpersonal manipulation, abnormal behavior, and abnormal thoughts (Al Aïn, Carré, Fantini-Hauwel, Baudouin, & Besche-Richard, 2013).

Distress: a condition where the environmental demands exceed the individual capabilities causing physical and emotional dysfunction (Kim & Han, 2018).

Empathy changes across the life span (e. g., Decety et al., 2016; Jeffrey, 2019). Data indicates that toddlers of 18 months are capable of expressing prosocial behaviors which are based in emotional processing (Levy, Goldstein & Feldman, 2019; Svetlova, Nichols & Brownell, 2010). Longitudinal studies on adolescents show an increasing tendency in empathy indexes over the course of a year. These results also show that women have higher indexes than men (Christov-Moore, Simpson, Coudé, Grigaityte, Iacoboni, & Ferrari, 2014; Mestre, Samper, Frías & Tur, 2009). In adults there is also an increase in empathy measured through tasks of moral situations and decisions. However, the increase only correlates with measures of emotional empathy and not with cognitive empathy (Rosen, Brand & Kalbe, 2016).

Empathy indexes are commonly calculated using different instruments that only measure one of the components of empathy. The more common instrument is the Empathy Quotient (EQ [Lawrence, Shaw, Baker, Baron-Cohen, & David, 2004]). This is an instrument for adults with 60 items (e. g. I find it easy to put myself in somebody else's shoes) and evaluates the individual's level of agreement or disagreement with the items. The scale measures both components, but principally emotional empathy. Another common instrument is the Toronto Empathy Questionnaire. This is an instrument for adults with 16 items (e. g. I enjoy making other people feel better), and the items are evaluated based on how often the state or feeling is experienced (Spreng, McKinnon, Mar & Levine, 2009).

The instruments for children calculate a general index of empathy, and some of those instruments are available in Spanish. One example of these instruments is the Cognitive and Affective Empathy Test for Children and Adolescents (TECA-NA by its initials in Spanish). This is an instrument with 30 items that evaluates empathy in a population from 10 to 16 years old (López-Pérez, Ambrona & Márquez-González, 2014).

Having instruments allows us to do precise psychological evaluations for therapeutic intervention. Therefore, it is important to standardize the instruments for the target population. In the Mexican population, two instruments are available that measure empathy: one for middle-school students (Bautista-Hernández, Vera, Tánori, & Valdés, 2016) and the other for students of medicine (Alcorta-Garza, González-Guerrero, Tavitas-Herrera, Rodríguez-Lara, & Hojat, 2005); however, there are no instruments that evaluate empathy in Mexican children.

Early evaluation is very important to detect different psychological dysfunctions and to offer treatments with better results (Costello, 2016; Georgiou, Kimonis & Fanti, 2018). The evaluation of empathy is particularly important since it is related with ASD (van der Zee & Derksen, 2019). The main goal of this study was to translate and validate an instrument to measure the affective and cognitive components of empathy in a population of children between 8 to 12 years old.

Method

The present experimental protocol was conducted under strict agreement of the guidelines established by the Ethical Committee of the Faculty of Psychology of the National University of Mexico¹, and by the ethical code of the Mexican Society of Psychology². Finally, the scale was applied under the informed consent of the children's legal guardians and schools' authorities. The researchers were allowed to work in the schools' facilities for two weeks.

1 (<http://www.psicologia.unam.mx/comite-de-etica-de-investigacion-de-la-facultad-de-psicologia/>)

2 (http://www.psicologia.unam.mx/documentos/pdf/comite_etica/CODIGO_ETICO_SMP.pdf)

Participants

The instrument was applied to a sample of 293 children from two different elementary schools in Mexico City. The average age was 10.3 years ($\sigma = 1.294$). 50.9% of the participants were girls. 23.2% of the sample was in third grade, 16.1% was in fourth grade, 28.4% was in fifth grade and 32.2% was in sixth grade.

Due to the analyses that were carried out, it was necessary to replace unanswered items with the median of the participant's total responses.

Instrument

The instrument applied was the adaptation of "A questionnaire to assess affective and cognitive empathy in children" from Zoll and Enz (2005). This scale was built with items from three different scales (Bryant's Index of empathy measurement,

1982; Leibetseder's E-Skala, 2001; Garton y Gringart's IRI versión, 2005) and 11 new items were added. Additionally, the Eisenberg's Child-Report Sympathy Scale (Eisenberg, Fabes, Shepard, Murphy & Jones, 1998) was added for validation purposes.

The scale was made up of 28 items, and all of the items from the original scale were preserved. Each item had a response scale of five options that were: I strongly disagree, I somewhat disagree, I don't agree or disagree, I somewhat agree, and I strongly agree. Twenty-seven of the items were positive, which means that a higher score implies a higher level of empathy. The items were kept in their original order. Table 1 shows the items and the dimension they measure, and the items from Eisenberg's Child-Report Sympathy Scale (Eisenberg, et al., 1998) which the authors reported separately.

Table 1.
Factors of the Empathy Scale for children

Cognitive Empathy

3. When I am angry or upset at someone, I usually try to imagine what he or she is thinking or feeling

5. I can tell by looking at a person, whether they are happy

7. I really like to watch people open presents, even when I don't get a present myself

10. When I am arguing with my friends about what we are going to do, I think carefully about what they are saying before I decide whose idea is best

11. I can tell what mood my parents are in by the look on their faces

14. I notice straight away when something makes my best friend unhappy

17. I can often guess the ending of other people's sentences because I know what they are about to say

19. I often try to understand my friends better by seeing things from their point of view

21. On the phone I can tell if the other person is happy or sad by the tone of their voice

23. I often know the ending of movies or books before they have finished

26. I think people can have different options about the same thing

29. I can tell by the look on my parent's face whether it's a good time to ask them for something

Affective Empathy

4. It makes me sad to see a child who can't find anyone to play with

6. Seeing a child who is crying makes me feel like crying

8. Sometimes I cry when I watch TV

12. I get upset when I see a child being hurt

15. Some songs make me so sad I feel like crying

18. When I see someone suffering, I feel bad too

20. When I walk by a needy person I feel like giving them something

22. It upsets me when another child is being shouted at

25. When my parents get upset I feel bad

27. I get upset when I see an animal being hurt

Eisenberg's Sympathy Scale

2. I feel sorry for other kids who don't have toys and clothes

9. When I see someone being picked on, I feel kind of sorry for them

16. I feel sorry for people who don't have the things that I have

24. When I see another child who is hurt or upset, I feel sorry for them

28. I often feel sorry for other children who are sad or in trouble

13. I don't feel sorry for other children who are being teased or picked on

The original scale was applied to 623 children from the United Kingdom (N = 472), Germany (N = 92), and Portugal (N = 55). Their ages were from 8 to 14 years old ($\bar{x} = 9.90$; $\sigma = 0.92$). The results from the analysis show that two factors explain 31.19% of the variance and there were no differences between countries. The scale was formed using 22 items: 12 that measure cognitive empathy, 10 that measure affective empathy, and 6 items from Eisenberg's Child-Report Sympathy Scale.

The translation process was done in two parts: 1) textual translation of the items and their grammatical correction, and 2) analysis of the items by four judges who were experts in emotions and empathy. The judges were bilingual and Spanish was their native language and English their second language. The judges analyzed the translation of each item and whether each item measures one, and only one, of the dimensions of empathy. At the end of the process, all of the judges agreed on the translation. The final items looked like this:

I feel sorry for other kids who don't have toys and clothes (Original)

Siento pena por otros niños que no tienen juguetes ni ropa (Translated)

It makes me sad to see a child who can't find anyone to play with (Original)

Me pone triste ver a algún niño que no encuentre con quien jugar (Translated)

Seeing a child who is crying makes me feel like crying (Original)

Al ver a un niño que está llorando, me dan ganas de llorar (Translated)

Validation and item discrimination

The data was captured using the statistical software SPSS (Ver. 21). A frequency distribution analysis on every item helped to discard those that had more than 55% of their answers in one of the options,

since there is a lack of variability for the statistical analysis. The results showed that in items 2(55.6%), 7(56%), 12(60.4%), 20(55.6%), 25(59.7%) and 27(77.8%) the children chose the option strongly agree.

The skewness and kurtosis scores were calculated for each item, and the values oscillate between 5.15 to 0.21. The results have shown that item 27 had a skewness value of -2.472 and 5.156 of kurtosis, which is higher than accepted values.

The total score on the scale and total score on each factor was calculated. The data distribution of the responses was divided into groups of quartiles and group 1 (quartile 1) was compared against group 3 (quartile 3) using an independent-sample t-test for each item. Our results showed that item 13 did not discriminate between groups ($p = 0.748$).

The correlation indexes were calculated for every item with the total score from the scale. These correlation values oscillated from 0.58 to 0.01. Item 13 was not correlated with the total score from the scale ($r = 0.016$), which means that it did not measure any of the empathy scale factors.

Exploratory factor analysis (EFA)

To verify the matrix of correlations we ran two tests: the Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity test. The KMO was 0.805 and Bartlett's sphericity test was statistically significant ($p = 0.000$). We ran a maximum likelihood EFA with varimax rotation and a maximum amount of 25 iterations. In the factorial loads, values under 0.40 were excluded. Table 2 shows the factorial loads from each item rounded from 0.674 to 0.419. The items that did not load to any factor were removed from the final matrix. The internal consistency quotient was calculated with a Cronbach's alpha for all of the scales and subscales (Table 2).

Table 2.
Cronbach Alpha of each factor and factorial loads from the items

Item	Factor			
	Concern for others	Cognitive	Affective	
24. Cuando veo a otro niño herido o molesto, siento pena por él	.650			
28. Suelo sentir pena por otros niños que están tristes o en problemas	.591			
16. Siento pena por las personas que no tienen las cosas que yo tengo	.445			
26. Pienso que la gente puede tener diferentes opciones acerca de la misma cosa		.667		
14. Noto de inmediato cuando algo hace infeliz a mi mejor amigo		.522		
19. Regularmente trato de entender a mis amigos viendo las cosas desde su punto de vista		.493		
6. Al ver un niño que está llorando, me dan ganas de llorar			.674	
22. Me molesta cuando otro niño es regañado			.439	
18. Cuando veo a alguien sufriendo también me siento mal			.429	
20. Cuando camino cerca de algún necesitado, siento ganas de darle algo			.419	
<i>Number of items</i>	<i>Total</i> 10	3	3	4
<i>Explained variance</i>	36.86	13.584	11.924	11.351
<i>Cronbach Alpha</i>	.753	.631	.599	.656

Confirmatory factor analysis (CFA)

This analysis was run in AMOS, an extension of SPSS, with the data of 293 participants using polychoric correlation. The

CFA was run using a model of three factors with 10 items and the original model with three factors and 28 items. The indexes of both models appear in Table 3.

Table 3.
Indexes of statistical fit of both models

Model	χ^2 (DF)	CMIN/DF	RMR	AGFI	CFI	NFI	AIC	RMSEA	LO	HI	P
1	41.015 (31)	1.323	.063	.953	.979	.921	89.015	.033	.000	.058	.849
2	597.462 (347)	1.722	.108	.851	.799	.632	715.462	.050	.043	.056	.519

Note: Meanings; χ^2 : Chi-squared; DF: Degrees of Freedom; CMIN/DF: Chi-squared between Degrees of Freedom; RMSR: Root Mean Square Residual; AGFI: Adjusted Goodness of Fit Index; CFI: Comparative Fit Index; NFI: Normed Fit Index; RMSEA: Root Mean Square of Approximation; AIC: Akaike Information Criterion.

The bivariate correlations were calculated with the total amount of each subscale (Table 4).

Table 4.
Indexes of correlation between the subscales

<i>Subscale</i>	<i>Concern for others</i>	<i>Cognitive</i>	<i>Affective</i>
<i>Concern for others</i>	1.000		
<i>Cognitive</i>	.267*	1.000	
<i>Affective</i>	.482*	.268*	1.000

Note: *p < .05.

Finally, descriptive analysis is shown in Table 5.

Table 5
Means and standard deviation of the subscales from the Empathy Scale in children

Subscale	Mean*	Standard deviation
<i>Concern for others</i>	9.0464	2.379
<i>Cognitive</i>	9.494	2.083
<i>Affective</i>	11.967	3.138

*Theoretical mean = 2.5.

Discussion

The goal of this study was the translation and the validation of the Zoll and Enz questionnaire (2005) in a population of Mexican children from 8 to 12 years old. This adaptation is the first attempt to make a questionnaire for a child population under 10 years old. As was mentioned, it is necessary to have instruments for early detection of different psychological problems during child development that can compromise their future.

The results show that the instrument possesses a medium level of reliability ($\alpha = 0.735$) and explained variance (36.86%). Compared with the previous instrument that

measured empathy, the scales have good indexes. For example, the original scale explained 31.19% of the variance even when the authors applied their instrument to 600 children (Zoll & Enz, 2005). Another example is Bryant’s empathy index (Wied et al. 2007), which was applied to children in third, fourth, and eighth grade, and the alphas were 0.52, 0.62, and 0.65, respectively. These results were similar to the original scale from 1982 (Bryant, 1982). In a similar way, Lopez-Perez et al. (2014) applied their instrument TECA-NA to 670 children from Spain and reported 38.88% of the explained variance. Finally, the instrument of Garton & Gringart (2005) explained 36.4% of the variance and their two factors had an alpha of 0.69 & 0.54 respectively. A possible explanation for this result might be that the construct of empathy is not easy to measure, since having positive items it could be prone to biased results.

The EFA gave results for three factors. The first was related to the cognitive component, the second was related to the affective component, and the third one, with items from the Eisenberg’s Child-Report Sympathy Scale (Eisenberg et al., 1998), was named concern for the other. The results showed good adjustment of the three indexes proposed by the EFA.

Some authors have proposed the empathic sadness factor and the attitude factor as relevant to measuring empathy (Wied et al., 2007). Other authors, such as López-Pérez et al., (2014) have proposed four important factors to measure empathy: perspective taking, emotional understanding, personal discomfort, and empathetic happiness. However, consider that these factors are part of the two components of cognitive and affective empathy. Likewise, Zoll & Enz (2005), among other authors (Smith, 2006, Garton & Gringart, 2005), also consider the cognitive and affective components as the main factors of empathy.

In the present paper, it was decided to take the Eisenberg’s Child-Report Sympathy Scale (Eisenberg et al., 1998) as a third factor which was named concern for the other, based

on the model proposed by Frans de Waal. According to his multi-level empathy model (e.g., de Waal & Preston, 2017), there are three empathic levels: emotional contagion, concern for the other, and perspective taking of the other. The first level is based on emotional contagion that allows rapid emotional communication between subjects. The next level (concern for the other), is related to the execution of actions that relieve the other from painful situations or that help him or her to feel better. Finally, the third level is the most complex and involves the attribution of mental states in others (see also, de Waal, 2008).

Even though the correlations between factors are small, the EFA indexes show a good fit to the proposed model. As it was mentioned before, due to the difficulty of measuring the construct of empathy, the explained variance and the index of internal consistency demonstrate good levels. Based on this, we can conclude that the instrument is valid and reliable, taking into account that this is the first attempt at adapting a scale to measure empathy in Mexican children.

Importantly, there are a few ways that the instrument could be improved. One recommendation is to add more items based on the three factors and apply the scale to a larger sample (both public and private schools) to increase the validity and reliability indexes. We also suggest that future studies should conduct another analysis of validity such as construct validity and apply the scale with instruments that measure related variables such as cooperation, altruism, or aggression, which may be helpful to detect unwanted behaviors such as harassment or aggression against peers or other living beings.

Authors' participation:

a) Conception and design of the work; b) Data acquisition; c) Analysis and interpretation of data; d) Writing of the manuscript; e) Critical review of the manuscript.

T.A.M. has contributed in c, d, e; N.C. in c; J.E.R.-C. in a, d, e; R.B.-G in a, b, d, e.

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