

Musical Aptitude Screening: A Brazilian Experience under Construction [†]

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Abstract: In Brazil, Law n. 9394/96 ensures rights such as the identification of talented students in order to offer specialized educational attention; in this sense, the Protocol for Screening of Musical Abilities was elaborated with 54 items and its complementary instruments (scales and questionnaires) in order to collaborate with the survey of students with indicators of musical talent. This work, therefore, aims to present the instruments and the evidence of effectiveness and usability found in a preliminarily manner. It is an investigation in progress and incorporates experimental psychometric (elaboration of scales) and psycho-physical (peer comparison method) methods. In total, 800 individuals, including children from six to eleven years old, their guardians (family members) and teachers, took part in the research. The results have indicated that participants with higher scores remain with the same indices in the later stage of evaluation; however, only from the statistical tests intended for validation, standardization and reliability, as well as exploratory factor analysis will it be possible to attest the validity, standardization of scores and prepare the final version for wide use of the instruments.

Keywords: music aptitude; measurement; screening



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1. Introduction

The Brazilian legislation Law n. 9394/96, states that talented students are part of the Special Education audience and that rights and resources are ensured for them, such as: identification, specialized educational assistance, permission to leave school, supplementation and curriculum planning, as well as acceleration. These legal rights extend from kindergarten to Higher Education, and they are considered in all areas of human, academic and creative knowledge, including for Arts such as Music [1]. After all, talent can manifest itself in different individuals and in any period of life, regardless of socioeconomic and cultural level [2].

In the last Brazilian school census, in 2022, released by the National Institute of Educational Studies and Research Anísio Teixeira (INEP), the total enrolled students identified as talented were 26,589 (regular classes) and 226 (special classes), and in the State of São Paulo, the locus of this research, the numbers were 2918 (regular classes) and 9 (special classes). From these indices, it is possible to conclude the small number of students that are identified and referred to educational care in a country such as Brazil, a country with a continental dimension and a significant number of inhabitants. The studies by Rangni, Rossi and Koga [3] and, mainly, those by Koga and Rangni [4], showed the neglect of talented Brazilian students, especially in the area of Music, with evidence also of a lack of instruments available for selection on the poll.

Some initiatives are widely known, including Carl Seashore's aptitude and musical talent test, and Edwin E. Gordon's tracking instruments, among others, as summarized by Gagné and McPherson [5]. Recently, the battery of scales and questionnaires by Haroutounian [6]; the Spanish scale for probing aptitude and musical talent by Hernández and Pérez [7] and the scale by Mullensiefen, Gingras, Musil and Stewart [8] have been recognized. Although these instrumental survey possibilities exist, they have not been validated for a Brazilian cultural diversity. It should be noted that this cultural structure relies on the miscegenation of many peoples, especially making it difficult to culturally validate instruments [9]. It is in this context that Koga [9] elaborated the Musical Abilities Screening Protocol (PSHM) and complementary instruments in order to track possible cases of musical talent in Brazilian schools and in other realities.

It is inferred that musical talent is a complex and abstract phenomenon with multiple variables, such as aptitude (eminent musical potential or intelligence) [6], motivation, rhythmic and aesthetic sense, imagination and creativity (giftedness) [10], audiation and musical memory [11], precocious musicality [12] and personality and over-excitability [13]. Moreover, for Gagné and McPherson [5] aptitude is synonymous with the concept of endowment, and for Haroutounian [6], Kirnarskaya [10] and Gordon [11] it is an important basis or variable, but not the only one, used to infer the presence of musical talent in a preliminary way. This route was chosen because it unites the cognitive system with the affective and creative one through the internal, symbolic or abstract representations of Music, which generate emotional meaning in the search for meaning when composing or performing a piece [14], with the dialectical and mediated interactions of these variables making a composer or interpreter unique or original [14].

Under these aspects, the following question arises: What evidence about the effectiveness of the PSHM and complementary instruments is already observed in relation to the survey of the presence of musical talent, based on the musical aptitude indices? What are the steps required to be completed for validity, standardization and normalization?

The objective outlined was to present the PSHM and its complementary instruments and the preliminary evidence of effectiveness.

1.1. Method

This is ongoing research which is based on the psychometric model "Item Response Theory" (validity of tests) and psychophysics (peer comparison method). Aptitude is considered a measurable construct through performance of the individual in certain tasks (items); thus, performance is treated as an effect and the construct (latent trait) as the cause in which individuals with more aptitude are more likely to present high performance in a set of items. It is worth mentioning that only the PSHM is based on psychophysics, as it deals with pairs of sound items [15,16].

A sample of approximately 800 individuals (students from six to eleven years old), teachers/adults and legal guardians/adults) from public, private, indigenous schools and institutions dedicated to serving talented students identified in Brazil and Mexico participated in the research.

The PSHM and other instruments were applied in two scenarios, the first with all students (PSHM and complementary instruments), and the second with those who had higher, medium and lower levels of musical aptitude, via random sampling; the students were to be evaluated musically and confirmation of musicality indices given (consecrated validated instruments and observations in musical activities). The research has ethical approval CAEE: 5 2224021.0.0000.5504.

Figure 1 outlines the research design, data collection and analysis procedure.

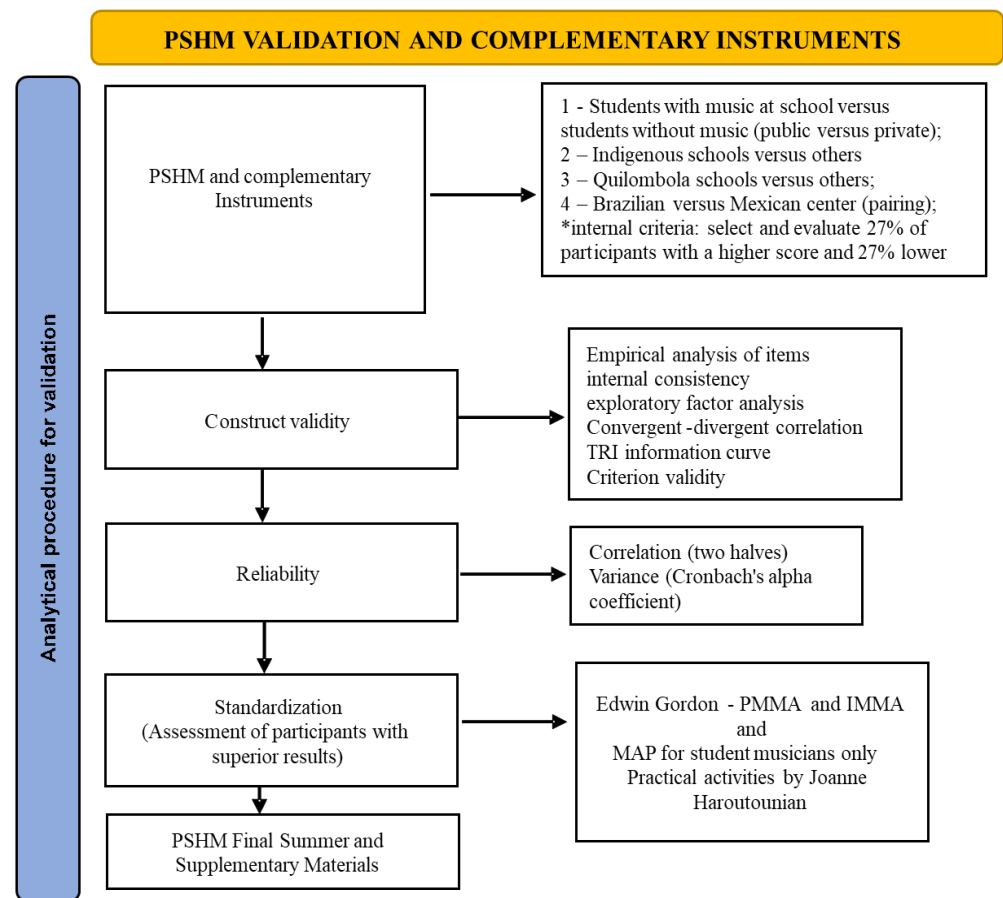


Figure 1. Research design and analytical procedures for validation.

Data collection was carried out during the year 2022, post-pandemic. In the first stage, pairs of sounds were presented to the participants, and they had five seconds to respond. At the end, they filled out a questionnaire with questions to mark, two of which were dissertations. Teachers and family members also completed the musical evaluation, with the teachers completing it in the classroom and family members taking it home and returning the results the next day. The interviews with teachers and students were audio-recorded. Due to the existence of bilingual schools, immigration, indigenous peoples and participation of Mexican students, the musical evaluation has versions in English, Spanish and Portuguese as well as guidance for translation (carried out at the time of the survey by indigenous teachers) in Guarany and Terena indigenous languages.

Each school received a researcher for an average of two to six days to carry out the musical aptitude survey. Completing the musical evaluation took an average of 50 min with students and 20 min with teachers. Figures 2 and 3 exemplify data collection in educational institutions. Figure 2 illustrates students responding in person and, in Figure 3, three participants responding virtually (completed directly on the PSHM platform after sending the access link).

Data analysis and validation of the PSHM toolkit are currently underway. The next steps include item analysis, internal consistency analysis (correlation), exploratory factor analysis, establishing cutoff scores in the psychometric test through distribution curve analysis, reliability assessment, and other procedures as guided by Pasquali [15] and Vieira [16].



Figure 2. Data collection in a public school (Brazil).



Figure 3. Data collection in a private school (Brazil).

1.2. Results and Discussion

The PSHM and complementary instruments could be given to groups and individuals, as was the case for headphones or amplified boxes for sound reproduction. There was no need for soundproofing; however, if it would have helped with the quality of the results, it was available to give. Tabulation was standard and by age group. There is the extraction of raw data and its conversion into scores. The complete material of the PSHM was developed to carry out an initial identification or screening, that is, there was a need for evaluation procedures as a way of confirming the individual's condition. In addition, it was essential to plan the intervention or musical enrichment later [9]. The structure of the PSHM and complementary materials followed the same method as the musical evaluations of Haroutounian [6], Hernández and Pérez [7], Kirnarskaya [10] and Gordon [11]. Figure 4 contemplates the description of the structure of the instruments; for more details, see Koga [9].

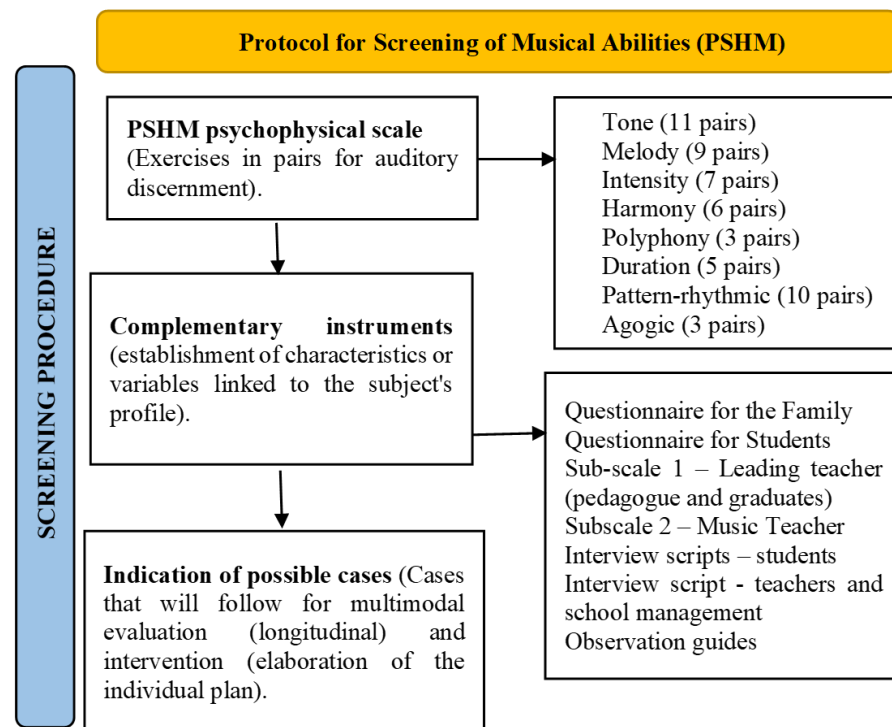


Figure 4. Complete PSHM structure and complementary instruments.

The PSHM and complementary instruments were restricted to school spaces. In the case of the online version, it could be carried out in computer labs or classrooms, and navigation in the system was intuitive and simple (self-application). Additionally, they had resources adapted for people with disabilities. The application worked on electronic devices—computers, tablets and cell phones—and responses were marked individually. Figure 5 illustrates the system design.

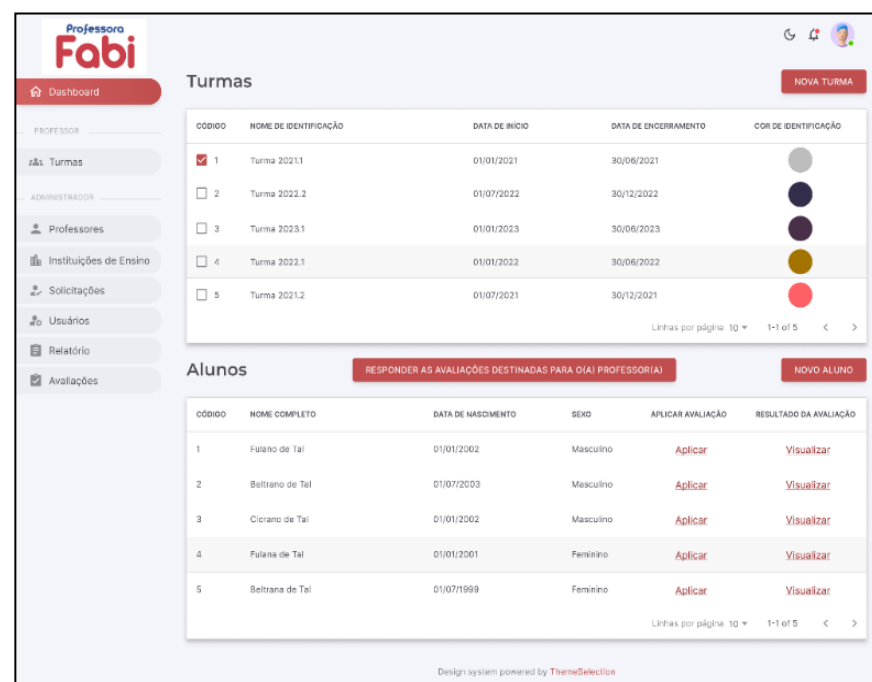


Figure 5. Design of the Professora Fabi system (teacher Fabi), which hosts the PSHM and its complementary instruments and was created by Rafael Pereira with the contribution of a Theme Selection design.

The printed version follows the same standards as the online version, with changes in manual filling out. Figure 6 exposes the printed format.

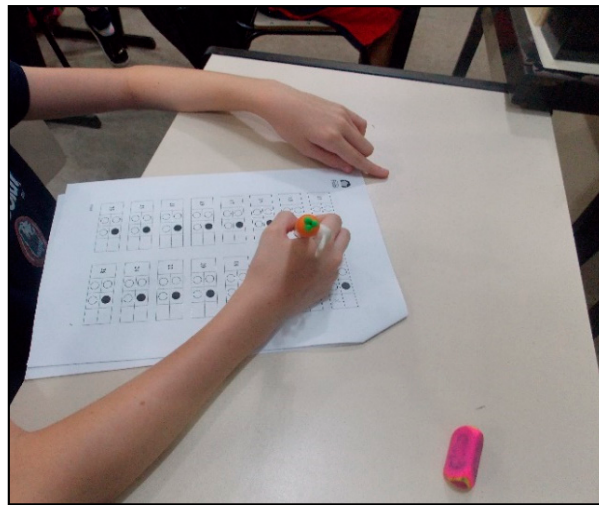


Figure 6. Printed design.

Since the construction reported in Koga [9] and Koga and Rangni [3], the PSHM and complementary instruments have shown satisfactory indices ($p \leq 0.05$ in the chi-square test) in their measurements. The authors point out that there was a significant correlation between the items and dimensions ($p \leq 0.05$ in Kendell's W). Differences were observed between schools which had Music as a subject and those without. To exemplify: in the Mann–Whitney statistical test, $p = 0.0479$ was obtained, considered statistically significant for the 1st years; $p = 0.0031$, very significant for the 2nd years; $p = 0.0001$, considered extremely significant for the 3rd years; $p = 0.0487$, significant for the 4th year; and $p = 0.0040$, very significant for the 5th year. Finally, the exploratory factor analysis among public schools (without Music as a subject and private schools with the subject) showed different factor distributions. Private school students generalize more about musical elements, which is why they presented only one factor (analytical ear), and public school students presented two factors (expressive ear and rhythmic sense), indicating a more specific perception of musical elements. In this sense, scores are assigned differently, as guided by Pasquali [15]. Based on the studies by Kirnarskaya [9] and Gordon [10], students considered superior in the PSHM and complementary instruments are those who present, in the private network, an architectural ear (score equal to or greater than 80) and, in the private network public, an analytical ear (score equal to or greater than 70).

Although these results were promising, as pointed out by Koga and Rangni [3], the binomial study (items less than and equal to $p \leq 0.05$) carried out by the authors showed a discrepancy among the items (some very easy and others difficult) and the amount of items, making it necessary to expand the study. Pasquali [15] and authors of international scales [6,7,11] demonstrate the importance of validation and the search for reliability as a way of adjusting the instrument to calibrate its measurement sensitivity. Kirnarskaya [10] emphasizes the importance of psychometric instruments in the musical evaluation process and how accuracy benefits the correct indication of possible cases of talent. Haroutounian [6] and Gordon [11] point out that these are processes that decide the type of educational attention, which is the culmination and reason why survey procedures and evaluations are carried out.

Even though the tabulation of data is in progress, an improvement in the usability and completion of the instruments has preliminarily been observed based on the sample of the first and second stages, it was necessary to determine whether the participants experienced fatigue while performing the musical tracking task. Pasquali [15] recommends that scales should have a maximum of 30 items. Regarding usability with children and young people,

there are instruments such as those developed by Haroutounian [6], Hernández and Pérez [7], Kirnarskaya [10], and Gordon [11], which demonstrate practicality for both administrators and participants. These instruments are quick to apply. However, the limitation is that they are designed specifically for music specialists, thus their use is restricted. In contrast, PSHM can be used by multiple educators. Additionally, after comparing the results, it will be possible to improve the cut-off scores of the items, including the score that will be assigned to indigenous schools [15]. Abramo and Natalie-Abramo [13] alert us to the specificities in the musicality of individuals, as well as the possibilities of manifestation of musical talent, which is why the cut-off notes or scores need to pass through the appropriate statistical tests, such as, for example, using linear transformations and even score matching [15]. Perception itself is also a challenge; after all, what are at stake are the elaboration and presentation of the stimulus and the individual's response, which passes through the sieve of understanding and sound representation in the brain [16].

Furthermore, with the tabulation of raw data completed, it will be possible to analyze whether the distribution will be normal or not, thus allowing us to collaborate in decision making regarding the use of parametric or non-parametric statistical tests. Based on studies by Gordon [11] and observing the scale by Hernández and Pérez [7], both paths allow for validation.

When analyzing the students who participated in the first and second stages, the following observations can be made: those who obtained results above 70 (indicative of average/superior auditory aptitude) were considered superior; those who scored between 31 and 69 were considered to have average musical aptitude; participants who scored below 30 were considered to have below-average scores; individuals who performed similarly in both stages were considered to have more reliable results [15].

With the data analysis completed and adjustments made, the instruments will be made available for use in Brazil and abroad.

1.3. Final Considerations

Limitations have occurred when carrying out the construction of the PSHM; however, for Brazilian cultural–musical diversity, it has been shown to be effective in a way that it will make it possible to know the aptitude and signs of musical talent for several cultures. The PSHM and complementary instruments, until the moment of data analysis, show evidence of contribution to the identification of children with musical aptitude and who may be referred to specialized Music Education. Collaborative work between teachers and specialist musicians is suggested. It is expected, through future research, to expand the sample of participants to contemplate other cultural realities and age groups, as well as to refine the capacity of these instruments in carrying out the musical aptitude survey, in addition to reaching reliable estimation indices, inferring the reliability and allowing score standards.

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Institutional Review Board Statement: The study was conducted in accordance with the Ethics and Research Committee of the Federal University of São Carlos with protocol code 52224021.0.0000.5504, 29 August 2022.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: This research is in progress and the set of PSHM instruments is in the process of patenting. Therefore, at the moment it will not be possible to share the data from the survey. Soon they will be made available on the page of the Research Group for the Development of Human Potential (GRUPOH, UFSCAR) with access at <https://altashabilidadesgrupoh.com.br/> (accessed on 6 June 2023).

Conflicts of Interest: The authors declare no conflict of interest.

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