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Impact of musical learning on the development of socio-emotional competencies in first-year high school students: a quasi-experimental study

Impacto del aprendizaje musical en el desarrollo de competencias socioemocionales de estudiantes de bachillerato: un estudio cuasi experimental

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Abstract

This research addresses the problem of the limited integration of music as a pedagogical resource in the classroom for improving the socio-emotional skills of first-year high school students, which hinders their adaptation to the inherent changes of adolescence. This problem is relevant because the development of young people requires cognitive development and the strengthening of certain socio-emotional skills necessary for their growth. For this reason, the main objective of this research was to analyze the impact of



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musical learning on the development of socio-emotional skills through the use of pedagogical methodologies and strategies.

A quasi-experimental methodology was applied, including the implementation of a pre-test and post-test with a control group that received traditional musical instruction and an experimental group that participated in directed musical activities. To ensure consistency with the methodology, the Bar-On ICE inventory was administered to measure the impact of the musical intervention. The findings demonstrate significant improvements within the experimental group, highlighting an increase in the ability to identify and manage emotions, as well as a reduction in stress, which tends to foster teamwork. The control group, on the other hand, showed no relevant changes, supporting the effectiveness of music as a tool for students' socio-emotional development.

Previous research demonstrates that socio-emotional learning is fundamental in the classroom, although its implementation is challenging due to limited institutional interest and curriculum constraints regarding the application of music. Therefore, a structured musical intervention designed to strengthen these competencies is proposed.

Keywords

Adaptability, musical learning, Bar-On, emotional development, musical education.

Resumen

Esta investigación aborda el problema de la poca integración musical como un recurso pedagógico dentro del aula de clase para la mejora de las competencias socioemocionales de los estudiantes que cursan el primer año de bachillerato, lo que los limita en la adaptación a los cambios inherentes de la adolescencia. Este problema es relevante pues la formación de los jóvenes requiere del desarrollo cognitivo y el fortalecimiento de ciertas habilidades socioemocionales necesarias para su desarrollo, por esta razón, el objetivo principal de esta investigación fue el analizar el impacto del aprendizaje musical en el desarrollo de las competencias socioemocionales mediante el uso de metodologías y estrategias pedagógicas.

Se aplicó una metodología cuasi experimental que incluye la implementación de un pretest y postest a un grupo de control que recibió instrucción musical tradicional y otro experimental, el cual realizó actividades musicales direccionadas. Para ser consecuentes con la metodología se aplicó el inventario de Bar-On ICE y así medir el impacto generado por la propuesta musical. Los hallazgos demuestran la presencia de mejoras significativas dentro del grupo experimental, destacando un aumento en la capacidad de identificación y gestión de emociones, así como en la reducción del estrés, lo que tiende a fomentar el trabajo grupal. Por su parte, el grupo de control no presentó cambios relevantes, lo que respalda la efectividad de la música como una herramienta que permite el desarrollo socioemocional de los estudiantes.

Investigaciones anteriores demuestran que el aprendizaje socioemocional es fundamental dentro del aula, a pesar de que su implementación es un desafío debido al escaso interés institucional y las limitantes del currículo frente a la aplicación de la música. Por ello, se propone implementar una intervención musical de forma estructurada, diseñada para el fortalecimiento de estas competencias.

Palabras clave

Adaptabilidad, aprendizaje musical, Bar-On, desarrollo emocional, educación musical.



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1. Introduction

Currently, education faces the challenge of developing students cognitively while emphasizing their socio-emotional skills, recognizing that these skills enable them to interact consciously with their environment, improve their interpersonal relationships, and regulate their emotions. Music emerges as an alternative for stimulating these fundamental aspects, which together contribute to the effective social functioning of young people. However, despite advances in pedagogy, certain difficulties hinder the integration of innovative strategies in the classroom, creating gaps in student education. In this context, music, recognized as a universal language that transcends cultural and emotional boundaries, appears as an optimal tool for strengthening socio-emotional skills, although its implementation within the Ecuadorian education system is limited, often confined to fulfilling the traditional curriculum.

The main problem addressed by this research focuses on the limited integration of music as a pedagogical resource in the socio-emotional development of high school students, which hinders the promotion of skills such as empathy and emotional regulation. This creates obstacles in social interaction and group work among young people. Therefore, it is crucial to address this issue given the need to develop resilient individuals with the ability to manage their emotions and adapt to change, which, in the medium term, can guarantee academic, personal, and professional success.

This research proposes to analyze how education in collaboration with music can enhance socio-emotional competencies in high school students by evaluating pedagogical methodologies adapted to this context and proposing strategies to strengthen these competencies. In this sense, the research questions focus on identifying the skills most favored by the implementation of music and how these skills influence the strategies adopted. It is important to note that the limitations of this study are centered on a sample of students from a specific educational institution, as well as the application of an adapted instrument for quantifying competencies. The aim is to contribute empirical evidence regarding the effectiveness of music as a tool to guide the implementation of applicable classroom strategies.

In this context, Troya-González et al. (2023) state that “music is a tool that can provide a sense of individual and group well-being; currently, it is considered by many to be an art form that can offer multiple benefits to society” (p. 117). Similarly, Pérez-Escoda and Filella-Guiu (2019) mention that “carrying out varied activities that allow for alternating moments of personal reflection with group work sessions, in which sharing, expressing, and contrasting points of view are excellent for fostering emotional development” (p. 38). However, despite current advances in pedagogy and its many innovative strategies, educational institutions face difficulties integrating them into the classroom. This situation becomes more evident at the high school level, where young people go through a crucial stage in their emotional and social development, which in the medium term creates gaps in their overall development.

Therefore, this study aims to analyze how musical learning enhances socio-emotional competencies, evaluate pedagogical methodologies adapted to this theme, and propose educational strategies to strengthen these competencies. To this end, the skills most affected by musical practice were identified, allowing for a quantitative approach to this issue. Data collection included the application of an assessment instrument. Furthermore, the research seeks to answer the following research questions: What socio-emotional competencies are affected by musical practice? What strategies based on musical



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instruction are most effective in enhancing each dimension? Are there significant differences in the results depending on the type of musical intervention applied?

This article is organized into four main sections. It begins with a review of the literature that establishes the relationship between music and socio-emotional competencies. Next, the methodology used to achieve the study's objective is described. Finally, the results are detailed, discussed, and the findings are concluded.

2. Literature review

2.1 Music and socio-emotional skills

Belay and Dejene (2024) point out that “social-emotional learning is widely recognized for fostering students’ social-emotional skills, which are essential for academic and personal growth” (p. 2). Music, being considered a universal language, has the capacity to transcend the cultural and reach the emotional, making it an ideal tool for individual personal development. In this sense, Albornoz (2009) considers that “educational music therapy, under the guidance of qualified professionals, motivates academic growth because it embraces the emotional dimension, which contributes to developing the motivation to learn” (p. 70). Therefore, it is important to consider that, within the educational field, the influence of music goes beyond the artistic or technical aspects, as it contributes to strengthening social-emotional competencies, which is evidenced by the empathy generated by the group when working together.

From the perspective of Jolay et al. (2023) These activities “are implemented not only in schools but also in different spaces, with different age groups, and in diverse contexts of vulnerability, risk, and emergency. This is partly because socio-emotional skills are malleable throughout life” (p. 373). This implies that proper emotional management can foster a healthy, strong, and mature individual by enabling them to manage their feelings effectively.

2.1.1 Importance of socio-emotional learning in education

Students spend most of their time at school, so their actions, personal relationships, and acquired knowledge are directly linked to academics, generating feelings and emotions that they may remember throughout their lives. In this context, Ferreira et al. (2023) comment that “schools will better fulfill their educational mission by integrating social-emotional learning into students' educational experience, maximizing their potential and facilitating future success in their personal and professional lives” (p. 54). When these programs are implemented correctly, they tend to enhance certain emotional skills and students' academic performance. For this reason, these skills are important when seeking to build a solid foundation that allows them to face challenges with resilience and adaptability.

Similarly, Treviño et al. (2020) agree that:

Specifically, emotions are embedded in the school environment and influence how students learn. It has been noted that experiencing positive emotions could help them solve problems, develop skills, and promote self-regulation; however, if they manifest in the opposite way, it would hinder their academic performance (p. 33).

From this arises the notion of emotional intelligence (EI), which is considered the capacity a person has to control their own emotions or those of others, differentiate between them, and use this information to their advantage to provide feedback on the learning process.



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Thus, Jambrina (2010) considers that “in this way, individuals with a weak personality would be able to awaken their latent energies, and impulsive individuals, channel their unleashed forces” (p. 340). This, taken together, develops mechanisms and capacities that influence students' development in the sensory, social, emotional, and affective domains.

2.2 Music as an educational tool

The Constitution of the Republic of Ecuador (2008), in Article 27, states that “education shall be centered on the human being and shall guarantee their holistic development, within the framework of respect for human rights, a sustainable environment, and inclusive and diverse democracy, of quality and warmth” (p. 33). Therefore, due to the need to explore pedagogical aspects that meet the current demands of music education, this research seeks to contribute empirical evidence on how learning music influences the emotions of students in the first years of high school.

Over time, Creech et al. (2013) have shown that “the greater subjective well-being observed among participants in musical activities could be due to their potential to provide a sense of purpose through musical progress and expression” (p. 42). Therefore, it is important to foster an inclusive learning environment, thus promoting comprehensive learning and cognitive development in students.

Meanwhile, Intriago-López and Zambrano-Loor (2023) mention that:

In Ecuador, there is little interest in implementing music as a pedagogical resource in classrooms due to various factors. Educational units limit themselves to complying only with what is indicated in the curriculum regarding the subject of Cultural and Artistic Education and music, so its contribution to improving the teaching and learning process, since it is not used as a pedagogical resource, is low (p. 1518).

However, practice has shown that when used, it proves to be a valuable resource that contributes to the educational process, allowing students to reach favorable levels for the development of their learning, skills, and abilities, in addition to successfully achieving the established pedagogical objectives. Therefore, it is understood that music pedagogy considers various aspects of learning, since by using audible and rhythmic teaching resources, students are encouraged to interpret and analyze them, thereby improving their academic performance based on the experiences and activities within the classroom.

2.2.1 Cognitive and emotional benefits of musical learning

According to Koelsch et al. (2010), “emotion assessments obtained during the sessions suggest that this positive change in mood was accompanied by an increase in positive emotions, as well as a decrease in negative emotions” (p. 313). This confirms that music naturally regulates people's mood, reducing their stress or anxiety while improving their self-esteem.

Furthermore, this type of stimulation can promote synapses, leading to new learning that motivates neuroplastic changes in brain functions. In other words, neurons send information in the form of signals to each other, intertwining until they produce a behavior. Thus, Cuervo and Ordóñez (2021) state that “these cognitive processes constitute our memory capacities. We receive information through sensory, verbal, or semantic stimuli and perceive it depending on the attention paid and the concentration employed” (p. 340).



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2.2.2 Impact of music on student development

The evidence from the research conducted by López and Salcedo (2021) shows that “since collaborative work is the hallmark of this discipline, students can improve their behavior, empathy, and creativity, leading to increased academic performance” (p. 18). Given these qualities of music, its inclusion should be mandatory at all levels of education, with a minimum of four hours per week, where young people are included regardless of gender or social class.

In this context, Sigueñas et al. (2024) mention having observed that “affective activities were essential for children's learning, since they experience emotions and sensations from an early age. Furthermore, an affective bond was established between the teacher and the children” (p. 533). Therefore, successful work will depend largely on the time the teacher dedicates to practicing with the students.

2.3 Socio-emotional Competencies

Murillo et al. (2018) explain that “a few years ago, higher education prioritized academic training over social and emotional development” (p. 136). However, today the importance of implementing transversal competencies is recognized, from which programs that foster the socio-emotional area can be developed. Over the years, emotions have been of interest to various scholars, who have evolved their concepts, defining them as a complex state that an individual experiences when subjected to arousal or disturbance due to their environment.

Similarly, Gómez et al. (2024) point out that:

Socio-emotional skills in face-to-face communication are essential tools for personal and social adjustment from an early age. While it is recognized that their characteristics require specific skills, there is a scarcity of studies that analyze the relationship between generally acquired socio-emotional skills and those necessary for online communication (p. 81).

Morlett (2023) points out that “in adolescence, individuals can achieve a better understanding of abstract concepts and reflect on facts; moreover, they begin to make decisions that involve greater risk” (p. 3). Experience dictates that an individual's social competence and adaptation to the academic and emotional environment during adulthood are interrelated, especially when interacting with others, generating positive or negative consequences that can affect their surroundings.

2.3.1 From unitary intelligence to emotional intelligence

Currently, stigmas still exist surrounding the concept of intelligence and who is truly considered intelligent; that is, intelligence is often reduced to a person's capacity to think, speak, or calculate. In this context, Barría et al. (2023) mention that “it was thought that there was a unitary intelligence capable of being measured by pen-and-paper tests, casually known as IQ or intelligence quotient tests, which, when solved, provided an indicator of the individual's intelligence” (p. 3).

Similarly, Pillajo (2024) states that:

Intelligence was generally measurable and at the same time linked to the application of brain functions that promote problem-solving through the reception and interpretation of information from the senses. This theory



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was accepted for many years and during this time it was the only theory of intelligence (p. 37).

Velásquez et al. (2024) state that “human beings possess the innate characteristic of expressing diverse emotions that arise spontaneously in response to stimuli received, and they have the ability to develop their cognitive capacity, that is, actions related to reasoning and intelligence” (p. 20). These concepts must be developed to enhance contemporary education, which means that teachers must appropriately employ strategies in these areas to foster their students' socio-emotional competencies. Therefore, prioritizing aspects such as emotional intelligence, cognition, and motivation is complex because they are interconnected; this leads to the understanding that emotional intelligence can be summarized as the management and handling of the individual's human aspects and how their responses to positive or negative stimuli allow them to recognize the emotions they experience.

In other words, theories of intelligence have evolved from a unitary concept, where intelligence was seen as a single, measurable capacity of each individual, generally represented by IQ, to much more complex models of multiple intelligences that integrate emotional, social, musical, and intrapersonal intelligence. This has laid the foundation for its development, recognizing that socio-emotional skills are important for an individual's personal success.

2.3.2 Theory of emotional intelligence according to Mayer and Salovey

Mayer et al. (2000) define it as “the capacity a person possesses for the perception and regulation of their own and others' emotions and considers four axes: perception, facilitation, understanding, and emotional regulation” (p. 273). According to Fragoso-Luzuriaga (2015), “different models emerged, shaped according to the particular vision of their authors” (p. 120). Taken together, these skills allow a person to make decisions about managing different situations they encounter at any given time, always seeking a balance between reason and emotion. This model clearly indicates that emotional intelligence is comprised of information processing rather than competencies, establishing a separation between them.

Similarly, Tituaña (2022) considers that:

The importance of EI in the school setting lies in breaking all alliances with the constructs of the intelligence quotient (exclusively educational centers focus on developing linguistic, logical-mathematical skills), as the sole predictor of academic performance; on the contrary, EI uses individual, emotional, and social factors that facilitate the improvement of attitudes, aptitudes, and the ability to understand and comprehend others, thus making it possible to predict the academic and professional success of all individuals involved in educational change (p. 21).

Therefore, due to its emphasis on the skills it measures, this model is considered a rigorous approach to the study of emotional intelligence. This is validated by various studies demonstrating that these competencies are related to improvements in academic performance. In the educational field, this model provides a theoretical framework for integrating pedagogical strategies to foster students' emotional development.



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2.4 Music as a catalyst for emotional skills

Music impacts people's emotions while facilitating their expression and self-regulation. Therefore, Bruna et al. (2022) argue that:

Emotional processing would be an integral part of cognition, affecting the degree to which emotions influence ongoing activities and behaviors, with increasing evidence supporting the view that cognition and emotion are linked in a highly complex way (p. 4).

It can be said, then, that through listening to or interpreting music, individuals process their complex emotions to develop greater awareness of their emotional state. This is relevant in the educational field, as students can use music as a tool to better manage stress and improve their emotional well-being. Furthermore, Troya-González et al. (2023) emphasize that “formal and structured music education, in addition to being an instrument that enhances an individual's personality, is a powerful tool for developing students' socio-communicative skills, giving them the opportunity to express their ideas artistically” (p. 130).

Therefore, this shared responsibility begins with the teacher, who is in charge of implementing educational planning that reinforces instruction with a focus on a particular area within the curriculum, considering the necessary resources to achieve the stated objectives. For this reason, it is necessary to reflect on the relevance of music in student development across different modalities and areas, unlocking their potential and thus improving their quality of life.

2.5 Role of teachers in socio-emotional development through music

Music pedagogy is a valuable tool in developing adolescents' skills, as it instills in them the motivation to participate in the process. Musical training potentially develops their intellectual capacities. To this end, teachers must engage in self-preparation regarding possible strategies to consider for promoting the musical components related to the activities to be carried out, according to the skill that needs to be developed in the classroom. As an example, Miñan and Espinoza (2020) maintain that teachers “need to seek appropriate methodological strategies that allow them to awaken students' interest, thus contributing to ensuring the success of the teaching-learning process, making it an enriching, fun, and highly productive experience” (p. 455).

Previous studies demonstrate that joint participation between teachers and students in musical activities reduces participants' stress levels, showing improvements in certain tolerant behaviors such as solidarity and respect, and enhancing self-esteem and empathy. For example, Chao et al. (2015) confirms that “music can improve behavior, since, after employing appropriate strategies, it can be used to enhance tolerant behaviors” (p. 1).

Likewise, Gutiérrez and Buitrago (2019) state that “school is the primary setting for the individual's development and socialization. It is there that students' perceptions, realities, subjectivities, and behaviors are consolidated. Consequently, the role of teachers is fundamental, as they act as guides” (p. 167). The creation of bonds in the classroom depends on this, since it is thanks to the teacher and their management of socio-emotional skills that this space becomes an environment of harmony, coexistence, and peace.

Thus, by applying structured pedagogical strategies in music, teachers create an inclusive environment that fosters emotional expression along with teamwork. This not only improves relationships among classmates but also boosts self-esteem and confidence.



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Furthermore, teachers serve as emotional role models for their students, providing guidance in managing complex situations through empathy and self-control. When they incorporate music into their teaching practices, they can implicitly share certain skills, which helps students develop essential competencies.

2.5.1 Pedagogical strategies for musical integration in the classroom

Integrating music requires teachers to apply appropriately designed pedagogical strategies to maximize its educational impact, as Linares et al. (2018) argue that:

Songwriting provides students with the opportunity to put new experiences into practice. Through diverse stimuli, both physical and cognitive, that highlight their artistic and creative side, communication and collaborative work are facilitated, making learning easier. Thus, the use of songs in the classroom can be considered an appropriate resource for lasting learning, since, through the combination of rhythms, verses, and repetitions, students better assimilate new knowledge (p. 16).

Another effective strategy is the implementation of group singing, fostering community work and communication skills. It is also suggested to include simple instruments in musical practice to teach rhythm and melody concepts while simultaneously promoting motor and coordination skills.

Its development considers ethical aspects that are fundamental for the manipulation of variables and the joint participation of students. Prior to implementation, representatives of the participating students were informed about the objectives, procedures, and potential benefits of the project, thus ensuring informed consent. Additionally, students who no longer wished to participate in the program could withdraw voluntarily without incurring academic penalties.

Consequently, adolescents forge their identity under the influence of agents that shape their way of thinking, acting, and interacting within their social group. Therefore, the application of self-esteem through the implementation of a musical project within the classroom, where they are the protagonists, becomes a tool that generates a favorable and democratic work environment. This helps the group overcome conflicts and improve self-esteem, as well as enhance the final product of the project.

3. Methodology

This research employs a quantitative approach with a quasi-experimental design, utilizing a pre-test and post-test, to analyze the impact of a music teaching strategy on the development of socio-emotional competencies in first-year high school students at the Jim Irwin Private School during the 2023-2024 academic year. The study allows for the objective observation of educational phenomena occurring in the environment of the participating students, thus justifying the need for intervention in socio-emotional development through music.

The study population consisted of 42 high school students aged 15-16 years from section C, which has 22 students (control group with 52% participation), and section D, with 20 students (experimental group with 48% participation). The selection of the working groups was based on the feasibility of integrating music into the curriculum to implement the innovative teaching method in the experimental group. This allowed for a comparison of



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results before and after the music-based intervention. No specific exclusion criteria were used for the research, as the entire available population participated.

The socio-emotional competencies for each dimension are then established for each group. Table 1 summarizes each dimension with its respective variables, from which the corresponding affirmative hypothesis (Hi) and null hypothesis (Ho) are derived.

Dimension	Independent Variable	Dependent Variable
Intrapersonal	Participate in musical activities	Improved emotional regulation among students
Stress Management		Improved stress management strategies among students
Mood		Improved mood among students
Interpersonal		Promotes interpersonal skills among students
Adaptability		Increased adaptability among students

Table 1. Formulation of variables and hypotheses according to the dimension.

- Affirmative hypothesis (Hi): Participation in musical activities contributes to the development of students' socio-emotional skills.
- Null hypothesis (Ho): Participation in musical activities does not contribute to the development of students' socio-emotional skills.

3.1 Instrument

To measure participants' socio-emotional competencies, an adaptation of the Bar-On Emotional Quotient Inventory (EQ-i) was used. This inventory was designed to assess individuals' emotional intelligence from a socio-emotional competency perspective. The original questionnaire consists of 133 questions grouped into five dimensions: intrapersonal, stress management, general mood, interpersonal, and adaptability. However, when applied in a more specific context, it was reduced to 85 items using an adapted five-point Likert scale, selecting those items most relevant to the educational context.

This adaptation of the instrument is based on the need to focus the assessment on the most important or relevant dimensions for the research purposes, as well as considering the time required for its administration. Therefore, items related to the subcomponents of assertiveness, self-concept, self-actualization, interpersonal relationships, and reality testing were removed, while those that allow for reliable measurements to validate socio-emotional skills related to musical learning were retained. This instrument is complemented by the following Likert scale: 1 = N (Never), 2 = PV (Rarely), 3 = AV (Sometimes), 4 = MV (Often), 5 = S (Always). With this information, clear instructions were provided to the students, ensuring their understanding of the activity.

Reliability was established using Cronbach's alpha coefficient, obtaining 77% for the pretest and 82% for the posttest, respectively, indicating acceptable and high consistency. Validity was verified through significant correlations between the total test score and each of its dimensions for both the pretest and posttest, guaranteeing that the instrument is reliable for the accurate measurement of socio-emotional components.



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4. Results

This section interprets the results obtained after applying the research instrument to high school students. These results are presented as a summary of the frequencies obtained for each of the analyzed dimensions, according to the response options selected on the corresponding Likert scale.

Table 2 details the frequencies for each dimension for both the pretest and posttest. In general, it can be observed that before the intervention, the options with the highest number of responses were "never," "rarely," and "sometimes," while after the intervention, this pattern changed, with "always" becoming the most frequently selected option.

PRETEST						POSTEST					
Pregunta	N	PV	Intrapersonal dimension					PV	AV	MV	S
			AV	MV	S	N					
P-1	2	4	11	2	1	1	1	2	13	3	
P-2	0	4	4	8	4	1	1	2	7	9	
P-3	8	6	4	2	0	0	2	8	10	0	
P-4	0	3	10	5	2	1	1	6	8	4	
P-5	8	4	5	3	0	1	4	4	9	2	
P-6	1	1	9	5	4	0	0	2	9	9	
P-7	0	3	8	5	4	0	1	2	10	7	
P-8	3	4	9	2	2	1	1	5	10	3	
P-9	4	4	6	5	1	1	2	4	8	5	
P-10	1	4	7	7	1	0	1	7	9	3	
P-11	0	0	2	9	9	0	1	2	2	15	
P-12	0	0	6	10	4	0	0	4	6	10	
P-13	2	0	7	8	3	0	0	4	10	6	
P-14	0	2	3	9	6	0	0	1	10	9	
P-15	0	3	4	10	3	0	1	1	11	7	
Stress management dimension											
P-16	0	2	11	5	2	0	0	2	11	7	
P-17	0	6	5	5	4	0	2	4	6	8	
P-18	0	6	9	4	1	0	1	4	4	11	
P-19	2	1	9	8	0	0	8	2	5	5	
P-20	0	4	5	10	1	0	0	1	11	8	
P-21	0	3	9	3	5	0	0	3	4	13	
P-22	0	2	7	9	2	0	3	4	6	7	
P-23	1	1	5	9	4	0	2	5	8	5	
P-24	1	7	7	2	3	0	1	4	8	7	
P-25	2	3	7	7	1	0	4	3	7	6	
P-26	0	3	7	8	2	0	3	5	7	5	
P-27	1	3	6	9	1	0	4	2	4	10	
P-28	2	5	4	6	3	0	1	6	7	6	
P-29	4	7	4	4	1	0	4	3	6	7	
P-30	1	3	7	6	3	0	0	3	11	6	
P-31	2	4	8	5	1	0	3	5	3	9	



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P-32	1	1	4	6	8	0	1	1	9	9
P-33	0	1	12	5	2	0	2	6	6	6
P-34	1	5	4	7	3	0	2	2	6	10
Mood Dimension										
P-35	2	1	6	6	5	1	1	5	4	9
P-36	3	4	4	4	5	0	2	2	4	12
P-37	1	4	7	4	4	0	1	1	10	8
P-38	1	2	5	7	5	0	0	2	7	11
P-39	1	4	7	3	5	0	0	4	7	9
P-40	1	2	6	8	3	0	0	2	11	7
P-41	0	0	5	5	10	0	3	3	4	10
P-42	1	2	3	6	8	0	0	1	7	12
P-43	0	1	4	3	12	0	0	1	3	16
P-44	0	1	7	8	4	0	0	2	8	10
P-45	0	1	10	5	4	0	1	4	4	11
P-46	1	0	7	9	3	0	0	3	9	8
P-47	0	2	3	12	3	0	1	2	2	15
P-48	1	2	9	4	4	0	0	5	8	7
P-49	0	4	6	7	3	0	1	5	5	9
P-50	1	0	11	4	4	0	0	2	10	8
P-51	3	3	7	5	2	0	1	2	10	7
Interpersonal dimension										
P-52	3	2	7	6	2	0	2	3	12	3
P-53	0	4	4	10	2	0	3	6	8	3
P-54	3	1	6	8	2	0	0	6	8	6
P-55	0	3	6	6	5	0	1	6	3	10
P-56	1	4	3	4	8	0	0	5	8	7
P-57	2	7	5	2	4	1	2	4	10	3
P-58	3	4	5	4	4	2	2	4	6	6
P-59	0	1	7	7	5	0	4	2	11	3
P-60	0	1	4	5	10	0	3	1	8	8
P-61	4	0	5	6	5	0	2	6	5	7
P-62	4	2	5	8	1	1	3	4	7	5
P-63	0	2	7	5	6	0	1	6	2	11
P-64	2	3	4	6	5	0	3	2	6	9
P-65	1	3	6	7	3	1	2	5	5	7
P-66	0	1	2	13	4	0	1	4	7	8
P-67	1	7	4	5	3	0	1	7	7	5
P-68	0	0	3	10	7	0	0	1	7	12
P-69	2	4	6	4	4	0	0	5	10	5
Adaptability dimension										
P-70	0	2	6	6	6	0	1	5	8	6



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P-71	3	3	2	3	9	0	1	3	7	9
P-72	1	1	1	9	8	0	0	3	7	10
P-73	0	3	5	6	6	0	0	6	5	9
P-74	1	0	5	6	8	0	3	4	3	10
P-75	2	7	6	4	1	2	2	5	9	2
P-76	0	1	7	6	6	0	1	5	6	8
P-77	1	2	7	9	1	0	3	7	4	6
P-78	2	4	7	6	1	1	1	5	6	7
P-79	1	5	3	10	1	0	5	3	6	6
P-80	2	7	5	6	0	3	2	6	8	1
P-81	1	6	6	6	1	0	3	6	6	5
P-82	1	3	8	5	3	0	3	4	5	8
P-83	1	2	7	4	6	0	4	4	5	7
P-84	3	3	7	4	3	0	4	2	9	5
P-85	3	5	5	3	4	3	3	5	5	4

Table 2 Frequency table according to dimension

Table 3 summarizes the results obtained by the Student's t-test performed in the SPSS statistical software for each dimension, showing the data for each group, mean value, standard deviation and significance or p-value.

Dimension	Group	Media	x	σ	Sig
Intrapersonal	Experimental	-9,5	7,29	1,63	<,001
	Control	3,091	6,015	1,282	0,025
Stress Management	Experimental	-13,45	11,381	2,545	<,001
	Control	-0,227	9,008	1,92	0,907
Mood	Experimental	-11,75	10,647	2,381	<,001
	Control	1,318	7,699	1,641	0,431
Interpersonal	Experimental	-7,55	13,736	3,071	0,024
	Control	-2,045	9,907	2,112	0,344
Adaptability	Experimental	-6,4	9,616	2,15	0,008
	Control	-1,227	6,81	1,452	0,407

Table 3 Student's t-test results for each dimension

Figure 1 summarizes the frequencies of the responses provided by the students in the pretest, that is, before the intervention. It details the Likert scale values for each of the study dimensions.



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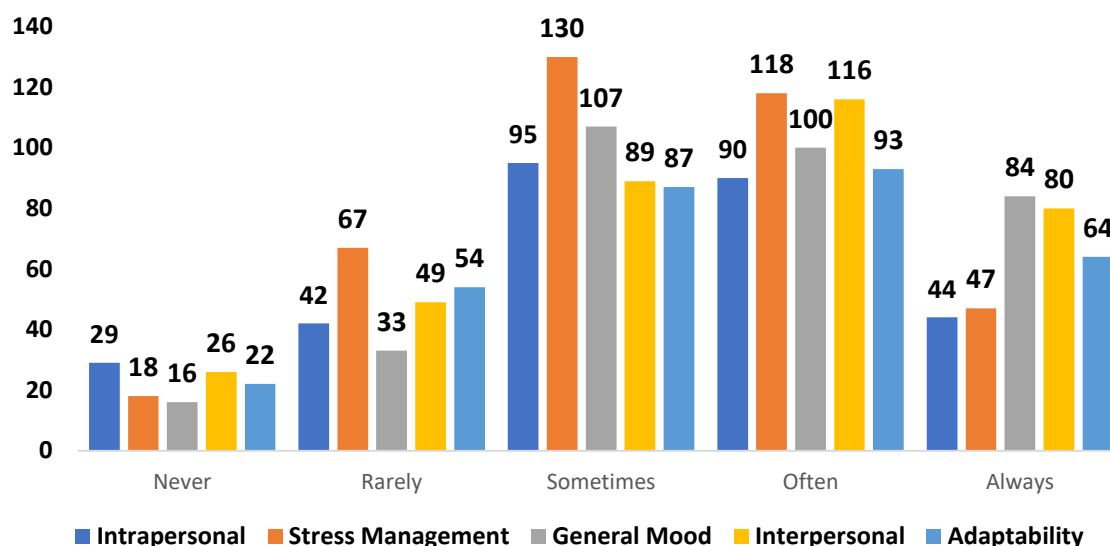


Figure 1 Comparison of response frequencies for each dimension for the pretest

Figure 2 shows the frequencies of the responses given by the students in the post-test, that is, after the academic intervention was implemented. It details the Likert scale values for each of the study dimensions.

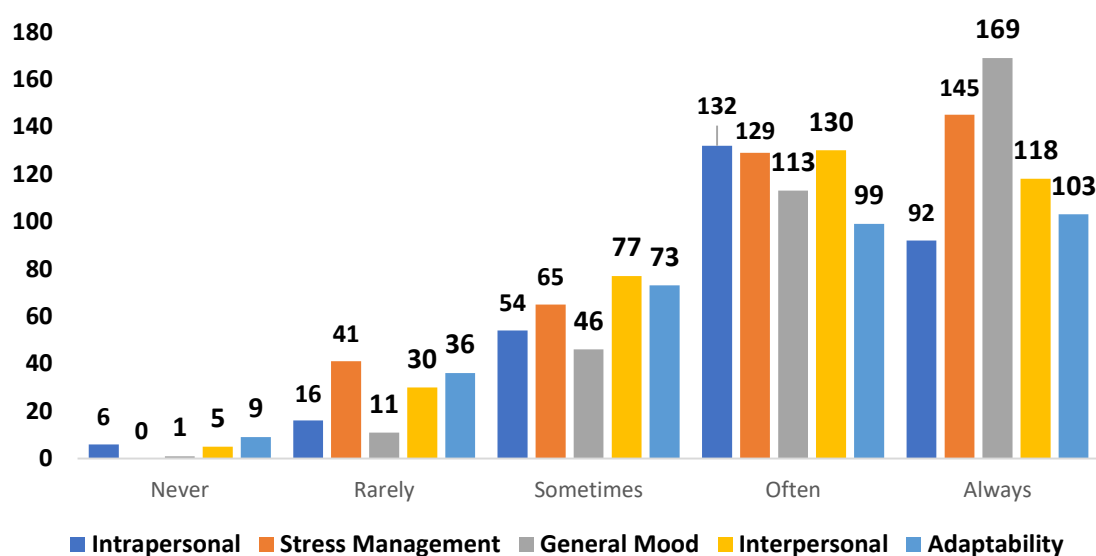


Figure 2 Comparison of response frequencies for each dimension for the post-test

4.1 Intrapersonal Dimension

The t-test summarized in Table 3 for the experimental group, within a 95% confidence interval, yielded a mean of -9.5 with a p-value < 0.05, indicating significant differences between the data obtained. Therefore, the hypothesis H_1 is accepted as valid: participation in musical activities significantly improves the intrapersonal dimension of emotional regulation.



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Similarly, for the control group, with a 95% confidence interval and a mean of 3.091, a p -value < 0.05 was obtained, implying the presence of significant differences. Therefore, the hypothesis H_i is accepted: participation in musical activities significantly improves emotional regulation in the control group.

Figures 1 and 2 show a decreasing trend in response options considered negative, with 79.31%, 61.9%, and 43.16% for N, PV, and AV, respectively. Conversely, for the positive response options MV and S, an increase of 46.67% and over 100% is observed. It can be inferred, then, that this increase is due to the inclusive and collaborative environment in which the students find themselves when developing the musical activities planned by the teacher. In this sense, music not only encourages their expression but also allows them to explore their emotions within a space where they feel safe.

4.2 Stress management dimension

For the experimental group in its stress management dimension, Table 3 shows that within a 95% confidence interval, a mean of -13.450 was obtained with a p -value < 0.05 , which implies the presence of significant differences between the data obtained. Therefore, the null hypothesis (H_0) is accepted: participation in musical activities significantly improves stress management strategies.

In turn, for the control group, within a 95% confidence interval, a mean of -0.227 was obtained with a p -value > 0.05 , which means that there are no significant differences between the means of the values obtained. Therefore, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted: participation in musical activities does not significantly improve stress management strategies.

Figures 1 and 2 show a downward trend of 100%, 38.81%, and 50%, respectively, for the negative response options N, PV, and AV, while the positive options MV and S show an increase of 9.32% and 208%, which is interpreted as a considerable improvement. This indicates an improvement in coping strategies after the musical intervention, suggesting a decrease in perceived stress levels, a reduction in impulsivity and anxiety, and an increased ability to remain calm and manage difficult situations in the classroom.

4.3 Mood Dimension

For the mood dimension of the experimental group, Table 3 shows that the mean of the paired differences is -11.750 within a 95% confidence interval, where the p -value < 0.05 ; therefore, the null hypothesis (H_0) is accepted: participation in musical activities significantly improves mood.

While for the control group, a p -value > 0.05 is presented, with a mean of 1.318 within a 95% confidence interval; that is, there are no significant differences between the means of the data obtained; therefore, H_0 is rejected and H_a is accepted: participation in musical activities does not significantly improve mood.

Figures 1 and 2 show a decreasing trend in the response options considered negative (N, PV, and AV) of 93.75%, 66.67%, and 57.01%, respectively, while the positive options (MV and S) show an increase of 13% and 101.19%. This means that students experience an improvement in their mood after participating in the planned musical activities. The results showed a reduction in symptoms associated with anxiety and depression. They also appeared more optimistic, motivated, and confident. In contrast, the control group did not show a significant change.



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4.4 Interpersonal dimension

For the interpersonal dimension of the experimental group, Table 3 shows that within a 95% confidence interval, the mean of the paired differences is -7.55 with a p-value < 0.05, therefore accepting H1: participation in musical activities fosters interpersonal skills.

Similarly, for the control group, the significance is shown with a p-value > 0.05 and the mean of the paired differences is -2.045, demonstrating that there are no significant differences between the means of the collected data; therefore, accepting H0: participation in musical activities does not foster interpersonal skills.

Figures 1 and 2 show a decrease in the response options considered negative (N, PV, and AV) of 80.77%, 38.78%, and 13.48%, respectively, while the positive options (MV and S) show an increase of 12.07% and 47.50%.

4.5 Adaptability Dimension

Analyzing Table 3, the results for adaptability in the experimental group, within a 95% confidence interval, show a mean of -6.4 for the paired differences with a p-value < 0.05. Therefore, the null hypothesis (H0) is accepted: participation in musical activities increases adaptability and flexibility.

For the control group, with a 95% confidence interval, the mean was -1.227 and a p-value of 1.227. Therefore, the null hypothesis (H0) is accepted: participation in musical activities does not increase adaptability and flexibility.

Figures 1 and 2 show a decreasing trend in the response options considered negative (N, PV, and AV) of 59.06%, 33.33%, and 16.09%, respectively, while the positive options (MV and S) show an increase of 6.45% and 60.94%. Among the items with the greatest variation was the ability to adapt easily to change, shifting from a high number of responses to "never," "rarely," or "sometimes" to "often" and "always." This suggests that the implemented musical activities were effective in the group, fostering greater openness to potential changes.

5. Discussion

After ten weeks of intervention, the results obtained from the Bar-On Inventory reveal an improvement in the skills of the experimental group compared to the control group. It is important to note that the control group did not receive any experimental intervention; in this case, they received traditional music education. The difference observed between these groups confirms that the applied pedagogical strategies are not only effective but also surpass the conventional methodology used in the classroom, reinforcing the idea that music allows students to develop emotional and social skills. To illustrate this, Cacñahuaray-Chumpitaz and Matalinares-Calvet (2024) state that it is important to "include emotional education programs in school settings, since their impact on overall well-being and on students' ability to relate constructively is evident" (p. 85).

The skills with the greatest impact in the research were self-awareness, where the experimental group showed a greater capacity for identifying and understanding their emotions. An improvement is noticeable in the ability to manage stressful situations and in interpersonal relationships, with an increase in empathy levels and the capacity for collaborative work. For example, Vizcaino et al. (2025) maintain that:

The results obtained support the existence of seven factors associated with emotional self-regulation, interpersonal regulation, empathy,



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motivation, conflict resolution, and teamwork. These factors explain a large part of the variance in the test, providing evidence of the instrument's validity (p. 137).

Based on the instruments applied to the students, it was observed that those who actively participated in musical activities showed a notable improvement in managing their emotions, as well as in teamwork, as noted by Troya-González et al. (2023), who conclude that music education “is the sphere that gives students, within the framework of their life vision, tools for their full and integral development and the possibility of their educational self-realization without any discrimination and with a true sense of inclusion” (p. 130).

A comparative analysis revealed that educational programs that integrate music have a positive impact on the development of emotions, especially on self-regulation and the social sphere of the participants, particularly when group activities are integrated into their routine, as Treviño et al. also observed. (2020) points out that “when students do not know how to control their emotions, their performance and academic achievement are affected; therefore, it is important to make students aware of the value of regulating these emotions in unexpected and/or significant situations” (p. 44).

This validates the integration of musical activities into the curriculum as a strategy to promote students' emotional and social well-being. In this sense, music is considered to foster personal and collective development within the classroom. From an educational perspective, Hallam (2010) mentions that “group musical performance benefits the development of social skills, which can contribute to health and well-being throughout an individual's life, thus contributing to community cohesion and benefiting society” (p. 22).

In summary, the results showed statistically significant differences favoring the experimental group after the intervention, demonstrating that when music is taught using innovative methodologies, it can enhance the development of students' socio-emotional skills. These findings support the importance of implementing music programs within secondary education, thereby strengthening the emotional well-being of young people. Thus, for example, Ruvalcaba et al. (2016) point out that “the effect of socio-emotional skills seems to be more evident in the educational sphere at home and at school, that is, the adolescent's immediate environment and not necessarily as an action of their community environment” (p. 85).

6. Conclusions

This research reveals significant findings that justify the stated objective. Through the application of a quasi-experimental design, it has been demonstrated that the implementation of pedagogical strategies based on musical learning improves the socio-emotional skills of the students participating in the experimental group, achieving a 78% increase in their ability to identify complex emotions and manage their responses effectively, especially in situations of academic stress.

The preliminary analysis highlights that the positive deviations of the experimental group after the implementation of musical activities progressively improve the students' socio-emotional skills. Furthermore, the calculated significances support its validity, demonstrating a real and measurable impact on the students' socio-emotional development. The control group, not being exposed to a direct intervention, did not experience significant changes in any of the evaluated skills. This divergence between the



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two study groups supports the hypothesis that music is a determining factor in developing skills such as emotional intelligence and empathy.

In this context, from an educational perspective, these results reinforce the importance of integrating approaches that range from the academic to the inclusion of socio-emotional dimensions by incorporating methodologies into the curriculum that consider music as a pedagogical tool. It has been demonstrated that music facilitates cognitive learning and acts as a bridge for addressing and resolving common emotional conflicts during adolescence.

Likewise, the research demonstrates that music acts as an artistic stimulus in strengthening socio-emotional skills. Thus, the members of the experimental group participated in strategically designed musical activities and showed superior performance compared to the control group. This confirms that using music as a pedagogical tool transforms the classroom environment, creating a space of inclusion and motivation, which promotes students' emotional well-being and academic performance.

Music activates various parts of the brain, a fact corroborated by the observation that anxiety and stress levels decreased in the experimental group, while self-esteem and teamwork skills increased. This implies that students' skills are malleable and can be stimulated through the use of appropriate pedagogical strategies.

The collected data not only indicates that music is an effective artistic tool, but also serves as a pedagogical resource that promotes socio-emotional skills in adolescents. Developing these skills not only improves students' social dynamics in the classroom, but also contributes to their overall well-being as part of an educational strategy implemented by the teacher. Therefore, the importance of teacher support for their students during this process is evident, as teachers must receive adequate information that allows them to implement music-based pedagogical strategies to maximize the socio-emotional impact..

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Authorship statement-Credit

JONATHAN PILLAJO-TITUAÑA: State of the art, related concepts, methodology, validation, data analysis, writing – first draft.

MARÍA GUACHO-MOREJÓN: State of the art, related concepts, data analysis, organization and integration of collected data, conclusions, final writing and editing.



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Statement on the use of artificial intelligence

The authors report that they used the ChatGPT tool (GPT-4 model, OpenAI; version June 2025) solely to assist in the rewriting and linguistic refinement of certain passages of the manuscript. No scientific components, results, analyses, or interpretations were produced by artificial intelligence. The authors reviewed and validated all content, assuming responsibility for its accuracy and rigor.



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