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Transcultural adaptation and psychometric properties of the International Development and Early Learning Assessment (IDELA) in Brazilian pre-school children

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ABSTRACT

Early childhood is a sensitive period for development, and it is important to use psychometrically sound instruments to assess the child's developmental abilities. The International Development and Early Learning Assessment (IDELA) represents an innovative, feasible and low-cost assessment tool for preschool children that evaluates motor development, pre-numeracy, pre-literacy, and socioemotional development. These areas of development represent "key" skills for early development and school readiness. The objectives of this study were to translate the IDELA to Brazilian Portuguese, to conduct its cultural adaptation to the Brazilian population, to analyze its content validity, to assess its inter-rater reliability, to analyze the internal consistency of its sub-domains and to investigate associations between the child's IDELA scores and sociodemographic characteristics of the family. This was a descriptive, cross-sectional study, in which a sample of 565 preschool children were assessed with the IDELA in the city of Embu das Artes, São Paulo. Results indicated that the IDELA was successfully translated and culturally adapted to the Brazilian population, presenting adequate content validity, good internal consistency of its sub-domains and very high inter-rater reliability. Among the evaluated children, the girls' mean scores were higher than the boys' mean scores; 5-year-old children had higher scores than 4-year-old children; a positive correlation was observed between maternal education and the children's mean scores in the total IDELA, the pre-mathematics and the socioemotional subdomains. In conclusion, the Brazilian version of the IDELA proved to be feasible, adequate and reliable to assess early childhood development and school readiness of preschool age children in Brazil. Future studies could use the IDELA to provide relevant data about the children's development and school readiness in other Brazilian regions that will be useful in the planning of public health and education policies to improve children's integral development and their academic achievement.

Introduction

Human development results from the interaction between genetic and environmental factors (Meaney, 2010; Paus, 2010; Toth, 2015; Veenema, 2012; Weaver, 2014). When the environment is stimulating, positive bi-directional interactions between the child and the caregivers occur. These interactions are crucial for early childhood, an extremely relevant period for human development (Bethell, Jones, Gombojav, Linkenbach & Sege, 2019; Biglan, Flay, Embry & Sandler, 2012; Eshel, Daelmans, Cabral de Mello & Martines, 2006; Nelson et al., 2007). During early childhood there is a rapid and progressive improvement

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in motor, cognitive, socioemotional, language and self-regulation skills that prepares the children for formal education and plays a critical role throughout the life course (Nelson, 1999; Tau & Peterson, 2010; Black et al., 2016; Britto et al., 2017; Fox, Levitt & Nelson, 2010).

School readiness has been defined as a set of developmental dimensions that are relevant for school performance. These domains include cognitive, motor, and socioemotional skills (Blair, 2002; Duncan et al., 2007; Pisani, Borisova & Dowd, 2018), as well as the approaches to learning, such as persistence, motivation, concentration, and engagement (Britto, 2012; Raver & Zigler, 1997). The acquisition of these skills during preschool years is important for children's adaptation to the school environment and their subsequent academic success (Falchi & Friendman, 2015; Li-Grining, Raver, Jones-Lewis, Madison-Boyd & Lennon, 2014; Webster-Stratton, Jamila Reid & Stoolmiller, 2008; Wolf et al., 2016).

Considering that children's early learning and development are directly related to their future academic performance, developmental skills and school readiness should be routinely evaluated, in order to ensure that children achieve their developmental potential, as well as to prevent learning and developmental disabilities (Britto, 2012; Fernald, Prado, Kariger & Raikes, 2017; Pisani et al., 2018; Wolf et al., 2016).

The assessment of developmental skills and school readiness are frequently performed through clinical evaluation. However, a clinical evaluation performed in isolation identifies less than 30% of children with developmental problems (Zeppone, Volpon & Del Ciampo, 2012), whereas the use of standardized instruments has been pointed out as an effective strategy for early and accurate identification of children at risk for developmental delays (Bufferd, Dougherty, Carlson, Rose & Klein, 2012; Fernald et al., 2017; Scharf, Scharf & Stroustrup, 2016). The use of standardized assessments can also help in the planning and implementation of clinical, school and family interventions, which may significantly improve the developmental trajectories of these children (Bufferd et al., 2012; Fernald et al., 2017), as well as to provide relevant information about the efficacy of public health and educational policies (Carneiro & Heckman; Doyle, Harmon, Heckman & Tremblay, 2009).

Some of the instruments most commonly used to assess early childhood development (ECD) are the Bayley Scales of Infant and Toddler Development (Albers et al., 2007; Bayley, 2006), the Ages and Stages Questionnaires 3 (ASQ-3) (Filgueiras, Pires, Maissonette & Landeira-Fernandez, 2013; Squires et al., 2015), the Child Behavior Checklist (CBCL) (Achenbach, 1991; Bordin et al., 2013; Bordin, Mari & Caeiro, 1995) and the Denver Developmental Screening Test (Frankenburg et al., 1967/1992).

Despite their relevance, the above instruments are majorly used in the clinical context to assess individual developmental issues and/or present important limitations to their applicability in low- and middle-income countries (LMICs). For example, some of the above instruments (i.e. Denver, ASQ-3, Bayley) have been used primarily in high-income countries, demand extent training to be used, have a long application time or a high financial cost (Albers et al., 2007; Frankenburg, Dodds, Archer, Shapiro & Bresnick, 1992; Squires, Bricker, Heo & Twombly, 2001; Wolf et al., 2016).

In addition to the above instruments, some population-level tools were designed for assessing and comparing developmental profiles of groups of children around the world. These include the Early Development Instrument (EDI; Janus & Offord, 2007), the East Asia Pacific Early Child Development Scales (EAP-ECDS; Rao et al., 2019), the Early Learning Outcomes Measure (ELOM), developed for use in South Africa (Snelling, Dawes, Biersteker, Girdwood & Tredoux, 2019), the Survey of Well Being of Young Children (SWYC; Perrin, Sheldrick, Visco & Mattern, 2016); the Measuring Early Learning Quality & Outcomes (MELQO) designed to assess child development and quality of early childhood education (ECE) (Raikes et al., 2019), the PRIDI (The Regional Project on Child Development Indicators; Verdisco, Cueto, Thompson, & Neuschmidt, 2015), and the Early Human Capability Index (eHCI) (Sincovich, Gregory & Zanon, 2019), developed to assess the key aspects of 3–5 year old children's development.

Regarding population-level tools, they also present characteristics that might constitute barriers to its use. The EAP-ECDS, the ELOM and the PRIDI, for example, were initially designed to be used only in specific cultural settings (East Asia, South Africa and Latin America, respectively) (Rao et al., 2019; Snelling et al., 2019; Verdisco, Cueto, Thompson, & Neuschmidt, 2015). The EDI, the SWYC and the eHCI are exclusively based on parent's or caregiver's report (Janus & Offord, 2007; Perrin et al., 2016; Sincovich et al., 2019); and many of them have not yet been properly adapted for use in Brazil (Janus & Offord, 2007; Raikes et al., 2019; Rao et al., 2019; Verdisco, Cueto, Thompson, & Neuschmidt, 2015).

Considering the lack of instruments that could be used in diverse settings to assess developmental profiles and school readiness, in 2016 the non-governmental organization Save the Children (USA) convened a panel of experts to elaborate an assessment tool that could overcome the above limitations. Therefore, Save The Children's specialists conducted the process of developing and validating the International Development and Early Learning Assessment (IDELA) (Pisani, Borisova & Dowd, 2015), so that it would add the following innovations to the ECD field: a) international applicability, especially within low and middle income countries; b) feasibility, low cost materials and ease of administration and adaptation; c) psychometric rigor, especially for direct child's assessment. The IDELA is a direct assessment tool intended to assess the child's development and school readiness of 3 to 6-year-old children (Pisani et al., 2018), and it is composed of 24 items that assess four distinct developmental areas (Pisani et al., 2018). The IDELA has three main characteristics: psychometric rigor, accessibility/viability; and international applicability (Wolf et al., 2016). Thus, the IDELA proposes a direct child assessment that is feasible and affordable in low resource settings, once it requires simple materials and can be administered in a short period of time.

The IDELA showed an excellent reliability and validity in the countries where it has been used. For example, data from a sample of 2.232 children from four countries pointed to an intra-class correlation above 0.75, indicating an excellent inter-rater reliability (Pisani et al., 2018). Studies conducted in Zambia and Egypt demonstrated the construct validity of the IDELA (Pisani et al., 2015). So far, the IDELA has been translated and used in more than 70 countries, such as Ethiopia, Afghanistan, Mozambique, Colombia and Bolivia, among others (Pisani et al., 2015, 2018; Wolf et al., 2016). The IDELA represents a holistic, reliable, and internationally applicable early development assessment (Pisani et al., 2015).

Considering the described limitations of the available tools to assess ECD individually in Brazil (i.e. Bayley, Denver, ASQ, CBCL), and considering that population-level tools are not yet fully validated to be used in Brazil (i.e. the MELQO and the EDI) or do not provide direct assessment of the child (i.e. the eHCI), the current study was designed to translate the IDELA to Brazilian Portuguese, to conduct the cultural adaptation to the Brazilian culture, to analyze the content validity and to assess the inter-rater reliability and the internal consistency of the IDELA in Brazil.

The Brazilian version of the IDELA represents a promising innovation since the IDELA is a low cost and feasible instrument that can be used to provide a more precise picture of the developmental skills and school readiness of pre-school children in Brazil. IDELA allows population comparisons over time, including the evaluation of ECD programs throughout children's outcomes.

Methods

This was a descriptive, cross-sectional study conducted in the city of Embu das Artes, a city considered as part of the metropolitan area of São Paulo, the largest city in Brazil. Embu das Artes is a city that struggles against unemployment, inequalities, and violence. In 2019 the city had

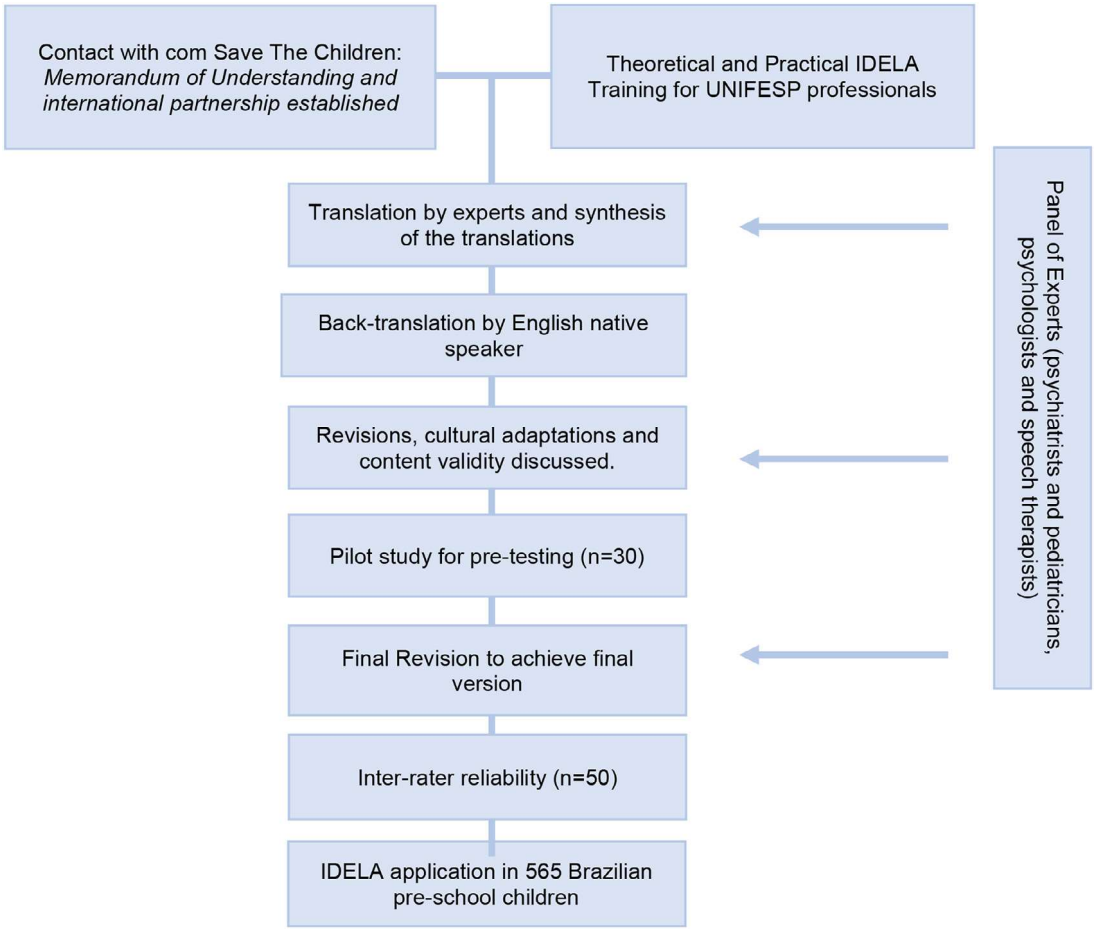

Fig. 1. Translation, Cultural Adaptation, Content Validity and Inter-rater reliability for IDELA in Brazil.

29 municipal preschools with a total of 7.430 students. Enrolled prevalence in Embu das Artes is below national values (84,8% vs 92,9%). Embu das Artes is the thirtieth most populous city in the state of São Paulo, with 240.230 people (IBGE, 2010). Around 35% of the population of Embu das Artes earns less than half of the minimum wage per month (approximately USD100/month). This amount is equivalent to 50–60% of other Brazilian cities.

The study was approved by the Ethics Committee of the Federal University of São Paulo (UNIFESP), protocol number 99,144,718.2.0000.5505. After the assurance that their decision to participate in the study would not interfere with the child's access to the pre-school, all participating mothers signed informed consents and the child gave an oral assent to be interviewed and was aware that he/she could stop the interview at any time.

The procedures for translation, cultural adaptation, content validation and the assessment of the inter-rater reliability and internal consistency of the IDELA followed the literature recommendations (Boateng, Neilands, Frongillo, Melgar-Quiñonez, & Young, 2018; Hungerbuhler et al., 2016; Gjersing, Caplehorn & Clausen, 2010; Pisani et al., 2018; Santos, Pessoa & Araujo, 2016; Widenfelt, Treffers, de Beurs, Siebelink & Koudijs, 2005;) and are shown in Fig. 1 and described below.

Translation, back-translation, cultural adaptation and content validity

The authors of the present study contacted Save the Children to obtain permission to translate and adapt the IDELA to Brazilian Portuguese. A developmental specialist from Save the Children came to Brazil to provide intensive IDELA training to eleven clinicians and researchers from UNIFESP.

The original English version of the IDELA was initially translated into Brazilian Portuguese by two co-authors of the current study, who were native speakers of Brazilian Portuguese and fluent in English. This first version was used to the back-translation of the IDELA by an English native speaker with fluency in Brazilian Portuguese and that was not involved in the initial translation process.

A panel of experts on ECD was then invited to revise this version of the IDELA to assess the cross-cultural equivalence between the original and the translated versions of the IDELA according to the semantic, idiomatic, experimental, and conceptual equivalences (Hungerbühler et al., 2016), especially regarding the pertinence and adequacy of the words, symbols, and images to the Brazilian culture. The panel of experts was composed of medical doctors (psychiatrists and pediatricians), psychologists and speech therapists.

The panel of experts was also asked to assess the content validity of the IDELA, both before and after the pilot study. The content validity was assessed both by experts and the target population, according to the literature recommendations (Boateng et al., 2018).

Sampling (participants)

The study was conducted between 2016 and 2019, and 565 preschool children (4 to 6 years old) were assessed with the Brazilian version of the IDELA. IDELA's assessments were conducted in 11 randomly selected public pre-schools of Embu das Artes (out of a total of 29).

All children assented to be interviewed and their mothers signed the written consent forms. The assessment took place at the public preschool where the child was enrolled.

Out of those 565 children, 50 were randomly selected to be interviewed and scored by two evaluators simultaneously, in order to assess IDELA's inter-rater reliability in the Brazilian sample.

Exclusion criteria involved the children whose mothers did not sign the informed consent and children with a diagnosis of autism spectrum disorders.

Instruments

a) The International Development and Early Learning Assessment (IDELA)

The IDELA is composed of an Administration Guide (which is an orientation document for the interviewers, with detailed explanations about how to interview the child and how to score each item); a Scoring Sheet (which corresponds to a summary of the answers for each item); the Questionnaire for Caregivers (which is a direct interview of the main caregiver of the child about the family sociodemographic characteristics, socioeconomical status, and the family environment); and the IDELA main tool.

The IDELA is composed of 24 main items that directly evaluate key developmental skills and early learning of 3 to 6 years-old children. More specifically, the IDELA assesses 4 developmental subdomains (motor development, pre-mathematics and numeracy, socioemotional development, initial language and pre-writing), and 2 additional developmental areas (self-regulation, and executive functions) (Pisani et al., 2015). Answers for each item can be marked as "Correct", "Incorrect" or "No Response". After assessing the 24 items, the interviewers also answer 7 questions addressing the persistence, motivation, and engagement of the children during the tasks. All items have the same impact on the final score, so results are presented for both the developmental subdomains and the additional areas.

The IDELA scores for each of the four subdomains (motor development, pre-mathematics, pre-writing, and socioemotional development) and for the total score vary from 0% (when the child did not answer the items correctly) to 100% (when the child answered the item correctly). The average time to complete the IDELA interview is 30 minutes. Considering that the main objective of the IDELA is to assess the children according to their own performance, there are no cut-off points. The materials needed for the assessment are low cost (i.e., pencils, blank papers, counting items, picture cards and a children's book) and can be adapted for each country according to the environmental resources.

b) Sociodemographic data and socioeconomic status

At the beginning of the evaluation, the mother (or main caregiver) was asked to answer questions about the child's name, age, sex, and level at the preschool (Group 4 or 5 according to age), and to answer questions about his/her age, relationship with the child, their educational level and socioeconomic status. Socioeconomic status was stratified according to the Brazilian Economic Classification Criteria instrument (ABA-ABIPEME), which divides the socioeconomic level in five categories (from "A" to "E", considering "A" as the highest and "E" as the lowest socioeconomic level) based on a questionnaire that assesses number of household items owned by the families (i.e. refrigerators, washing machines, TV, etc.) and the family's main provider educational level (Jannuzzi, de & Baeninger, 1996).

Pilot study and final revision

Thirty children were initially interviewed in order to assess whether the IDELA was easy to understand. The results from this pilot study were revised by the Panel of Experts on ECD in order to include possible modifications. After these steps were completed, the final version of the Brazilian IDELA was achieved. These 30 children were not included in the analyses of the IDELA scores presented in the current study.

Inter-rater reliability

Fifty children (20 boys and 30 girls) were randomly selected to be simultaneously interviewed by two researchers. During the interview, one researcher asked the questions to the child and both researchers independently and simultaneously scored the child's responses. The two researchers took turns on who was going to conduct the interview. The agreement between their answers was calculated.

IDELA application in the Brazilian sample

Once the processes of translation, content validation, cultural adaptation and inter-rater reliability were finished, the Brazilian version of the IDELA was used to assess 565 children studying in public preschools in the city of Embu das Artes. These assessments were conducted by health and education professionals who had at least a college degree and had participated of a training conducted by a development specialist from Save The Children who came to Brazil specifically to train our research team. The training comprised around 30 hours of theoretical and practical activities, including presentations about the elaboration process of IDELA, its contents and psychometric properties, guidelines for application, scoring and correction guidelines, as well as role-playing of the IDELA application, supervised evaluation of 20 preschool age children and the discussion of their results. Each of the 11 researchers had to successfully interview at least 2 children to conclude the training. Costs for this initial training came from a grant from the Bill and Melinda Gates Foundation, and involved transportation, accommodation, and food expenses for the specialist from Save The Children.

Statistical analyses

Initially, data were analyzed descriptively. For categorical variables, absolute and relative frequencies were calculated and presented in the form of mean, quartiles, minimum, maximum and standard deviation.

Inter-rater reliability was calculated by the intraclass correlations. The associations between IDELA scores and sociodemographic data were done using ANOVA for categorical variables and Pearson correlations for continuous variables. The internal consistency of the IDELA subdomains were calculated according to the Cronbach's alpha values. For all statistical tests, a significance level of 5% was adopted. Descriptive analyzes were performed using the statistical software SPSS 20.0.

Results

Translation and cross-cultural adaptation

All the IDELA documents were translated into Brazilian Portuguese and culturally adapted to Brazil (i.e., the IDELA main tool; the Administration Guide; the Scoring Sheet; and the Questionnaire for Caregivers).

The cultural adaptations suggested by the expert panel included: decisions on the best way to present the instructions so that they were simple, straightforward and easy for the child to understand; selection of beans as the countable items in the pre-mathematics subdomain; change in the sequence of letters in the "Letter identification" item, according to the most frequent letters in Brazilian Portuguese; change in the sounds to be recognized in the "First Letter Sounds" item, according to most frequent sounds used at this age range in Brazilian Portuguese; selection of images more frequently known by Brazilian children at this age in the "Addition and Subtraction" item; selection of the most appropriate children's books according to the Brazilian reality.

According to pilot study, all IDELA subdomains were adequately measured by the Brazilian version of the IDELA, indicating a satisfactory content validity.

Table 1.
Scores on the IDELA items and subdomains.

	Mean	Standard Deviation	Range
Socioemocional	**54,5**	**20,6**	**0 - 100**
Personal Awareness	67.1	17.4	0 - 100
Friends	49.5	26.3	0 - 100
Emotion	61.0	33.7	0 - 100
Empathy	57.7	36.1	0 - 100
Conflict Resoluction	37.5	34.3	0 - 100
Motor	**66.3**	**22.9**	**0 - 100**
Copying Shapes	69.4	40.6	0 - 100
Drawing a Person	71.4	23.5	0 - 100
Folding Paper	41.9	37.2	0 - 100
Hopping	82.7	30.3	0 - 100
Pre-Writing	**54.5**	**18.2**	**0 – 98.3**
Oral vocabulary	54.5	22.9	0 - 100
Writing knwoledge	61.5	32.9	0 - 100
Letter Identification	36.7	37.1	0 - 100
First Letter Sounds	20.2	30.1	0 - 100
Writing Level	84.0	26.4	0 - 100
Oral comprehension	70.3	27.3	0 - 100
Pre-Mathematics	**53.6**	**21.8**	**0 - 100**
Size and Lenght Comparison	69.0	25.5	0 - 100
Classification	39.9	31.2	0 - 100
Shape Identification	61.0	31.0	0 - 100
Number identification	40.7	31.5	0 - 100
Numerical knowledge	49.7	37.9	0 - 100
Addition and Subtraction	51.9	36.4	0 - 100
Puzzle	63.1	37.2	0 - 100
IDELA Total	**57.3**	**17.0**	**0 – 96.8**

Inter-rater reliability

Excellent inter-rater reliability (Landis, 1977) was found for the total IDELA scores (0,961), as well as for the socioemotional (0,947), pre-literacy (0,962), pre-mathematics (0,989) and self-regulation abilities (0,942). The inter-rater reliability for the motor subdomain and approaches to learning were moderate (0.739 and 0.741, respectively).

Internal consistency of the IDELA subdomains

The Cronbach's alpha for the total IDELA was 0.78. The Cronbach's alpha for each of the IDELA subdomains were: 0.55 for motor development; 0.52 for pre-mathematics; 0.41 for pre-writing; 0.59 for socioemotional development; 0.83 for self-regulation; and 0.93 for executive functioning.

IDELA application in 565 children

The mothers and/or primary caregivers of 565 4-to-6-year-old children were interviewed to provide data on their age, ethnicity, level of education and socioeconomic class. For this interview, 96.5% of respondents were the children's mothers, 57.2% (266) had completed high school and 70.4% (339) belonged to socioeconomic class C. Among the 565 children assessed, 54% (305) were male.

Table 1 shows the scores obtained in each IDELA subdomain evaluated, identified by the items in each developmental area.

The IDELA scores were analyzed according to gender and age (Tables 2 and 3). Regarding child's gender, it was found that, except for the pre-mathematics ($p = 0.665$), the girls' mean scores were higher than boys' (Table 2). Regarding age, the mean scores of 5-year-old children were higher than that of 4-year-old children (Table 3).

Regarding maternal level of education, there were significant differences in the total children's IDELA ($p = 0.035$), pre-mathematics ($p = 0.004$) and socioemotional ($p = 0.023$) scores. More specifically, preschoolers from mothers who completed at least high school had higher scores than the ones from mothers who were illiterate or had only finished elementary school (Table 4).

Table 2.
IDELA scores according to the child's gender.

	Mean	Standard Deviation	Range	N	p
IDELA Total	**57.3**	**17.0**	**0 – 96.8**	**565**	0.008
Girls	59.3	16.6	0 – 91.4	260	
Boys	55.5	17.1	0 – 96.8	305	
Motor	**66.3**	**22.9**	**0 – 100**	**565**	0.002[a]
Girls	69.7	21.6	0– 100	260	
Boys	63.5	23.6	0 – 100	305	
Pre-Literacy	**54.5**	**18.2**	**0 – 98.3**	**565**	0.012
Girls	56.6	17.5	0 – 97.5	260	
Boys	52.8	18.5	0 – 98.3	305	
Pre-Mathematics	**53.6**	**21.8**	**0 – 100**	**565**	0.665[a]
Girls	54.0	22.2	0 – 100	260	
Boys	53.3	21.4	0 – 100	305	
Socioemotional	**54.5**	**20.6**	**0 – 100**	**565**	0.011
Girls	56.9	19.9	0 – 96.7	260	
Boys	52.5	20.9	0 – 100	305	

p = significance level in the t-test (Student) or the Mann-Whitney([a]).

Table 3.
IDELA scores according to children's age.

	Mean	Standard Deviation	Range	N	p
IDELA Total	**57.3**	**17.0**	**0 – 96.8**	**565**	<0.001
4	52.1	15.7	0 – 88.7	372	
5	67.2	14.8	0 – 96.8	193	
Motor	**66.3**	**22.9**	**0 - 100**	**565**	<0.001[a]
4	59.7	22.0	0 - 100	372	
5	79.1	19.0	0 - 100	193	
Pre-Literacy	**54.5**	**18.2**	**0 – 98.3**	**565**	<0.001
4	50.0	17.5	0 – 97.5	372	
5	63.3	16.1	0 – 98.3	193	
Pre-Mathematics	**53.6**	**21.8**	**0 - 100**	**565**	<0.001
4	47.5	20.0	0 – 95.7	372	
5	65.5	20.2	0 - 100	193	
Socioemotional	**54.5**	**20.6**	**0 - 100**	**565**	<0.001
4	51.2	19.9	0 – 98.0	372	
5	61.0	20.4	0 - 100	193	

p = significance level in the t-test (Student) or the Mann-Whitney([a]).

Regarding the feasibility of the Brazilian version of the IDELA, it is important to mention that on average, the application time was 27.7 minutes (SD=8.1 min), with a minimum of 13 min and a maximum of 74 min. The total cost of the material was in average 0.15 USD per child evaluated.

Regarding children's motivation to answer the IDELA items, the mean average scores were 86.7% for approaches to learning and 90.9% for persistence and engagement (SD=18,4).

Discussion

The findings of the present study indicated that the IDELA was successfully translated to the Brazilian Portuguese and was effectively adapted to the Brazilian culture, presented an adequate content validity and high inter-rater reliability. It also presented good internal consistency scores for the IDELA sub-domains. These results are in accordance with studies that demonstrated that the IDELA has been successfully used in more than 70 countries around the world, especially in low and middle-income countries (Pisani et al., 2015, 2018).

The study followed all methodological steps for the processes of translation, cultural adaptation, back-translation, assessment of the content validity and the inter-rater reliability analyses (Boateng et al., 2018; Hungerbühler et al., 2016); Pisani et al., 2018; Widenfelt et al., 2005). The present study also followed all of Save The Children's training guidelines (Pisani et al., 2018). Another strength was the expertise of the professionals involved in the study in the field of early childhood development.

Table 4.
Associations between IDELA Scores and Maternal Education.

	Mean	Standard Deviation	Range	p
IDELA Total				0.035
Illiterate – Unfinished Elementary School	53.4[B]	15.5	9.0 – 90.9	
Finished Elementary School – Incomplete High School	55.3[B]	17.3	0 – 91.4	
Finished High School or College	58.6[A]	17.0	0 – 96.8	
Motor				0.208
Illiterate – Unfinished Elementary School	64	22.5	0 - 100	
Finished Elementary School – Incomplete High School	63.6	22.8	0 - 100	
Finished High School or College	67.7	22.6	0 - 100	
Pre-Writing				0.274
Illiterate – Unfinished Elementary School	52.5	17.8	12.5 – 97.5	
Finished Elementary School – Incomplete High School	52.4	18.1	0 – 95.8	
Finished High School or College	55.3	18.2	0 – 98.3	
Pre-mathematics				0.004[a]
Illiterate – Unfinished Elementary School	48[B]	20.1	7.6 – 93.8	
Finished Elementary School – Incomplete High School	49.1[B]	23.2	0 – 91.4	
Finished High School or College	55.6[A]	21.4	0 - 100	
Socioemotional				0.023
Illiterate – Unfinished Elementary School	48.9[B]	17.8	3.3 – 94.7	
Finished Elementary School – Incomplete High School	56[A]	18.5	0 – 92	
Finished High School or College	55.9[A]	21.4	0 - 100	

p = significance level in the ANOVA or the Kruskal-Wallis tests.

The processes of translation and cultural adaptation were conducted effectively, as the children evaluated were able to fully understand tasks and instructions, as well as to respond appropriately to the questions. As demonstrated in the IDELA technical report (Pisani et al., 2015), the Brazilian children showed enthusiasm and motivation to participate in the assessment, according to the high scores obtained in the persistence, motivation, and engagement scores throughout the evaluation.

Regarding content validity, the present study indicates that the Brazilian version of the IDELA adequately measures the developmental concepts that it is intended to, according to criteria suggested by Guion (1977), providing initial data to continue the validation process of IDELA in Brazil.

The inter-rater reliability for the total IDELA scores was excellent (0.96). The total IDELA inter-rater reliability scores in Egypt, Malawi, Rwanda and Zambia were 0.97, 0.93, 0.95 and 0.97 respectively (Pisani et al., 2018), similar to the Brazilian inter-rater reliability scores.

The inter-rater reliability for the socioemotional, pre-writing, pre-mathematics and self-regulation subdomains were above 0.9, while the inter-rater reliability for the motor development and approaches to learning abilities were lower (0.74). These lower rates may be due to the fact that the items assessing approaches to learning are more subjective, as they are dependent on the interviewer's opinions. It is possible to hypothesize that the lower inter-rater reliability for the motor development sub-domain may be due to the fact that these items (e.g. folding paper and hopping) require a model provided by each interviewer. Nevertheless, the inter-rater reliability for the motor development subdomain in our sample (0.74) was similar to the scores obtained in Rwanda (Pisani et al., 2018).

The internal consistency analyses showed that the IDELA items in the four developmental subdomains (motor development, pre-mathematics, socioemotional development, and pre-writing) had lower scores (ranging from 0.41 to 0.59) than the scores for the self-regulation (0.83) and executive functioning items (0.93). Internal consistency value for total IDELA in Brazil (0.78) was similar to data from Mozambique (0.84) and Pakistan (0.85) (Pisani et al., 2015). Regarding each subdomain, similarities were found in the socioemotional values: Bangladesh and Indonesia present internal consistency of 0.68 for this subdomain, while our sample showed 0.59 (Pisani et al., 2015).

Like previous studies (Pisani et al., 2018; Wolf et al., 2016), the current results also demonstrate that the IDELA is feasible to be administered in low-income countries and for a large number of children, considering that the materials used for the assessment had a very low cost, and that the mean time for the interview was short.

The results indicated that the children were highly engaged in answering the IDELA. For instance, 75% of the children were able to correctly answer almost 70% of the items. Interestingly, differences were observed among the scores of the subdomains. For example, the mean score for gross motor development was 82.2% whereas the mean scores for the emotion recognition and personal awareness subdomains were 61% and 67%, respectively. These findings may suggest that learning opportunities for motor skills tend to be more frequent and/or more appraised than the learning opportunities for socio emotional skills in the Brazilian pre-schools (Brasil, 2018). In this sense, IDELA seems to be a culturally sensitive instrument, allowing to point out different learning opportunities for diverse countries / cultural settings.

Children had high mean scores for the pre-literacy sub-domain (84%), although one of its subitems (First Letter Sounds) was correctly answered by only 20.2% of the children. This finding may reflect the fact that phonological skills are rarely taught in Brazilian pre-schools (Brasil, 2018). Differently, scores in the pre-numeracy items, that are part of the regular pre-school curriculum, ranged from 40% to 70%. The mean scores in pre-writing and pre-mathematics were higher in Brazilian children than the scores for same age children in Bangladesh, Mozambique, and Pakistan (Pisani, Borisova & Poehlman, 2014).

The current results showed that girls had higher mean scores than boys in most of the IDELA items, what is in accordance with the literature (Janus & Offord, 2007; Rao et al., 2019; UNICEF, 2019) and with data from other countries where the IDELA was used (Dowd et al., 2018).

Additionally, as it was expected, older children had higher scores than younger ones, which is consistent with a regular improvement in performance over the years and converging with other IDELA studies around the world (Pisani et al., 2015) as well as with evidence from other instruments such as the MELQO (UNICEF, 2017) and the PRIDI (Verdisco, Cueto, Thompson, & Neuschmidt, 2015).

Results also suggested that children whose mothers had higher levels of education achieved higher mean total scores, and pre-numeracy and socioemotional scores. These findings are in accordance with studies that have demonstrated that maternal education has been consistently associated with children's school performance (Anazawa, Guedes, Komatsu & Menezes-Filho, 2016). It is also noteworthy that the majority of the children evaluated (70.4%) belonged to class C (socioeconomic status), fact that may have influenced the mother level of education. Stud-

ies using the IDELA in other countries have also found positive correlations between socioeconomic status and children's IDELA scores, especially regarding the pre-literacy domain (Dowd et al., 2018; Pisani et al., 2015).

It is important to mention that the current study has some limitations. For instance, although the sampling process was adequate and results indicated high inter-rater reliability, it is not possible to determine whether these results will be replicated in different settings. In addition, future studies with a representative sample of all the Brazilian regions are needed in order to investigate whether the current results are generalizable. Additionally future psychometric studies should include a factor analysis of the IDELA and the inclusion of larger samples with more diverse social and cultural characteristics. It is also important to continue investigating possible associations between the IDELA scores and other sociodemographic and clinical characteristics of the child, the mother and/or the family. Future longitudinal studies are also suggested, to investigate possible associations between the child's IDELA scores in pre-school with their performance in elementary schools. These data could be useful to the elaboration and planning of public policies regarding early childhood education and to investigate the impact of parental programs on children's development.

Despite its limitations, the psychometric findings presented in this study demonstrate that the Brazilian version of the IDELA is an adequate tool for assessing multiple early child development areas as well as school readiness in Brazil, in accordance with results around the world (Pisani et al., 2018; Wolf et al., 2016).

The current study presents several advantages and scientific contributions not only for the assessment of ECD, but also for the elaboration and planning of efficient interventions in family, clinical and school contexts. They also reinforce that the IDELA is a feasible and easily adapted instrument to different cultures, including low and middle-income countries. This fact can greatly contribute to the gathering of information about ECD and early learning from different countries worldwide (Pisani et al., 2018; Wolf et al., 2016).

Conclusions

The results of the current study demonstrated that the Brazilian version of IDELA is an adequate and reliable instrument for directly assessing the development and school readiness of children aged 4 to 6 years old in Brazil. It was successfully translated and culturally adapted to this country, presenting an adequate content validity, very high inter-rater reliability scores and good internal consistency scores. Therefore, the IDELA paves the way for new studies assessing early childhood development and education in Brazil and gives support to the planning of public health and education policies in this country.

Ethics approval statement

This study was approved by the institutional Ethics Committee of the Federal University of São Paulo (UNIFESP), protocol number 99144718.2.0000.5505

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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