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An Initial Evaluation of a Measure of Social-Emotional Skills Among Brazilian Children and Adolescents

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ABSTRACT

Growing evidence suggests that providing children and adolescents with explicit opportunities to learn social and emotional skills during elementary and secondary school can support positive developmental outcomes. However, understanding the benefits of social-emotional learning (SEL) programs requires an ability to measure potential changes in SEL skills. This study investigates the factor structure, reliability, and preliminary percentile norms of a new SEL measure for use in Brazil. The measure is aligned with the Collaborative for Academic Social and Emotional Learning's (CASEL) SEL competencies and was then administered to 7728 participants between the ages of 9–17 years old. Results confirmed a five-factor model that was well-aligned with the CASEL framework. Internal consistency, test-retest reliability, and initial criterion-related validity provided further support for the constructs. Implications for future research and practice are discussed.

Social and emotional learning (SEL) is a complex construct that includes a broad range of skills relating to the ways that children recognize, manage, regulate, express and utilize emotions in interactions with peers and adults (Greenberg 2023; McClelland et al. 2017). Considerable evidence now indicates that providing school-age students with specific instruction in SEL can promote and understanding of these skills along with secondary benefits associated with broader developmental outcomes (Durlak et al. 2011, 2022). Beginning in 2018, SEL became a mandatory component of the Brazilian education system for *all* children from preschool through high school leading to a proliferation of efforts to implement such programs (McCoy et al. 2021). These efforts have led to debates among educators regarding what the SEL construct includes, the best ways to deliver SEL, and how SEL programs should be evaluated (Berg et al. 2017; Durlak et al. 2022). As a result, many other constructs and terms such as soft-skills, noncognitive skills, emotional intelligence, or life skills are often included in reference to SEL (Joksimović et al. 2022; Jones and Doolittle 2017; Martinez-Yarza et al. 2023). Efforts to address confusion regarding the operational definitions of SEL within Brazil has led to the widespread adoption of the Collaborative for Academic, Social, and Emotional Learning's (CASEL) core SEL competencies including self-awareness, self-management, social awareness, relationship skills, and responsible decision-making (CASEL 2012; Greenberg 2023). In the current study, we evaluate the validity and reliability of a measure designed specifically to measure these five CASEL competencies among students in Brazil.

1 | Measuring CASEL's Five SEL Competencies

Several researchers have utilized CASEL's five-domain model for developing measures of SEL in international contexts. For example, Shi et al. (2022) created a student self-report instrument that was administered to over 3000 elementary school-aged children in China. These researchers developed over 70

Summary

- We present a 39-item self-report test of social-emotional learning based on the five Collaborative for Academic Social and Emotional Learning (CASEL) competency domains: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making.
- Evaluated data from 7728 students and results indicate that the measure demonstrates factorial adequacy, initial reliability, and initial validity.
- Overall findings suggest this new measure has promise for assessing social-emotional learning (SEL) competencies among school-age students, particularly in Brazil.

items to capture the constructs proposed in CASEL's model and then trimmed these items through a series of analyses resulting in a final model that included 38 items. These items measured self-awareness (eight items), self-management (seven items), social awareness (eight items), relationship skills (eight items), and responsible decision making (seven items). Together, these factors accounted for approximately 58% of the variance in student responses, and the resulting factors demonstrated strong internal consistencies ranging from 0.87 to 0.91.

In a separate effort, Mantz et al. (2016) developed items to measure the five CASEL competencies and administered the measure to over 30,000 students from 126 schools in the state of Delaware. Due to several ethical concerns, these researchers decided to eliminate items pertaining to self-awareness and instead created a 12-item instrument to measure social-awareness, self-management skills, relationship skills, and decision-making skills (three items each). They then evaluated this instrument with two samples and found support for a four-factor model. However, internal consistencies for these constructs were low ($\alpha = 0.58$–0.69), which they attributed to the fact that each factor contained only three items. The researchers therefore recommended only using total scores on the measure, which had a stronger coefficient alpha (0.84). Thus, although this study had many strengths including a large sample representative of the state of Delaware, a limitation was that the measure provides global, rather than specific, information on each of CASEL's five underlying competencies.

In a third example, Gresham et al. (2020) applied a novel approach for developing an SEL instrument to reflect the five CASEL competencies by utilizing extant data gathered from the standardization sample for the Social Skills Information System (Gresham and Elliott 2008). These researchers postulated that items on the SSIS—which measures social skills, internalizing behaviors, and externalizing behaviors—could be organized around CASEL's five competency areas due to similarities between items on the original SSIS and the CASEL framework. The researchers used extant data from 139 elementary aged students and 89 adolescents and aligned existing items on the SSIS with CASEL's five-constructs and found that the model demonstrated marginal, but adequate, fit to the data (Gresham et al. 2020). Moreover, internal consistency estimates for the five factors ranged from 0.72 to 0.85 for children (ages 8–12 years) and between 0.76 and 0.88 for adolescents (ages 13–18 years). Finally, for a subsample of the original sample, test-retest reliabilities on the five factors ranged from 0.68 to 0.77 on four of the five derived constructs.

In yet another measurement study focused on the CASEL framework, Crowder et al. (2019) worked with practitioners from one school district to develop items that could be used with elementary, middle, and high school students. Thus, this effort addressed two important issues: (1) the developmental aspects of SEL, and (2) the importance of designing a measure that reflected the realities of school-based practitioners. The researchers tested a 40-item measure using Rausch modeling and then organized and tested items within each construct according to developmental age (i.e., elementary, middle, high school) but also evaluated differential item functioning across gender and race. Findings revealed difficulties with item ordering and item targeting leading the researchers to suggest that future efforts employ mixed-methods research approaches for improving item ordering and larger item pools to help with item targeting. Despite these challenges, Crowder et al. (2019) did find limited evidence of differential item functioning for many of the items included in their measure, suggesting that SEL items may function similarly across student characteristics.

2 | SEL in Brazil

The mandate to teach SEL to all children in Brazil is rooted in the growing awareness of its importance in addressing the country's educational and social challenges. Studies in Brazil have shown that SEL is vital for fostering a positive school environment, improving student engagement, and reducing problems such as bullying and school dropout (Canettieri et al. 2021). Moreover, the inclusion of SEL in the National Common Curricular Base reflects the recognition by Brazilian policymakers that the academic success of students is linked to their social and emotional development (Brazil. Ministry of Education 2017). Another driver of SEL is the need to reduce socioeconomic inequalities by equipping students with holistic development, such as emotional regulation, empathy, and interpersonal relationships, all of which are perceived as lacking in traditional educational models (Del Prette and Del Prette 2017). Many children in Brazil face adverse conditions that hinder their academic performance and overall well-being (Souza et al. 2024) and implementing SEL in schools is often viewed as a strategy to mitigate these challenges (Greenberg et al. 2017).

Given the perceived benefits of SEL programming, there are several reasons why it is important to have a reliable and valid measure of SEL in Brazil. First, a rapidly growing number of schools throughout the country are implementing SEL programs, however, very little is currently known about effectiveness of these programs and having a reliable and valid SEL measure would help to address this gap (Cipriano et al. 2023; Coelho and Sousa 2017; Greenberg et al. 2003; Heckman et al. 2006). Second, little consensus regarding what constitutes SEL has led to a proliferation of varied curricula, programming,

and measurement approaches being implemented throughout the country under the broader umbrella of SEL (Primi et al. 2021). Although an outcome measure alone may not lead to greater clarity among practitioners regarding SEL, developing a measure that is well-grounded in theory and research should contribute to better operationalization of SEL as a construct. Third, the lack of consensus regarding SEL coupled with the proliferation of different types of SEL curricula and measurement approaches limits the ability to compare these widely varying efforts to one another. As demonstrated by existing research in SEL and related fields, the ability to compare curricula is crucial for helping practitioners gain deeper insights into program quality, understand the potential benefits of specific programs for particular groups of children and youth, and assess how different programs may perform across various educational settings or contexts (Chen et al. 2023; Joksimović et al. 2022; Thomas et al. 2022).

Although developing SEL measures within Brazil remains a challenge, several researchers have used approaches similar to the approach taken by Gresham et al. (2020), by combining existing measures to create new SEL tools. Primi et al. (2016) created an inventory to assess social and emotional skills using existing measures of locus of control, self-esteem, the Strengths and Difficulties measure, two big five personality tests, and measures of self-efficacy, grit, and self-evaluation. The resulting instrument contained 209 self-report items and 21 different scales that were administered to over 3000 students in the 5th, 6th, 9th, 10th, and 12th grades. Initial results of an exploratory factor analysis of these data suggested that the eight instruments loaded on 12 different factors, a finding that seems somewhat intuitive given the fact that the researchers used existing instruments with existing factor structures. These researchers then constrained the number of possible factors to between 5 and 10 and selected a 6-factor model to represent SEL competencies. However, this final model accounted for only 24% of the variance in student responses and internal consistencies were not reported. In a second effort, these researchers trimmed items from their first effort (i.e., 209 items) to 90 items to represent the six original factors (Primi et al. 2016). This revised measure was then administered to over 24,000 Brazilian students in 5th, 10th, and 12th grades. Data from this second study were then subjected to a CFA in alignment with the 6-factor model identified in Study 1. Although results suggested modest model fit and internal consistencies above 0.75, the authors argued that the final model was best aligned with the Big Five personality framework rather than SEL.

3 | Study Purpose

The primary aim of the current study was to evaluate a student-report measure of SEL in a large sample of students in public school settings in Brazil. The reality that researchers and practitioners face regarding understanding and implementing SEL programming in Brazil is challenging (Anunciação et al. 2019; Martinez-Yarza et al. 2023; McCoy et al. 2021; Primi et al. 2021) and the country has initiated widespread implementation of SEL curriculum and programming. Unfortunately, there are currently few tools that have been rigorously evaluated to assess CASEL's five SEL competencies. Despite growing global interest in developing SEL assessment instruments, many existing efforts face significant limitations. These include weak evidence of internal consistency (Mantz et al. 2016), omission or misdefinition of key SEL constructs (Mantz et al. 2016; Primi et al. 2016, 2021), retrofitting SEL models to data collected for unrelated purposes (Gresham et al. 2020), and difficulties in identifying developmentally appropriate items (Crowder et al. 2019). In Brazil, for example, SEL measurement efforts have relied on existing tools to draw broad connections between SEL and the Big Five personality traits (Primi et al. 2016, 2021), potentially increasing confusion about how SEL is defined and assessed.

We hoped to address some of these limitations by evaluating a student-report measure, based on the CASEL framework, for use in Brazil. The 39-item measure was initially developed through an iterative process that included literature review (including prior measures), expert ratings of all items, interviews with children and parents, and a pilot implementation (Marques et al. 2023). The current study extends these initial efforts by evaluating the factor structure of this measure with a large diverse sample of Brazilian children and youth. We anticipated that we could confirm the validity of a five-factor model for the Genios Socioemotional instrument in alignment with CASEL's five core SEL competencies. We further anticipated that the resulting factors would display adequate internal consistency, test-retest reliability, and initial criterion-related validity. Our two primary research questions were:

R1: *Could we confirm a five-factor model that included self-awareness, self-management, social awareness, relationship skills, and responsible decision-making in alignment with the CASEL model?*

R2: *Would these factors demonstrate adequate psychometric properties (i.e., reliability and validity) on a sample comprised exclusively of Brazilian elementary and secondary students?.*

4 | Methods

4.1 | Participants

The sample included 7728 students from the Southwest and South regions of Brazil from 112 different schools. Table 1 shows overall demographics for the sample in column 1 as well as parallel demographics for a subsample of the larger sample for whom we had two measurement time points (i.e., column 2). Time two data were gathered from students attending 34 different schools. It is important to note that some demographic data were missing for the children and youth in the sample, also indicated in Table 1 each of the listed demographic categories.

All students were Brazilian and most self-identified as White (48.8%), followed by mixed-race (34.4%), Black (10.6%), Asian-descendent (3.9%), and Indigenous (2.4%). In Brazil, racial and ethnic categories are more fluid compared to those commonly used in the United States. The Brazilian census uses a self-report tool that classifies individuals into one of five broad categories: White, Mixed Race, Black, Asian, and Indigenous, reflecting the nation's history of racial mixing and diversity

TABLE 1 | Sample characteristics.

Variable	Overall ($N = 7728$)	Retest ($N = 1326$)
Gender		
- Male	2719 (50.0%)	400 (47.7%)
- Female	2638 (48.5%)	431 (51.4%)
- prefer not to say	77 (1.4%)	7 (0.8%)
- N-Miss	2294	488
Age	12.19 (1.84)	12.50 (1.75)
Self-reported race		
- White	3721 (48.7%)	711 (53.6%)
- Mixed (White + Black)	2630 (34.4%)	431 (32.5%)
- Black	809 (10.6%)	96 (7.2%)
- Asian descendent	301 (3.9%)	51 (3.8%)
- Indigenous	181 (2.4%)	37 (2.8%)
- N-Miss	86	
People at the same house?		
- 1–3 people	3595 (47.2%)	688 (51.9%)
- 4 up to 7 people	3308 (43.5%)	537 (40.5%)
- 8 up to 10 people	450 (5.9%)	58 (4.4%)
- 11 or more	260 (3.4%)	42 (3.2%)
- N-Miss	115	1
Brazilian state		
- Santa Catarina	6784 (87.9%)	1143 (86.2%)
- Rio Grande do Sul	338 (4.4%)	134 (10.1%)
- Minas Gerais	592 (7.7%)	49 (3.7%)
- Mato Grosso do Sul	2 (0.0%)	—
- Alagoas	2 (0.0%)	—
- Paraná	1 (0.0%)	—
- N-Miss	9	—
Participating Schools	112	34
Grade		
-4 (Elementary School: 3rd grade)	1376 (17.9%)	158 (11.9%)
-5 (Elementary School: 4th grade)	1676 (21.8%)	259 (19.5%)
-6 (Elementary School: 5th grade)	1382 (18.0%)	243 (18.3%)
-7 (Middle school: 6th grade)	1167 (15.2%)	231 (17.4%)
-8 (Middle school: 7th grade)	1089 (14.2%)	211 (15.9%)
-9 (Middle school: 8th grade)	994 (12.9%)	224 (16.9%)
- N-Miss	44	

(Brazilian Institute of Geography and Statistics - Instituto Brasileiro de Geografia e Estatística IBGE 2022). However, racial inequalities do affect access education and other social services, making the need for universal SEL even more urgent, particularly within marginalized communities (Jagers et al. 2019; Williams and Cooper 2019). Moreover, unlike the U.S. Census Bureau, which separates race and ethnicity (e.g., Hispanic or Latino as an ethnicity rather than a race), Brazilians are often excluded from these categories despite cultural and historical ties to Latin America (U.S. Census Bureau 2020).

Participants ranged in age from 9 to 17 years old ($M = 12.18$; $SD = 1.83$), and were enrolled in grades 4 through 8. Although we had a relatively large amount of missing data pertaining to student gender, approximately 50% of respondents reported being male, 49% reported female, and 1.5% indicated a preference not to report. Brazilian grade levels are approximately one unit lower than U.S. grade levels (see Table 1). Finally, despite the fact we did not gather socioeconomic status data for the participants, the study took place in public schools, which tend to serve children living in low-income and conflict-affected settings in the region where the study took place. The sample at T2 (i.e., test-retest only) was comprised of 1327, or approximately 16.5% of the larger sample. The demographic characteristics of this subsample, also presented in Table 1, were comparable to those of the larger sample.

4.2 | Measures

4.2.1 | The Genios Socioemotional Tool (Marques et al. 2023)

This self-report measure was designed to assess the five core social-emotional competencies outlined by CASEL: self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. The instrument was developed to align with CASEL's framework as outlined by (Marques et al. 2023). To maintain strong conceptual grounding, we used the following definitions: self-awareness (four items) refers to recognizing one's emotions, thoughts, and values and understanding their influence on behavior; self-management (nine items) involves regulating emotions, thoughts, and behaviors, including stress management and goal-setting; social awareness (eight items) captures the ability to empathize with others, appreciate diverse perspectives, and recognize social norms; relationship skills (10 items) encompass communication, cooperation, conflict resolution, and helping behaviors; and responsible decision-making (eight items) refers to making ethical and constructive choices considering consequences for oneself and others (Van Pham 2024; Ariza and Brown 2022; CASEL 2020). Items were initially selected from CASEL-approved instruments, many in English, and underwent a rigorous translation and adaptation process. Two independent translators completed the initial translation, followed by two back-translators. Additional items were created in Portuguese to address cultural and contextual nuances. The final item set was reviewed by four specialists in psychology and education from Brazil who assessed clarity, content validity, and relevance using a 5-point polytomous scale. Items with a content validity

coefficient (CVC) below 0.8 were revised or excluded. To ensure readability and appropriateness for children and adolescents, all items were written in simple language, maintaining positive valence within each scale. Complex terms were clarified with examples or synonyms, such as "I admit (talk) when I have done something wrong" or "I know how to identify my strengths (skills and healthy characteristics)." The final version consists of 39 items, distributed across the five CASEL competency domains, with responses collected on a 5-point Likert scale ranging from 1 = *Never* to 5 = *Always*.

4.2.2 | Children's Depression Inventory (CDI, Kovacs 1981)

In the current study, an adapted version of the CDI was used to evaluate concurrent criterion-related validity of the Genios measure among children. As part of the English to Brazilian Portuguese translation process, pilot administrations were conducted with a small group of children to assess item comprehension. Based on these results and the linguistic demands of the items, three items were eliminated and the final version was administered to children aged 8–11 years (i.e., up to the 5th grade), an age group deemed developmentally capable of understanding and accurately responding to the measure. The final measure included 24 items scored on a 0–2 scale according to responses pertaining to sadness (e.g., 0 = *I am sad once in a while*, 1 = *I am sad many times*, 2 = *I am sad all the time*), and other indicators of depression (e.g., pessimism, sense of failure, irritability, etc.). The CDI has been evaluated in numerous studies with school-age children (Craighead et al. 1998; Saylor et al. 1984; Sitarenios and Kovacs 1999) and has strong psychometric properties with higher scores indicative of greater severity of symptoms. On the current sample, the alpha coefficient for participating children was 0.83 for the total scale.

4.2.3 | Depression, Anxiety, and Stress Scale–21 (DASS-21, Silva et al. 2016)

The DASS-21 was administered to assess depressive symptoms among adolescents and to examine the concurrent criterion-related validity of the Genios measure within this age group. In the current study, the instrument was used with participants aged 12 years old and older, based on its complexity and the suitability of its content for this developmental stage, particularly within school, home, and social contexts. This age-appropriate selection was made in consultation with both the educational staff and the research team. It was also informed by the understanding that administering measures designed for younger children could negatively impact adolescents' engagement and the quality of their responses. The measure includes 21 items divided into three subscales: depression (e.g., "I have felt that life was meaningless"), anxiety (e.g., "I have experienced breathing difficulty"), and stress (e.g., "I find it difficult to relax"). Responses are provided on a four-point scale: 0 = *Does Not Apply to Me at All*, 1 = *Applies to Me Some of the Time*, 2 = *Applies to Me a Good Part of the Time*, and 3 = *Applies to Me Most the Time* with higher scores indicating greater severity of distress symptoms. The internal consistency on the total score for the current sample was obtained via Cronbach's alpha and was 0.92.

Demographic Information was gathered through self-report. Students were asked about their gender, how many people lived in their household, and how they identified racially/ethnically. For the ethnic questions, we used the categories used in the most recent census (Brazilian Institute of Geography and Statistics - Instituto Brasileiro de Geografia e Estatística IBGE 2022).

4.3 | Procedures

Before any data collection, the project was approved by the Brazilian Ethical Council under number 56387122.3.0000.5281. The recruitment process prioritized ensuring a broad and diverse sample within the constraints of school availability with willingness to participate. Schools were invited through direct contact with school administrators and educational coordinators, who were provided with detailed information about the study's objectives and procedures. Once schools agreed to participate, students and their families were informed about the research and invited to take part voluntarily. Consent forms were distributed to parents, and assent was obtained from students before participation.

The study included schools from multiple regions within the state, aiming to capture a representative cross-section of students from public schools. However, participation was ultimately dependent on institutional approval, which may have influenced the final composition of the sample. The first data collection occurred between May and August 2023. The second data collection occurred between October and December 2023. Data collection was conducted in classroom settings to ensure standardized administration of the measures. Trained research assistants provided students with verbal instructions, clarifying any doubts before they began responding to the assessments. To minimize potential biases, teachers facilitated logistical aspects of administration and students were instructed to ask teachers if they had any difficulties understanding specific words or sentences. Participants completed the assessments individually in a quiet and structured environment. To protect participants' confidentiality, all responses were anonymized, and identifying information was stored separately from the research database. Ethical considerations were strictly followed, including adherence to national regulations on research with human subjects. Efforts were made to maximize participation and engagement by maintaining open communication with school staff and adapting logistical procedures to fit school schedules.

4.4 | Analytic Approach

All data were first transferred to Excel spreadsheets and then to the R 4.0 programming language. Data preparation and data cleaning included exhaustive checks for inconsistencies (e.g., participant identification), coding or response errors (e.g., 15 instead of 1 or 5 on each scale), and other issues which could produce consequent distortions in analyses. List-wise deletion

was implemented due to the large sample size and the low frequency of missing cases (< 5%) for all items of the Genios measure. Given the small proportion of missing data, this approach minimizes potential biases while preserving statistical power.

We used a confirmatory factor analysis (CFA) framework to evaluate five competing solutions for the SEL items using the full data set ($N = 7728$) and Mplus 8.7 (Muthén and Muthén 2017). In all analyses, we defined the estimator as a weighted least squares–mean (WLSM) to accommodate the ordered categorical nature of the items, which showed violations of the ordinary least squares' assumption of constant variance in the errors (DiStefano and Morgan 2014). We implemented the delta parameterization by fixing total means and total variances from 0 to 1. To account for clustering within schools, we used cluster-robust standard errors at the school level.

Model fit was assessed with the chi-square test of model fit and based on recommended cutoff values by Hu and Bentler (1999), Kline (2023), and Fabrigar et al. (1999) for the comparative fit index (CFI) and Tucker-Lewis index (TLI) > 0.95, root mean square error of approximation (RMSEA) < 0.06, and the standardized root mean square residual (SRMR) < 0.06. Additionally, item factor loadings, reliability, and previous research (Arruda et al. 2020; Guo et al. 2019; Marques et al. 2023) regarding the overall adequacy of each solution was used when interpreting CFA results. The reliability of the results was measured via ordinal Cronbach's alpha computed with polychoric correlations (Chalmers 2018). Values of 0.7 or greater were defined as adequate internal consistency. Test-retest reliability evaluates the stability of test scores over time, indicating whether they reflect stable traits rather than random variation (Matheson 2019). To assess this, we examined a subsample that completed the Genios socioemotional tool twice, approximately 5 months apart. Participants were unaware of their initial scores during the second administration.

Individual linear models were computed to investigate overall relationships between constructs and to conduct an initial evaluation of the criterion-related validity of the Genios measure. For these analyses, we did not use responses from children who checked the "I don't understand" option on the CDI. Lastly, normative data were established through a two-step approach. First, linear tests were conducted to evaluate whether demographic variables significantly influenced the results. Second, percentile ranks were calculated, either grouped or ungrouped by demographic factors. All percentile ranks indicate the percentage of individuals scoring at or below a specific score. A Shiny app (an R-based framework) was developed to provide an easy and intuitive way to interpret the results, and all analyses were performed using R programming language 4, with lavaan 0.615, and Mplus 8. The significance level was defined as 0.05, and codes and notebooks are freely available at https://osf.io/9dps4/.

5 | Results

As a first step in the model building process, we checked the statistical plausibility of 5 theoretical models by comparing their fit statistics (CFI, RMSEA, and SRMR) and the percentage of variance explained (see Table 2). The models were derived from prior theory and research (Crowder et al. 2019; Gresham et al. 2020; Marques et al. 2023; Shi et al. 2022), with the final model based on CASEL's five-factor framework (CASEL 2020). The first five eigenvalues were as follows: unidimensional solution = 11.345, 2-factor = 2.765, 3-factor = 1.804, 4-factor = 1.419, and 5-factors = 1.125. We then ran a CFA freeing the parameters between items and their respective factors and fixing all other parameters to zero. Figure 1 provides an overview of the 5-factor solution. The chi-square test of model fit was significant $X^2(692) = 35760.46$, the CFI was 0.929, the TLI was 0.924, the RMSEA was 0.081 (90% CI 0.080–0.082), and the SRMR was 0.053, indicating good fit. The standardized regression coefficients derived from the CFA were statistically significant (i.e., $p < 0.001$) and all loadings were moderate to large in magnitude (Cohen 1988). Internal consistency on each factor was evaluated using the ordinal Cronbach's alpha and all coefficient alphas were above 0.70: Self-Awareness = 0.73, Self-Management = 0.79. Social Awareness = 0.81, Relationship Skills = 0.79, and Responsible Decision-Making = 0.78.

Taken together, results of the CFA, robustness of the factor loadings, internal consistencies, the stability of responses across time, and alignment with previous research (CASEL 2020; Marques et al. 2023; Shi et al. 2022) lent support to the five-factor solution for the Genios instrument. As with other research evaluating similar scales in other countries (c.f., Gresham et al. 2020; Shi et al. 2022), the latent correlations between all factors were large, and ranged from 0.5 between social-awareness and self-awareness to 0.9 between relationship skills and responsible decision making. In Table S1 we provide an overview of the distribution of responses on each of the 39 items along with sample level descriptive statistics including means and standard deviations for each item and total scores.

TABLE 2 | CFA results on Genios SEL for five competing models.

Domains	X^2	df	*p* value	CFI	RMSEA	% variance
1	45261.791	702	< 0.001	0.751	0.068	0.280
2	19332.025	664	< 0.001	0.862	0.052	0.335
3	10298.811	627	< 0.001	0.920	0.041	0.367
4	6287.099	591	< 0.001	0.948	0.034	0.388
5	4704.340	556	< 0.001	0.960	0.031	0.403

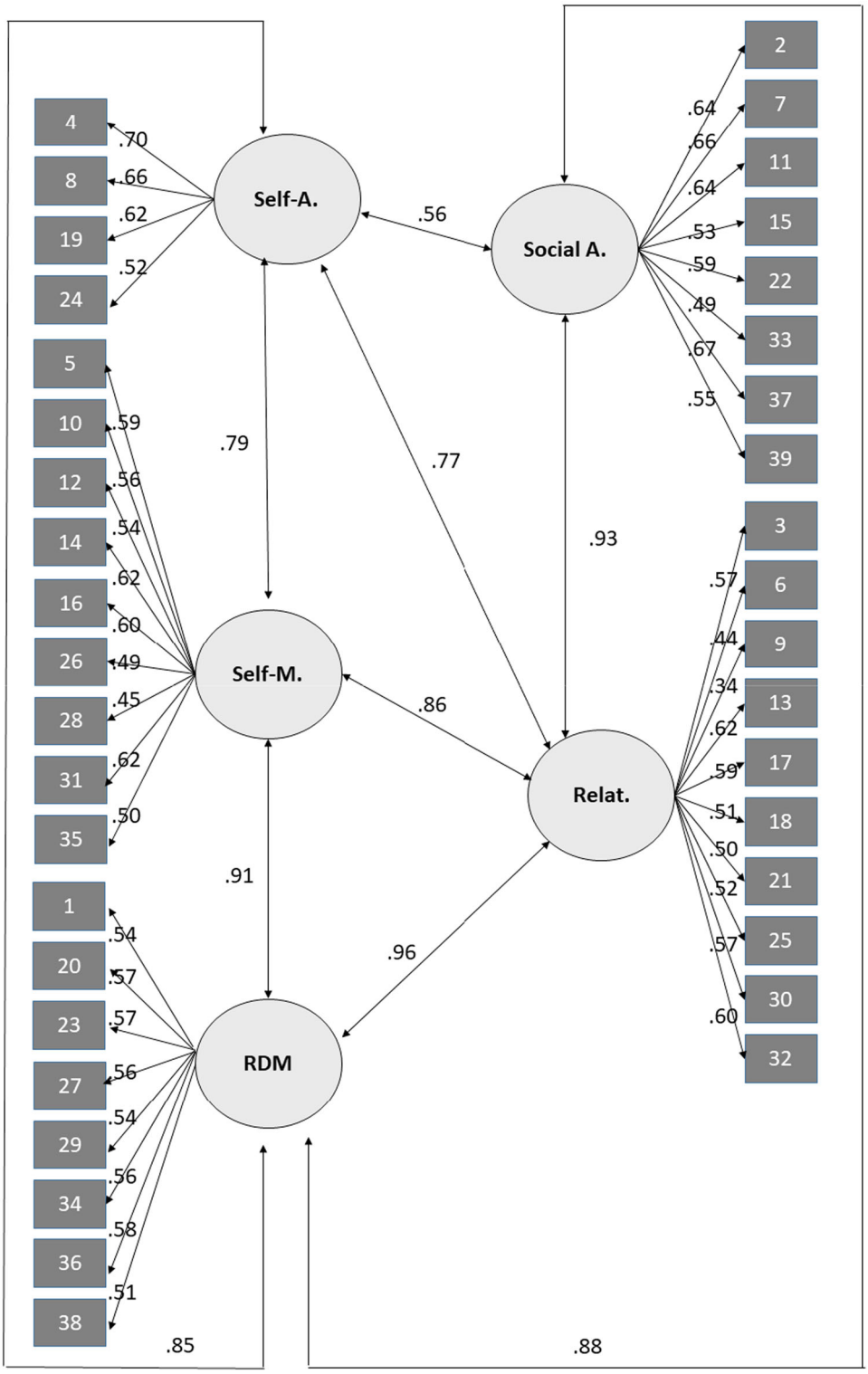

FIGURE 1 | Results of CFA on Genios socioemotional tool. *Note:* Factor weights are standardized. Self-A = Self-awareness, Self-M = Self-management, RDM = Responsible decision-making, Social A. = Social Awareness, Relat. = Relationship skills.

Using a subsample of the original sample, we then conducted test-retest reliability to evaluate the stability of factor total scores across a 5-month interval (see Table 3). Because all participating students were receiving some form of SEL instruction, we also present the means and standard deviations of each test with the results of the test-retest reliability. As shown in the Table, the test-retest correlation for self-awareness was 0.58, self-management was 0.55, social awareness was 0.55, relationship skills were 0.52, and responsible decision-making was 0.54, all correlations were significant (i.e., $p < 0.001$).

To provide initial evidence for the criterion-related validity of the measure, we next examined associations between scores on each

TABLE 3 | Means (M), standard deviations (SD), and test-retest correlations.

	First assessment	Retest	*p*	Correlation
Self-awareness	3.56 (0.92)	3.58 (0.94)	0.600	0.57
Self-Management	3.17 (0.74)	3.22 (0.74)	0.080	0.55
Social Awareness	3.56 (0.74)	3.59 (0.76)	0.296	0.54
Relationship Skills	3.36 (0.64)	3.38 (0.67)	0.530	0.50
Responsible Decision-Making	3.36 (0.71)	3.39 (0.73)	0.300	0.54
Overall mean	3.40 (0.61)	3.43 (0.64)	0.212	0.59

Note: These results refer to a sample formed of 1326 students that participated of the data collection at both times (first assessment, and retest collection).

TABLE 4 | Associations between Genios SEL domains, CDI, and DASS-21.

	CDI	DASS-21			
	Children enrolled up to 5th grade	Children enrolled 5th grade or higher			
Domain	Depression	Depression	Anxiety	Stress	Total
Self-Awareness	−0.47***	−0.39***	−0.25***	−0.25***	−0.33***
Self-Management	−0.41***	−0.24***	−0.18***	−0.22***	−0.24***
Social Awareness	−0.22***	0.10***	0.20***	0.19***	0.18***
Relationship Skills	−0.35***	−0.11***	−0.01	−0.02	−0.05***
Responsible Decision-Making	−0.35***	−0.13***	−0.04	−0.05**	−0.08***
Total Score	−0.44**	−0.21***	−0.08**	−0.10***	−0.14***

Note: Depression (CDI) was administered to young children enrolled in the 5th grade, while DASS-21 was administered to older children and early adolescents.
**$p < 0.01$; ***$p < 0.001$.

TABLE 5 | Percentile rankings on the Genios measure by grade level.

		Grade					
Percentile	Overall	4th	5th	6th	7th	8th	9th
1	67	74	69	74	58	69	50
5	91	94	95	90	87.45	89	88
10	101	106	105	99	101	98	101
20	112	114	115	110	112	110	112
30	120	122	123	117	121	117	119
40	127	129	130	125	128	123	124
50	133	135	136	131	133	127	131
60	139	142	142	137	139	134	137
70	145	149	149	144	145	140	143
80	153	155	156	152	152	146.8	151
90	162	166	166	161	161	158	159
95	169	173	172	166	168	165.45	167
99	183	187	186	181	178	181	182
M	131.83	134.85	135.24	130.13	131.34	127.78	129.80
SD	24.35	24.19	24.28	23.91	24.51	23.65	24.74
N	7684	1376	1676	1382	1167	1089	994

of the five-factors, total scores on Genios, and scores on the CDI (3rd, 4th, & 5th grades, $n = 2487$) and the DASS-21 (6th, 7th, 8th grades, $n = 3256$). Correlations between each factor and the two criterion measures are shown in Table 4. Children's scores on the CDI were moderately and negatively associated with all five factors and with the total score on the CDI. On the DASS-21, associations between the five Genios factors and adolescents' scores on the Depression factor followed a pattern similar to the

one observed among children on the CDI, whereas associations with Anxiety, and Stress were more modest.

Lastly, because distributions for all domain scores were skewed and highly correlated with the overall score, we computed percentile ranks for each factor and the total score by grade level (see Table 5). These preliminary percentile rankings were designed to provide baseline comparisons for other research on additional populations in Brazil but may also inform comparisons by practitioners and policy makers in practice until such research is completed.

6 | Discussion

This study evaluated the factor structure, reliability, initial criterion-related validity and initial percentile rankings of a measure of SEL competencies in a large and diverse sample of Brazilian children and youth. Item construction and the basis of our analyses were grounded in the well-established CASEL framework, and self-perceived competencies in self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Items mapping these constructs were developed through a six-step process (Marques et al. 2023). Although this initial evaluation should be replicated, results of our CFA, reliability analyses, and relationship with other variables are promising and suggest that the Genios Socioemotional Tool may provide new opportunities to study the effects of SEL programming in Brazil. To date, one can find numerous assessment tools with the *potential* to provide reliable and valid estimates of SEL competencies, which may be seen as an expected consequence of the global movement toward SEL (U.S. Department of Health and Human Services 2019). However, many of these existing tools suffer from measurement limitations and feasibility challenges. To the best of our knowledge, this study is the first to investigate the psychometric properties of an SEL tool aligned with the CASEL framework in Brazil.

Our results have similarities and differences with prior international research (Ross and Tolan 2018; Vinal and Renshaw 2022). Much of the prior research on this topic has relied on teacher-reports of SEL competencies (Vinal and Renshaw 2022) and research that has focused on child-reports has suffered from several limitations including retrospective approaches to creating SEL constructs (Gresham et al. 2020), incomplete or unidimensional constructs to represent SEL (Mantz et al. 2016; Thomas et al. 2022), and poor internal consistencies in studies that do include multiple SEL domains (Mantz et al. 2016). By contrast, the results obtained in the CFA presented here demonstrated adequate fit for a five-factor child self-report of SEL competencies and the internal consistencies on these derived constructs were strong. Although intercorrelations between the constructs were high, suggestive of a higher-order factor, observing strong correlations between SEL constructs is consistent with the findings from similar research in other countries, and may be due to the self-report nature of the items and similarities between items across constructs (Shi et al. 2022).

Regarding the specific observed constructs, self-awareness encompasses the identification of emotions and the recognition of personal strengths and weaknesses. This domain is related to self-perceptions, the recognition of one's own attitudes, opinions, and intentions for actions and emotions towards themselves and others. Our findings demonstrated that items on this construct include "value own efforts, successes, and achievements." Studies in clinical settings have demonstrated that dysfunctions of self-awareness are tied to negative feelings and might include depression, suicide, and dysfunction (Silvia and O'Brien 2004). The findings from our study indicated strong internal consistency and evidence of the test-retest reliability on this factor with this sample.

The second factor, Self-Management, reflects the ability to accurately regulate one's emotions and behaviors in a variety of situations. This skill included stress management, self-discipline, and self-motivation (Martinez-Yarza et al. 2023). Our findings demonstrated that "striving for what is wanted" (item 7) and "continuing to do activities, even the difficult ones" (item 3) were reflective of items on this domain. The third factor, Social Awareness was characterized by being aware of the culture, beliefs, and feelings of the people and world around them. Thus, social awareness encompassed the ability of students to take the perspective of—and to empathize with—others including individuals from diverse backgrounds and cultures (Ross and Tolan 2018). Our results indicated that deliberately "trying to make others feel good" and the "respect of different opinions" were items that reflected this domain.

The final two factors, Relationship Skills and Responsible Decision-Making, demonstrated strong inter-correlations. However, the relationship skills domain was comprised of items such as "offering help to anyone who needs it" and "good relationships with classmates" whereas items on the responsible decision-making factor included items such as "I think about the consequences of my actions" and "liking learning and doing new things." Moreover, although these constructs were highly correlated with one another, the content of the items, and our test of different CFA models suggested that these constructs were distinct with relationship skills relating primarily to building meaningful relationships and decision making being more focused on making good decisions in social situations and with regard to emotional health (Ross and Tolan 2018).

Evidence of adequate reliability is particularly important for a child self-report measure and our findings suggested that the Genios factors had strong internal consistencies as well as good initial evidence of test-retest reliability. Despite the inherent variability in socioemotional constructs over time, the stability observed across administrations suggests that the instrument can reliably capture key SEL dimensions. Developing further understanding about the reliability of this and other similar measures within Brazil will continue to be important to ensure confidence in tools used by practitioners and researchers when implementing and evaluating SEL programs.

To begin to investigate the criterion-related validity of Genios, children in our sample completed a second measure focused on depressive symptomology (i.e., CDI) whereas adolescents completed the DAS-21, which included three constructs (i.e., depression, anxiety and stress). For children, results indicated that SEL factors were correlated with depressive symptomology

(i.e., CDI). Similarly, for adolescents, all factors on the SEL measure were associated with the depression construct on the DAS-21. For both children and adolescents, the strength of the associations varied from weak to large depending on the Genios construct, however, these associations provide some initial support for the criterion-related validity of the assessment. Further research is needed to better establish the validity of Genios using parallel measures that assess constructs such as social skills, the quality of students' relationships, and social-information processing skills. Such findings would strengthen the findings presented here, and would provide additional validity.

6.1 | Study Limitations

This study has several strengths and limitations that should be considered with the findings. Most notably, it involved a large sample of children enrolled in Brazilian public schools in two macro regions (southwest, with Minas Gerais, and south, with Santa Catarina and Rio Grande do Sul). The data collection was performed in a well-controlled environment, and teachers and their assistants were available to discuss and help children understand particular words and sentences. Regarding limitations, we used classic test theory to evaluate the factor structure of this instrument, which could potentially lead to ceiling effects among students taking the assessment. Although our item level means and standard deviations (see Table S1) approximated normal distributions, many were skewed towards the upper end of the response scale so future efforts using alternative approaches such as Item Response Theory have the potential to facilitate greater differentiation in item and construct scores among students (c.f., Crowder et al. 2019). In this initial study we did not investigate, nor did we develop, items that we considered to reflect a range of developmental competencies. Rather, items were developed through an iterative process to reflect the CASEL constructs, with particular attention paid to ensuring that items and language aligned with Brazilian culture. Future research exploring differential item functioning by developmental age and other student characteristics is needed to further understand how items function for different developmental levels and to establish age level norms.

Second, the measure was administered and tested with students in upper elementary school and early adolescence. Future research examining the factor structure and psychometric properties of this instrument with younger children and older adolescents should be conducted before using the instrument with those populations. A third limitation is that the participating students represent a convenience sample from the southwest and south regions of the country. Thus, the generalization of the results to broader population samples is limited and should be interpreted in light of the sampling procedures and sample characteristics. Fourth, a direct replication should include psychometrically sound tools to assess a variety of social-emotional skills to establish further evidence of the measure's criterion-related validity. Finally, the data collection occurred via computers with the support of teachers, suggesting that any replication should ensure the participants have basic computer literacy.

7 | Conclusions

Despite these limitations, the results from the current study provide initial evidence for the construct validity, reliability, and criterion-related validity of a self-report assessment of SEL competencies for use in Brazil. Having psychometrically defensible measures of SEL in Brazil is important because such instruments can potentially help to clarify varying perspectives regarding the definition of SEL that currently exist but can also provide opportunities to address questions related to the efficacy of the many SEL interventions currently being implemented throughout the country. Gathering data regarding SEL competencies from these programs could allow educators and policy makers to make informed decisions about the specific benefits of various programs. In addition, further development of measures such as the one presented here could potentially have application in clinical settings to help therapists and medical professionals better understand the needs of clients and to monitor treatment outcomes. There is a continuing need to develop and test measures that will allow researchers and practitioners to make informed judgements about the effects of various SEL interventions and how such efforts may have differential impacts on specific subgroups of students and/or in different contexts.

Ethics Statement

Before any data collection, the project was approved by the Brazilian Ethical Council under number 56387122.3.0000.5281. Below is the English-translated version of the approval issued by the Brazilian Ethics Committee.

Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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Supporting Information

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