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Adaptation and Evidence of Validity of the Prosocial Tendencies Measure (PTM) to the Brazilian Context

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Abstract

Prosocial behavior is usually defined as a set of actions aimed to benefit others. This study aims at presenting validity and reliability evidence for the Brazilian version of the Prosocial Tendencies Measure (PTM). The study was conducted with 555 students ($M_{age} = 23,38$; $SD = 6,24$) from public and private universities in southeastern Brazil, 69% being female. The scale showed good evidence of content validity. The internal 6-factor structure was tested by Confirmatory Factor Analysis and showed acceptable goodness-of-fit indices. The Multigroup Confirmatory Factor Analysis (MCFCA) accepted configural, metric and scalar invariance, indicating that the PTM is an equivalent measure for men and women of different age groups. No unexpected response patterns to the instrument's items were found. Evidence of convergent validity was observed with the Prosociality Measurement Scale (EMPA). The reliability indices obtained indicated adequate internal consistency of the instrument. The adapted scale shows evidence of reliability and validity, making it suitable for use in the Brazilian context.

Keywords Adaptation · Colleges · Validation evidence · Scale · Prosocial

This study aims at presenting validity and reliability evidence for the Brazilian version of the Prosocial Tendencies Measure.

The internal 6-factor structure was tested by Confirmatory Factor Analysis and showed acceptable goodness-of-fit indices.

The PTM is an equivalent measure for men and women of different age groups, according to the MCFCA.

The reliability indices obtained indicated adequate internal consistency of the instrument.

The adapted scale shows evidence of reliability and validity, making it suitable for use in the Brazilian context.

Introduction

Prosocial behavior is usually defined as a set of actions aimed to benefit others (Eisenberg et al., 2006; Eisenberg & Fabes, 1998). Some examples of such behavior are: sharing and giving resources, helping and assisting others, volunteerism, cooperation, and comforting others (Carlo, 2014). Prosocial behaviors are important indicators of social well-being and morality, and such actions have been linked positively to physical and behavioral health, academic outcomes, and positive interpersonal relationships (Carlo, 2014). The Researches in the area diverges in terms of how these prosocial tendencies are categorized, which are based on both intentions and motivations for their manifestation (Batson & Powell, 2003; Feigin et al., 2014; Krebs, 1970; Rodrigues & Hewig, 2021). Thereby, the wide range of actions that can compose prosocial behavior allowed the emergence of different operational definitions and, consequently, ways of measuring this concept.

The Prosocial Tendency Measure (PTM) came into being from the discussion between two prosocial tendency measurement categories: the first one concerns measures that assess behavior as an overall framework, and the second

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one concerns instruments that assess behavior in specific situations (Carlo & Randall, 2002). Based on theory and research suggesting that prosocial behavior may take different forms (Eisenberg & Fabes, 1998; Fabes et al., 1999), the scale was firstly designed to investigate the psychometric properties of a multidimensional measure of prosocial tendency among college students and young adults (Carlo & Randall, 2002).

The original PTM scale was designed with 23 items subdivided into 6 dimensions, namely: altruistic (voluntary helping behavior motivated by internalized moral principles of helping others); compliant (helping behavior motivated by the verbal or nonverbal demand of someone); anonymous (helping where the person receiving the help does not know who offered help); emotional (orientation to help others in emotionally evocative situations); public (behavior motivated by a desire for approval and recognition from others); dire (behavior motivated by emergency circumstances). The PTM was validated in the North American context, showing fair goodness-of-fit psychometric indices, evidence of individual differences in prosocial tendencies of college students. It thus validated the multidimensional model that also allowed the correlation between patterns of individual characteristics and different types of prosocial tendencies (Carlo & Randall, 2002). The scale was further applied to a sample of adolescents. After some modifications it comprised 25 items and was named Prosocial Tendency Measurement-Revised (PTM-R). The new version of the instrument also showed good psychometric properties for the multidimensional structure with six types of tendencies (Carlo et al., 2003).

Studies showing that factors such as gender and age influence how different dimensions of prosocial behavior tendencies are expressed support the advocacy for different dimensions of this behavior (Carlo et al., 2003; Carlo & Randall, 2002). Moreover, the different dimensions also correlate differently with each other, showing that although concerning the same prosocial behavior they have different motivations (Carlo & Guzman, 2009; Christ et al., 2016). Research has also shown correlations between the subscales of PTM and cognitive variables, emotional variables, and measures of responsibility and social desirability (Carlo et al., 2003). Finally, prosociality dimensions relate in different ways also to other constructs commonly studied in the field of moral development, such as empathy (Davis et al., 2019; Gülseven et al., 2020; Rodrigues et al., 2017).

PTM is a self-report scale, easy to apply, and has been widely used. Authors recommend that it be computed for each of its subscales or dimensions, and to avoid global trend measures (Carlo & Randall, 2002). The nature of each of the six dimensions of prosocial behavior has been the focus of research that has investigated the relations

between these dimensions and other diverse constructs such as: parental socialization practices and values of familism (Calderón-Tena et al., 2011), moral constructs (Mestre et al., 2019), personality traits and individual affective dimensions (Rodrigues et al., 2017), comparative studies between the original multidimensional model of prosocial tendency (Carlo et al., 2003; Carlo & Randall, 2002; Ngai & Xie, 2018), and the applicability of the model in different non-Western cultures (Gülseven et al., 2020; Ngai & Xie, 2018).

Prosocial tendencies are also investigated by other instruments: the Extent of Global Prosocial Behavior (Rushton et al., 1981), which measures an overall index measure of prosocial behavior; and the Prosocial Moral Reasoning (PROM; Carlo, Eisenberg, & Knight, 1992), which aims to assess prosocial moral reasoning. Another instrument that should be mentioned is the Prosociality Measurement Scale (EMPA), developed by Caprara, Steca, Zelli and Capanna (2005); however, its theoretical basis is other than that adopted in the present research (classifies prosocial behaviors as sharing, helping, caring, and empathy). The EMPA was translated and semantically validated into Portuguese by the *Laboratório de Investigação Pró-social Aplicada* (LIPA) of the Universitat Autònoma de Barcelona (Spain) (Roche & Selva, 2010).

The PTM has been translated and adapted for several cultures given the importance of studying prosocial behavior, and the relevance of these studies to both the individual and social domains. For example, the instrument was applied to Iranian students (Azimpour et al., 2012) and also to a sample of German university students (Rodrigues et al., 2017). In both studies, the objective was to validate and adapt the scale and to analyze its multidimensionality. In the Portuguese culture, the PTM was adapted and translated to build evidence for an intervention project named Heroic Imagination Project (Silva, 2016). All these studies found good evidence of validity.

In addition to the aforementioned validation studies, the PTM has been validated and translated to Spanish in Argentina with a sample of adolescents (Richaud et al., 2012) and with a cross-cultural sample of older North American and Argentinian adolescents (McGinley et al., 2014). Other validation studies have been carried out with Spanish adolescents (Mestre et al., 2019) and a sample of Chinese participants (one with university students and another with adolescents; Ngai & Xie, 2018). In all these validation studies, the psychometric properties of the scale proved to be adequate and reinforced the multidimensionality of PTM.

In a study with university students and adults from Germany, gender comparisons showed that women reported higher scores in the altruistic and compliant dimensions, while men scored higher in public prosocial tendency (Rodrigues et al., 2017). For the Chinese adolescent

population, girls scored higher compared to boys in the altruistic, compliant, and emotional prosocial dimensions, while there was no significant gender-related difference for the anonymous and public dimensions (Ngai & Xie, 2018). On the other hand, there was no significant difference in prosocial behavior by gender in the PTM adaptation study for the Iranian student population (Azimpour et al., 2012).

Despite the relative consensus on research regarding the psychometric qualities of both PTM and PTM-R, and the multidimensional format of the instrument, some inconsistencies are apparent regarding the internal factor structure of the PTM. The results of the PTM validity study for the Chinese population showed validity for only five of the six dimensions of the original PTM (dire and altruistic subscales were merged). In addition, based on the results of an Exploratory Factor Analysis (EFA), two items from the original scale were excluded (Ngai & Xie, 2018). The five-factor solution of the PTM Chinese version also showed positive and significant correlations among all the five dimensions of the scale, notably the public subscale was positively and strongly correlated with the altruistic subscale.

The validation study with Argentinean adolescents also resulted in the reduction of the number of PTM subscales (Richaud et al., 2012). Confirmatory factor analysis suggested that the four-factor structure was a more parsimonious representation of the motivations underlying prosocial behavior. Thus, dire, compliant, and emotional subscales were clustered into a single scale and renamed responsive prosocial behavior. The proposed four dimensions showed: positive relations between public and anonymous; negative relations of both anonymous and public with altruistic; no significant relations between altruistic and responsive, and between anonymous and responsive; and a positive relation between responsive and public (Richaud et al., 2012).

Other studies, however, have shown that the findings of the internal structure of PTM may vary by age of the sample. Thus, for example, one of the explanations for the aforementioned four-dimension structure found in the Argentinian study (Richaud et al., 2012) is that the age of the adolescents in the sample was (M age = 12.4 years, and included 10-year-olds). It is possible that those young adolescents might not have been able to distinguish between the six posited different dimensions of prosocial tendencies (McGinley et al., 2014). Consistent with this explanation, a study that reexamined the translation and validation of the PTM for older Argentinian adolescents and compared the Argentinian PTM with a sample of U.S. adolescents (McGinley et al., 2014) confirmed the posited six-factor internal structure model for both the Argentinian and U.S. samples. Importantly, the six-factor model showed better model fit than an alternative four-factor model.

Thus, despite the presence of some apparent inconsistencies in the PTM internal structure, most international studies have proposed the six-factor model due to the theoretical congruence (Carlo, 2014; Carlo et al., 2003; Carlo & Randall, 2002) and findings generally show that the theoretical six-factor model has better goodness-of-fit indices when compared to other more parsimonious alternative models (Azimpour et al., 2012; Carlo et al., 2010; McGinley et al., 2014; Mestre et al., 2019; Rodrigues et al., 2017).

In order to assess the external structure of the PTM six-factor multidimensional model, other instruments have been used to assess the convergent and discriminant validity of the scale. Thus, for example, the validity study of the PTM for a sample of German university students correlated the six subscales of prosocial tendency with empathy, social desirability, positive and negative affect, and the five personality traits (Rodrigues et al., 2017). Results showed convergence between the dimensions dire, emotional and compliant, and empathy, convergence between altruistic tendency and social desirability, as previously reported in the original validation study (Carlo et al., 2003). As expected, the findings with the five personality traits showed divergent relations to specific subscales of the PTM (Rodrigues et al., 2017).

Although the PTM is an instrument with great relevance and recognition in the literature on prosocial behavior, and its psychometric properties are recognized worldwide, no studies exist that validate the measure for use with youth in the Brazilian context. The present article, thus, aims to present evidence of validity and reliability for a Brazilian Portuguese language version of the PTM. The PTM version was chosen instead of the PTM-R version due to the age group comprised in the sample of this study. In order to enable the psychometric analysis, the following stages were taken into consideration: content validity, internal structure validity (comparison between rival models described in literature; invariance test of the measurement model across participants' gender and age groups), validity based on the pattern of response to the item, validity based on the relationships with external measures. To this end, the steps recommended in the Standards (American Educational Research Association [AERA], American Psychological Association [APA], National Council on Measurement in Education [NCME], 2014) were performed.

Based on prior theory and research, we hypothesized evidence of acceptable reliability and validity of the PTM, that the six-factor model would be the best fit model as compared to alternative models, that the PTM would demonstrate acceptable model fit both men and women and across age groups. In addition, we expected evidence of convergent validity such that several subscales of the PTM would be positively related to subscales of another measure of prosocial behavior (EMPA).

Method

Participants

A total of 555 university students ($M_{age} = 23.38$; $SD = 6.24$) of whom 66.15% were female participated in the survey. Regarding the type of institution they attended, 75.82% of the students were from public university, and 23.32% from private university. Students were from humanities (37.82%), health (32.12%), biological (17.27%), and exact (12.78%) areas. The statistical power of the sample was calculated using the calculator for sample size in structural equation models (<https://www.danielsoper.com/statcalc/calculator.aspx?id=89>). The post-sensitivity power analyses of the sample was calculated using the WebPower Statistical Power Analysis Online (Zhang, Z., & Yuan, K.-H., 2018): <https://webpower.psychstat.org/wiki/>. We conduct the power analysis SEM based on RMSEA (MacCallum et al., 1996). For the sample size of 555, a significant level of 0.05, 215 degrees of freedom, RMSEA for H0 0, RMSEA for H1 0,038 and type of analysis close fit, the power was 1. In addition, with this number of participants, the main Rules of Thumb proposed by Kyriazos (2018), such as 100–500 or more subjects per study, were surpassed.

Procedure

The research was approved by the Committee on Ethics in Research in Human Beings of the Institute of Psychology of the University of São Paulo (CEPH-IPUSP), authorization number 44756621.1.0000.5561. The research instruments and the Informed Consent Form (ICF) were prepared on the Google Forms, and sent via social media (WhatsApp, Facebook, Instagram) and e-mail of university students. The snowball technique was used for nonprobability samples, i.e., when the research has any inclusion criterion, especially social research, in which a participant shares with new participants and so on, reaching several participants from different regions of the country (Vinuto, 2014). The form was shared for five weeks, and data collection was closed at the end of that period.

Procedure and Adaptation of the PTM

The procedural stages for validating the PTM content followed the recommendations of the International Test Commission (2010), as recommended by Borsa et al. (2012). After the measure developer's permission to use the Prosocial Tendencies Measure (PTM) was obtained, the original version was translated by two independent bilingual translators familiar with translating instruments into Portuguese. In order to minimize the risk of linguistic, cultural, and

theoretical and practical understanding biases, we summarized the translated versions of these versions. This procedure aimed at comparing the two different translations, and assess their semantic, idiomatic, conceptual, linguistic, and contextual discrepancies.

Three experts in the field of psychology qualitatively assessed the brief versions as regards their structure, language clarity, instructions, terms and expressions. The assessment aimed at adequacy to target-audience, and possibility of generalizing them to other regions and contexts. After minor adjustments recommended by the judges, the new version was presented to the target audience. Four university students qualitatively assessed the questionnaire in order to check if the items, instructions, and scale were clear and adequate, and if the terms and expressions were appropriate to their group. With the new brief version of the items, another translator independently performed the back-translation process, which was reviewed by the original author of the original scale.

Instruments

Sociodemographic data form prepared to obtain data such as age, gender and university.

Prosocial Tendencies Measure (PTM) scale built to meet the empirical and theoretical suggestions that define the existence of different and distinct forms of prosocial tendencies (Carlo & Randall, 2002). This is a self-report measure that assesses prosocial tendency in a multidimensional fashion. It consists of 23 items that investigate the thoughts and actions people carry out in order to benefit others. The response form is on a 5-point Likert scale (1 - does not describe me at all to 5 - perfectly describes me). It is subdivided into 6 types of prosocial tendencies: public ($\alpha = 0,78$; with 4 items: 1, 3, 5, 13); anonymous ($\alpha = 0,85$; with 5 items: 8, 11, 15, 19, 22); dire ($\alpha = 0,63$; with 3 items: 6, 5, 14); compliant ($\alpha = 0,80$; with 2 items: 7,18); emotional ($\alpha = 0,75$; with 4 items: 2, 12, 17, 21); altruistic ($\alpha = 0,74$; with 5 items: 4, 10, 16, 20, 23). The items of the altruistic tendency scale should be inverted to calculate the score. Scores are calculated for each subscale, as recommended (Carlo & Randall, 2002).

Prosociality Measurement Scale (EMPA) this scale seeks indications of prosocial behavior, understood as a set of behaviors that favor other people or groups, not seeking for rewards.(Roche & Selva, 2010). It is a self-assessment scale consisting of 16 items that are subdivided into four different types of prosociality: sharing (referring to sharing what you have - either material or intellectual - with others; items 2, 9, 11, 14; α this study = 0.596), helping (referring

to being available when someone needs help; items 1, 3, 6, 7; ∞ this study=0.714), caring (referring to helping people in material need or situation of emotional distress; items 4, 10, 13, 15; ∞ present study=0.742), and empathy (referring to the ability to put oneself in the other's place, being able to understand their feelings and needs; items 5, 8, 12, 16; ∞ this study=0.729) (Caprara et al., 2005). The instrument was used by the team of the *Laboratório de Investigação Pró-social Aplicada* (LIPA) of the *Universitat Autònoma de Barcelona* (Spain), at the beginning and at the end of an intervention program with adolescents (Roche & Selva, 2010). It was semantically validated into Portuguese through the translation of the instrument from Italian into English, from English into Spanish, and then from Spanish into Portuguese jointly with the LIPA team. The answer for each item is given through a 5-point Likert-type scale (1 - never/almost never true to 5 - always/almost always true). This scale will be used to perform the convergent validation with the PTM.

Analysis Procedures

Validity based on internal structure Since we already had the model's previous assumption defined by the original instrument, first we performed a Confirmatory Factor Analysis (CFA) to assess the structure plausibility. The CFA was performed using the JASP 0.14.1.0 software. The analysis was implemented using the Robust Diagonally Weighted Least Squares (RDWLS) estimation method, suitable for categorical data (DiStefano & Morgan, 2014; Li, 2015).

Alternative structures were tested. First, the six-factor model was compared with a one-dimensional model. Next, a comparison was made between goodness-of-fit indices of different models used in the literature: the original six-factor model (Carlo & Randall, 2002); the 5-factor model, which combines the emotional and dire subscales (Silva, 2016); the 5-factor model, which combines the altruism and dire subscales (Ngai & Xie, 2018); the 4-factor model, which combines the dire, emotional, and compliant subscales (Richaud et al., 2012). In all models, the goodness-of-fit indices and Akaike's information criterion (AIC) were used to evaluate the relative fit and the expected cross-validation index (ECVI), with lower values of both indicating better model fit (Brown, 2015).

An MCFCA was performed in order to investigate the invariance of PTM as a function of the participants' gender and age group. The MCFCA assessed the invariance of the measure in three models, namely: configural, metric, and scalar. Model 1 (configural invariance) assessed whether the scale configuration (number of factors and items per factor) was acceptable for both groups (sex and age group). When

the model is not supported, the instrument's factorial structure cannot be considered equivalent for the groups assessed. Model 2 (metric invariance) examined whether the factor loadings of the items could be considered equivalent across groups. Model 3 (scalar invariance) reviewed whether the level of latent trait required to endorse the thresholds of items categories were equivalent across groups (Cheung & Rensvold, 2002).

Following were the fit indices used to evaluate the configural model: Root Mean Square Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI). CFI and TLI values should be >0.90 , and preferably above 0.95; RMSEA values should be <0.08 or preferably <0.06 , with a confidence interval (upper threshold) <0.10 (Brown, 2015). Measurement invariance was assessed using the difference test of CFI - Δ CFI (Cheung & Rensvold, 2002). When significant reduction in CFI indices is found (Δ CFI >0.01) when fixing a parameter, the measure invariance cannot be accepted (Cheung & Rensvold, 2002).

The measure's reliability was measured by calculating the composite reliability coefficient. Values above 0.70 are considered adequate (Hair et al., 2009, p. 2; Valentini & Damásio, 2016).

Validity based on the pattern of response to the items FACTOR 10.10.03 software was used to evaluate the pattern of response to the items. The discrimination parameter and item thresholds were evaluated using Reckase's parameterization (1985).

Validity based on relationships with external measures Convergent validation was performed using the scores of the 6 PTM subscales, and correlation verification (Spearman's rho) with the scores of the four EMPA subscales. The level of correlation is expected to be moderate ($\rho \geq 0.39$).

Data normality was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests. The assumption of variance homogeneity was assessed using Levene's test. Bootstrapping procedures were performed (1000 resamples; 95% CI BCa) to obtain greater reliability of results, correct for normality deviations of the sample distribution and differences between group sizes, and also to present a 95% confidence interval for the differences between means (Haukoos & Lewis, 2005). Student's t test for independent samples was used to test the differences between the scores of variables, and participants' gender. In all analyses, effect sizes were calculated based on r^2 (ρ Spearman) and Cohen's d (t-test) measures.

Results

Content Validity

The brief translated versions were analyzed by expert judges. There was agreement regarding the structure, clarity of language, instructions, use of adequate terms and expressions, and generalization to other regions and contexts. The suggestions presented by the judges were analyzed qualitatively and, when pertinent, accepted. The version was also analyzed by the target audience, who agreed with the items, instructions, and clarity and appropriateness of terms and expressions for their group. The back-translation into English was analyzed by the author of the original scale, who issued a favorable opinion regarding the similarity of the version.

Validation Based on Internal Structure and Response Pattern

AFC was performed to assess the plausibility of the PTM original structure. The structure is composed of 23 items divided into 6 subscales (factors): Public (4 items); Anonymous (5 items); Dire (3 items); Compliant (2 items); Emotional (4 items); and Altruistic (5 items). Alternative structures were also tested, being one unidimensional structure, two 5-factor structures, and one 4-factor structure. The fit indices of the 5 models are presented in Table 1.

As can be observed, the model with 6 factors showed better fit indices. The AIC and ECVI indexes were also better (lower).

The factor loadings distributed over 6 factors are shown in Table 2. The Composite Reliability indices of each factor are also reported (Ferrando & Lorenzo-Seva, 2018).

The composite reliability of factors was acceptable (above 0.70) for almost all factors, except for 'Dire' (CR=0.64) and 'Altruistic' (CR=0.65). The composite reliability of the scale as a whole, however, proved to be acceptable (CR=0.864). The AFCMG results used to assess

the invariance of the scale as a function of gender and age group are presented in Table 3.

The results displayed in Table 3 point out the invariance of configural, metric, and scalar model among the groups established according to the participants' gender (men and women) and age group (between 18 and 20, between 21 and 25, and above 25). This shows that the PTM scale does not give rise to difference in response depending on the participants' sex or age group, allowing for comparison between groups.

For validity evidence based on the pattern of response to the item, the Differential Item Functioning (DIF) study showed that the most discriminative items of each subscale were: Public - item 5 'In front of others' ($a = 1.351$); Anonymous - item 15 'I help when they don't know' ($a = 1.849$); Dire - item 6 'People in crisis' ($a = 1.245$); Compliant - item 7 'People ask me for help' ($a = 1.844$); Emotional - item 12 'Emotionally distressed' ($a = 1.241$); Altruistic - item 20 'Well on the resume' ($a = 1.215$). The analysis of the items' Thresholds values showed no unexpected response pattern, so the higher the response category was, the higher the latent trait level was. The Fig. 1 presents Model of confirmatory factor analysis, showing all six subcategories of prosocial behavior, their estimated correlations and the estimated relation to the questions of the translated version of the PTM-Brazil.

Validation Based on Relationships with External Measures

Considering validity based on relations with external measures, we performed the Convergent Validation of the 6 PTM subscales, and the 4 EMPA subscales. Firstly, an AFC was performed to verify the EMPA evidence of validity in the sample reviewed. The structure composed of 16 items divided into 4 subscales (Helping, Sharing, Caring, and Empathy with 4 items each) showed adequate fit indices, supporting the model ($\chi^2 = 196.130$; $gl = 98$; $\chi^2/gl = 2.001$; $p < 0.001$; CFI = 0.983; TLI = 0.979; SRMS = 0.058; RMSEA = 0.043–95% CI [0.034; 0.051]).

Table 1 Models Tested by AFC of the Prosocial Tendencies Measure (PTM)

Model	χ^2	gl	χ^2/gl	CFI	TLI	RMSEA			SRMS	AIC	ECVI
						Inf 90%	Value	Sup 90%			
6 Factors	395.198	215	1.838	0.964	0.957	0.032	0.038	0.044	0.052	36968.552	0.893
5 Factors (E/T)	422.843	220	1.922	0.959	0.953	0.034	0.04	0.046	0.053	36992.427	0.925
5 Factors (A1/T)	957.701	220	4.356	0.851	0.828	0.071	0.076	0.081	0.093	37336.991	1.851
4 Factors (T / S / E)	525.66	224	2.346	0.939	0.931	0.043	0.048	0.054	0.062	37106.033	1.089
Unifactorial	1813.22	230	7.884	0.679	0.647	0.104	0.109	0.114	0.125	-	-

Note: all models were significant $p < 0.001$

χ^2 Chi-square, df degree of freedom, CFI comparative fit index, TLI Tucker Lewis index, SRMR standardized root mean squared residual, RMSEA root mean square error of approximation, CI confidence interval, AIC Akaike Information Criterion, ECVI: Expected Cross-Validation Index

Table 2 Factor Structure of the Prosocial Tendencies Measure (PTM)

	Factor Loadings - N = 555					
	Public	Anonymous	Dire	Compliant	Emotional	Altruistic
1- I can help others best when people are watching me	0.472					
3- When other people are around, it is easier for me to help needy others	0.568					
5- I get the most out of helping others when it is done in front of others	0.786					
13- Helping others when I am in the spotlight is when I work best	0.743					
8- I prefer to donate money anonymously		0.530				
11- I tend to help needy others most when they do not know who helped them		0.807				
15- Most of the time, I help others when they do not know who helped them		0.809				
19- I think that helping others without them knowing is the best type of situation		0.675				
22- I often make anonymous donations because they make me feel good.		0.605				
6- I tend to help people who are in a real crisis or need			0.606			
9- I tend to help people who hurt themselves badly			0.589			
14- It is easy for me to help others when they are in a dire situation			0.631			
7- When people ask me to help them, I don't hesitate				0.820		
18- I never hesitate to help others when they ask for it				0.693		
2- It is most fulfilling to me when I can comfort someone who is very distressed					0.541	
12- I tend to help others particularly when they are emotionally distressed					0.716	
17- I respond to helping others best when the situation is highly emotional					0.588	
21- Emotional situations make me want to help needy others					0.663	
4- I think that one of the best things about helping others is that it makes me look good						0.559
10- I believe that donating goods or money works best when it is tax-deductible						0.499
16- I believe I should receive more recognition for the time and energy I spend on charity work						0.432
20- One of the best things about doing charity work is that it looks good on my resume						0.617
23- I feel that if I help someone, they should help me in the future						0.503
Composite Reliability	0.743	0.819	0.638	0.730	0.715	0.653

Note: factor loading (standard error)

Data normality was assessed, and the results showed that all variables of the PTM and EMPA did not show normal distribution ($p < 0.001$). Table 4 presents the results of the correlations (Spearman's rho) obtained.

For convergent validation, the PTM and EMPA scales are expected to show moderate correlation ($0.30 < \rho < 0.70$). It may be observed that the Emotional, Dire, and Compliant subscales of the PTM showed moderate significant positive correlation ($\rho > 0.30$) with the EMPA subscales Sharing, Caring, Helping, and Empathy. The Public and Anonymous subscales showed moderate significant positive correlation with Caring. The other correlations were weak positive,

such as Altruistic with Sharing and Anonymous with Sharing, Helping, and Empathy.

Student's t-test for independent samples was performed in order to investigate to what extent the PTM and EMPA scores differed between men ($n = 383$) and women ($n = 172$). Results are shown in Table 5.

Women scored statistically higher than men on the Emotional (Cohen's $d = 0.26$), Altruistic (Cohen's $d = 0.29$), Dire (Cohen's $d = 0.24$), Caring, (Cohen's $d = 0.21$), Anonymous (Cohen's $d = 0.27$), Helping (Cohen's $d = 0.33$), and Sharing (Cohen's $d = 0.27$) subscales. On the Caring (Cohen's $d = 0.47$), Empathy (Cohen's $d = 0.55$) and Total EMPA ($d = 0.47$),

Table 3 AFCMG for the Prosocial Tendencies Measure (PTM) as a Function of Sex and Age Group

Measure invariance	Goodness-of-fit indices					
	LOT-R	RMSEA (90% CI)	SRMR	TLI	CFI	Δ CFI
Biological Sex						
Configural Invariance	0.030 (0.021–0.038)	0.063	0.973	0.977	-	
Metric Invariance	0.032 (0.024–0.039)	0.065	0.97	0.973	-0,004	
Scalar Invariance	0.031 (0.023–0.039)	0.063	0.971	0.973	0,000	
Age Group						
Configural Invariance	0.002 (0.000–0.023)	0.069	1	1	-	
Metric Invariance	0.014 (0.000–0.027)	0.072	0.994	0.995	-0,005	
Scalar Invariance	0.010 (0.000–0.025)	0.07	0.997	0.997	+0,003	

Note: all models were significant $p < 0.001$

χ^2 Chi-square; df degree of freedom, CFI: comparative fit index, TLI: Tucker Lewis index, SRMR: standardized root mean squared residual, RMSEA: root mean square error of approximation, CI: confidence interval, AIC: Akaike Information Criterion, Δ CFI: CFI difference

de Cohen = 0.51) subscales women had statistically higher scores than men with medium effect. Men showed statistically larger small effect scores on the Public subscale (Cohen's $d = 0.23$).

Discussion

The purpose of this study was to adapt the PTM into Brazilian Portuguese, and present evidence of different types of validity and reliability (American Educational Research Association [AERA], American Psychological Association [APA], National Council on Measurement in Education [NCME], 2014). Regarding content validity, the scale presented satisfactory rates of agreement in the opinion of the expert judges, target audience, and the author of the original study as regards clarity, relevance, and appropriateness of the items.

In order to review the PTM internal structure, the goodness-of-fit indices for different models used in literature were compared. Results pointed out to significantly higher goodness-of-fit level for the 6-factor model (altruism, anonymous, public, dire, emotional, compliant). The current study also provided evidence that items have higher

factorial loads for each of the 6 factors. These results are consistent with the original version of the PTM (Carlo & Randall, 2002) and adhere to the theorized multidimensional perspective of prosocial tendencies.

Regarding reliability (composite reliability), the reliability measure of the factor 'Dire' (CR = 0.64) below 0.70 was also observed in the original study, with this factor showing $\infty = 0.63$ (Carlo & Randall, 2002). For the 'Altruistic' factor (CR = 0.65), the original scale showed acceptable reliability ($\infty = 0.74$); however, in the retest this factor presented $\infty = 0.62$, and the factor 'Dire' in the retest also presented a $\infty = 0.54$. Both factors were lower than those found in the original study, supporting our findings. The Iranian study (Azimpour et al., 2012) also found reliability measures close to those found by our study (altruism $\infty = 0.586$ and dire $\infty = 0.696$).

Similarly to other translation and validation studies about this measure (Azimpour et al., 2012; Carlo et al., 2010; McGinley et al., 2014; Mestre et al., 2019; Rodrigues et al., 2017) that presented model indices that fit very well to the hypothesized six-factor multidimensional model of the PTM. These findings for Portuguese-speaking Brazilian students demonstrate that the multidimensional structure of prosocial tendencies as proposed by Carlo et al. (2003) is not hampered the language barrier in the Brazilian context.

Additionally, results demonstrated invariance of the model measure as a function of the age and sex variables, evidencing the potential of this instrument for performing comparisons between these different sample strata. Other studies have found this same result for sex (Ngai & Xie, 2018; Simões & Calheiros, 2016), junior and senior employees (Ngai & Xie, 2018).

The following correlations were found in our study corroborating with the original study (Carlo & Randall, 2002): positive between emotional, compliant and dire, between dire and anonymous, between anonymous and emotional, and negative between altruistic and public. Similar results were found by other validation research conducted in different cultural contexts like Argentina (Richaud et al., 2012), China (Ngai & Xie, 2018) and Germany (Rodrigues et al., 2017).

Regarding the differences with the results of the original study (Carlo & Randall, 2002), the Altruistic subscale correlated negatively with Emotional and Dire, as found in the Iranian validation study (Azimpour et al., 2012). In turn, the original study found a positive correlation between altruistic and emotional, and between altruistic and compliant, whereas our study found no positive correlation with altruism. Conceptual differences between subscales may explain these findings, as the altruistic prosocial tendency is explained as a voluntary helping tendency motivated by principles of concern for others, while other tendencies such

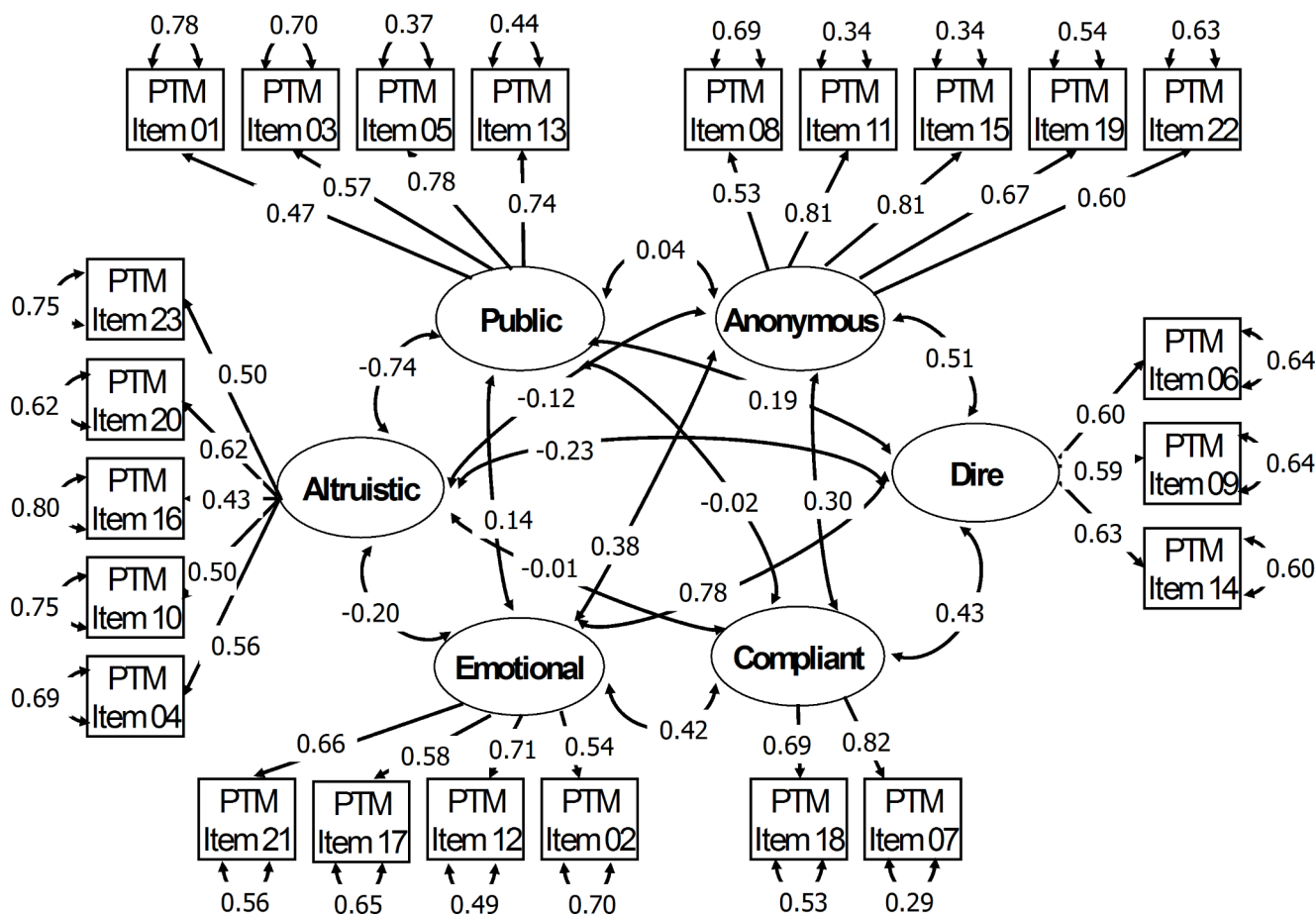


Fig. 1 Model of confirmatory factor analysis, showing all six subcategories of prosocial behavior, their estimated correlations and the estimated relation to the questions of the translated version of the PTM-Brazil.

Table 4 Correlation matrix of EMPA and PTM

	1	2	3	4	5	6	7	8	9
1-Sharing	-								
2-Helping	0.534**	-							
3-Caring	0.556**	0.666**	-						
4-Empathy	0.440**	0.512**	0.581**	-					
5-Public	0.008	-0.009	0.556**	-0.052	-				
6-Emotional	0.313**	0.420**	0.466**	0.484**	0.088*	-			
7-Altruistic	0.083*	-0.04	-0.014	0.048	-0.437**	-0.147**	-		
8-Dire	0.315**	0.493**	0.485**	0.404**	0.056	0.505**	-0.122**	-	
9-Compliant	0.333**	0.514**	0.428**	0.324**	-0.07	0.289**	0.022	0.285**	-
10-Anonymous	0.172**	0.272**	0.344**	0.276**	-0.003	0.258**	-0.071	0.363**	0.226**

Note. * = $p < 0.05$; ** = $p < 0.01$;

as emotional, dire, and compliant refer to prosocial behaviors demanded by specifics of the context (Carlo & Randall, 2002). Another possible explanation may be cultural, as the low level of education and low socioeconomic status prevailing in developing countries may explain forms of moral disengagement (Azimpour et al., 2012).

Another difference found in our study was the positive correlation between the Public and Emotional subscales, as

found in other studies (Ngai & Xie, 2018; Richaud et al., 2012; Rodrigues et al., 2017), which can be explained by social desirability as a major motivator for public prosocial behaviors (Carlo & Randall, 2002). In the case of our study, a great part of participants were psychology students. Helping those in psychological distress may be a characteristic of social desirability for this group, which would motivate

Table 5 Results of the test for difference in PTM and EMPA scores between males and females

		Scores		T-test statistics (Bootstrapping sample)			CI of the Mean Difference (95%)		
		<i>M</i>	<i>SD</i>	<i>t</i>	<i>Gf</i>	p-Value	Mean difference	Lower Threshold	Upper Threshold
Public	Female	1.69	0.69	-2.509	553	0.013	-0.161	-0.2922	-0.0384
	Male	1.85	0.72						
Emotional	Female	3.86	0.78	2.868	553	0.004	0.211	0.0517	0.3557
	Male	3.65	0.85						
Altruistic	Female	4.05	0.72	3.138	553	0.005	0.212	0.0832	0.3407
	Male	3.84	0.77						
Dire	Female	3.46	0.83	2.481	553	0.009	0.213	0.0391	0.3812
	Male	3.25	0.98						
Compliant	Female	3.99	0.86	2.296	553	0.038	0.183	0.0135	0.3724
	Male	3.8	0.9						
Anonymous	Female	3.36	0.9	2.813	553	0.007	0.252	0.0792	0.4186
	Male	3.11	1.01						
Helping	Female	4.1	0.63	3.374	553	0.002	0.224	0.0943	0.3672
	Male	3.88	0.76						
Sharing	Female	3.87	0.67	2.942	553	0.006	0.188	0.0623	0.3199
	Male	3.69	0.76						
Caring	Female	3.87	0.76	4.774	553	0.001	0.38	0.2277	0.5458
	Male	3.49	0.91						
Empathy	Female	3.74	0.76	5.506	553	0.001	0.462	0.2941	0.6312
	Male	3.28	0.97						
Total EMPA	Female	15.58	2.26	5.059	553	0.001	1.255	0.7773	1.7571
	Male	14.33	2.88						

Note: EMPA: Prosociality Measure Scale, M = Mean, SD: Standard Deviation; Gf: freedom degree; Significant difference: $p < 0.05$

them to act in these situations, and seek approval from others when doing so.

Once validity evidence based on the internal structure and reliability of the Brazilian PTM version was estimated and an understanding of the factorial organization of items was obtained, the evaluation of the pattern of response to the items through DIF and item thresholds has facilitated understanding the adequacy of the item properties. In the study that developed the PTM measure (Carlo & Randall, 2002), the authors did not present analyses seeking to assess item properties. In this Brazilian study, as well as in the German PTM validation study (Rodrigues et al., 2017), these analyses were performed and no unexpected item response patterns were found. This result suggests that the measure has adequate evidence of validation based on item response patterns.

The current study also assessed the convergent validity of the PTM Brazilian version, comparing it to a similar instrument (EMPA). It found that the emotional, dire, and compliant subscales moderately correlated with the four EMPA subscales, as well as public and anonymous moderately correlated with caring. The constructs definitions may be a first explanation for these findings, as the helping subscale deals with behaviors that are very similar to the items that make up the PTM compliant subscale, and the caring subscale conceptually resembles the PTM dire and emotional

subscales, also comprising items that relate to charitable attitudes. Since the EMPA is a scale designed to investigate prosociality in adolescents and children, and the addition of the empathy subscale was used for the adult version of the EMPA (Roche & Selva, 2010), the items in the EMPA is not designed to assess the underlying motives for helping. Thus, importantly, the altruistic subscale of the PTM was not significantly related to subscales of the EMPA, which might reflect the fact that the EMPA is not designed to assess selflessly-motivated forms of helping. Furthermore, the findings are consistent with prior research demonstrating that the altruistic PTM subscale does not correlate significantly with measures that assess common forms of helping (e.g., sharing) but does correlate with altruistic helping in dictator game dilemmas (Carlo & Randall, 2002; Rodrigues et al., 2017).

Regarding comparisons of means between sexes, data showed similar results to those found in the original study (Carlo & Randall, 2002) such that women had statistically higher scores than men on the emotional, altruistic, compliant, and anonymous subscales. However, unlike (Carlo & Randall, 2002), women in this study had statistically significantly higher scores than men on the dire subscale. The women's higher scores of prosocial tendencies in the subscales may be explained by women's attention to actions that are more sympathetic, more emotional, and more focused

on caring and concern for others. It also validates the higher score among women in the dire subscale, since it suggests that in emergency situations they are willing to help for the same previously described reasons (Carlo & Randall, 2002). On the other hand, men showed statistically higher scores in the public subscale than women. This latter finding is in line with other studies (Carlo & Randall, 2002; Rodrigues et al., 2017) and can be justified by the fact that men seek more external approval (Carlo & Randall, 2002).

Despite the good results achieved in the PTM adaptation and validation, some considerations should be made. Firstly, regarding participants, as the sample was composed of university students from southeastern Brazil, and some cultural differences may alter the interpretability of items and, thus, the use in other Brazilian regions demands extra care. Secondly, we also recognize that the study needs to be replicated, as the results convincingly demonstrated the measurement invariance in the Brazilian sample, but, for example, the comparison of this version with the original version was not carried out. Finally, this study did not assess the translation and adaptation of the PTM-R, recommended for adolescents, and future research may focus on this task. In brief, the adapted version with good PTM validity evidence may be useful for researchers, experts, and those seeking a valid and reliable model for measuring prosocial tendencies.

Although the PTM is a widely used instrument to investigate different prosocial behavior tendencies, no study had been translated, adapted, validated, and assessed regarding reliability of a Portuguese language version for the Brazilian population. The current paper aimed to adapt and validate the PTM for a sample of Brazilian university students. Data showed that PTM presented good psychometric properties with compatible internal structure, and adequate validity criteria in line with those defined by international literature. The measurement analysis of the model invariance for sex and age was also observed. Reliability indexes were adequate to measure what the instrument proposes. Taking these results into consideration, the PTM is a good instrument to access the multidimensional model to measure prosocial behavior tendencies.

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authorization number 44756621.1.0000.5561. The research instruments and the Informed Consent Form (ICF) were prepared on the Google Forms, and sent via social media (WhatsApp, Facebook, Instagram) and e-mail of university students.4All authors whose names appear on the submission1)made substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data; or the creation of new software used in the work;2)drafted the work or revised it critically for important intellectual content;3)approved the version to be published; and4)agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.5All authors contributed to the study conception and design. Material preparation, data collection by Beatriz Oliveira and Rodney da Costa, analysis were performed by K?nia Eliber Vieira and were reviewed by Gustavo Carlo. The first draft of the manuscript was written by Luciana Maria Caetano, the Brazilian version of manuscript was reviewed by Bet?nia Dell'Agli, the English version of manuscript was reviewed by Gustavo Carlo and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

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