

MUSICAL ABILITY AS AN ALLY IN REDUCING PSYCHOLOGICAL DISTRESS IN SCHOOL-AGE STUDENTS

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Abstract

Student mental health and well-being have gained increasing relevance in the educational field in recent years. In this context, psychological distress—understood as the combination of anxiety, depression, and stress—represents a significant risk factor for student well-being, prompting the search for strategies to mitigate its impact. Various studies suggest that music can positively influence emotional regulation and stress reduction; however, the specific role of musical ability in these processes remains to be further explored. This study examines the relationship between musical ability and psychological distress. The sample included 1,496 students from 6th grade of primary education to the 2nd year of high school across five educational institutions in Spain. The average age was 13.68 years ($SD = 2.03$), with a balanced gender distribution (51.3% female). The study employed a musical ability test and the General Distress Scale (DASS-21). The preliminary results show that students with higher musical ability reported lower levels of depression ($r = -0.123$), anxiety ($r = -0.115$), and stress ($r = -0.077$). Statistically significant differences were found between timbre perception and depression ($r = -0.124$), anxiety ($r = -0.121$), and stress ($r = -0.082$). Additionally, a negative relationship was observed between pitch perception and both depression ($r = -0.063$) and anxiety ($r = -0.058$); as well as between melody perception and depression ($r = -0.053$). These findings suggest that musical ability may act as a protective factor against students' psychological distress. This underscores the importance of integrating music education not only as a pedagogical tool, but also as a fundamental resource for facilitating the management of psychological distress in the school environment.

Keywords: *Musical ability, psychological distress, student well-being, mental health.*

1. Introduction

In recent years, the role of music in supporting mental health has attracted growing attention within educational contexts. As psychological well-being becomes an increasingly central concern in schools, researchers and educators alike are exploring how music might serve as a protective factor against emotional distress in students. This interest has been further amplified by the lasting impact of the COVID-19 pandemic, which significantly worsened levels of stress, anxiety, and other psychological difficulties among children and adolescents (Sun, 2022).

Years after the health crisis, concerns about student mental health persist, as reflected in a growing body of research, governmental initiatives, and educational strategies aimed at promoting emotional well-being in schools (Chang, Ji, Li, Pan, & Su, 2021; Muyor-Rodríguez, Caravaca-Sánchez, & Fernández-Prados, 2021). In this context, schools are not only places for academic development but also key environments for fostering emotional regulation and resilience.

One of the most pressing challenges is psychological distress—a combination of symptoms related to anxiety, depression, and stress—which has been consistently linked to negative emotional and academic outcomes (Bhatia & Kaur, 2024; Wuthrich, Belcher, Kilby, Jagiello, & Lowe, 2021). Identifying protective factors that can mitigate psychological distress is therefore essential.

Among the potential protective factors, music stands out due to its unique emotional and cognitive properties. Previous studies suggest that music can aid in stress reduction, emotional processing, and overall mental health. For instance, Perlovsky, Cabanac, Bonniot-Cabanac, & Cabanac (2013) found that listening to pleasant music during academic tasks reduced stress and improved performance. Similarly, Wang,

Huang, Zeb, Liu, & Wang (2022) reported that students engaged in music education experienced notable improvements in anxiety and well-being. However, the specific role of musical ability—beyond music exposure or passive listening—in protecting against psychological distress remains underexplored.

Musical ability is a multidimensional construct that encompasses various perceptual and cognitive skills involved in processing musical information. In this study, we focus on four core components: rhythm, melody, timbre, and pitch. These dimensions are commonly used in research on music cognition and are supported by models such as the one proposed by Law and Zentner (2012), which conceptualize musical ability as the capacity to accurately perceive, discriminate, and mentally represent distinct elements of sound. Rhythm refers to the perception of temporal patterns and beat; melody involves the recognition of sequential pitch relationships; timbre relates to the quality or color of a sound that distinguishes different instruments or voices; and pitch perception involves the ability to detect fine differences in frequency. These components were assessed through a musical ability test specifically designed to reflect these dimensions, and previous studies have shown that each plays a distinct role in emotional and cognitive processing (Janurik & Józsa, 2022; Wang et al., 2022).

In light of this, this study seeks to address that gap by investigating whether musical ability itself may serve as a protective factor against psychological distress in school-age students.

2. Objective

The present study examines the relationship between musical ability and psychological distress in students from 6th grade of primary education to the 2nd year of high school. Musical ability was assessed through core perceptual skills, including rhythm, melody, timbre, and pitch discrimination. Psychological distress was categorized into stress, anxiety, and depression. The primary objective was to determine whether higher levels of musical ability were linked to lower levels of psychological distress. By examining these associations across a wide developmental range, this research seeks to contribute new evidence on the potential role of musical ability as a protective factor. Furthermore, the study aims to strengthen the argument for integrating music education in schools not only for artistic and cognitive enrichment, but also as a valuable resource for fostering students' mental health in educational settings.

3. Methodology

3.1. Design

This study employed a cross-sectional, correlational design to explore the relationship between musical ability and psychological distress (comprising stress, anxiety, and depression) among students in primary and secondary education. Data were collected during the 2023–2024 academic year from students aged 10 to 21 years across five educational institutions in Spain.

3.2. Participants

The study involved a total of 1496 students enrolled in five educational institutions across Spain. Participants ranged from the 6th grade of primary education to the 2nd year of high school, with the distribution as follows: 18.4% in 6th grade of Primary Education, 16.4% in 1st year of Secondary Education, 16.5% in 2nd year of Secondary Education, 14.0% in 3rd year of Secondary Education, 13.5% in 4th year of Secondary Education, 13.0% in 1st year of High School, and 8.3% in 2nd year of High School. The age of the students varied between 10 and 21 years, with a mean age of 13.68 years ($SD = 2.03$ years). The sample was balanced by gender, comprising 51.3% female students and 48.7% male students.

Participation was voluntary, and informed consent was obtained from all students and their legal guardians prior to data collection. The selection of participants was based on convenience sampling, considering the availability and accessibility of the schools that agreed to collaborate in the study.

No exclusion criteria related to musical background, academic performance, or psychological history were applied, ensuring a diverse representation of the student population. The study was conducted in accordance with ethical standards and was approved by the relevant educational authorities.

3.3. Instruments and measures

The authors designed a music ability test which is currently being validated. The test comprises four modules: a) pitch (ability to detect the direction of small pitch differences), b) timbre (ability to detect subtle changes in instrumentation), c) melody (ability to detect differences in tonal and atonal melodies), and d) rhythm (ability to detect differences in metric and non-metric rhythms). The modules consist of 14 to 20 items, each of which requires participants to compare two musical stimuli which can be different or identical.

To assess levels of stress, anxiety, and depression among participants, we administered the Depression, Anxiety, and Stress Scale – 21 items (DASS-21) (Lovibond & Lovibond, 1995). This instrument comprises three subscales—stress, anxiety, and depression—each containing 7 items. Participants rated each item on a 4-point Likert scale (0 = "Did not apply to me at all" to 3 = "Applied to me very much or most of the time"). Higher scores reflect greater levels of psychological distress within each assessed dimension.

3.4. Data collection and analysis

Data collection took place during regular school hours in collaboration with the participating educational centers. After obtaining the necessary permissions from school authorities and informed consent from parents or legal guardians, students completed the assessments in a supervised group setting. Participation was voluntary, and confidentiality and anonymity were guaranteed throughout the process.

A musical ability test and the DASS-21 scales were applied. The total administration time for all instruments was approximately 45 minutes.

For data analysis, Pearson's correlation coefficients (r) were calculated to explore the relationships between musical ability and psychological distress variables (depression, anxiety, and stress). Statistical significance was established at $p < .05$. All statistical analyses were conducted using SPSS (versión 18).

4. Results

A Pearson correlation analysis was conducted to examine the relationships between musical ability subscales (melody, rhythm, pitch, and timbre), overall musical ability, and psychological distress dimensions (depression, anxiety, and stress). The results are presented in Table 1.

Table 1. Pearson correlations.

Variable	<i>n</i>	<i>M</i>	<i>SD</i>	1	2	3	4	5	6	7	8
1. Melody	1496	8.02	2.05	—							
2. Rhythm	1496	9.19	2.22	.315**	—						
3. Pitch	1496	12.67	3.39	.268**	.297**	—					
4. Timbre	1496	13.03	2.80	.270**	.352**	.421**	—				
5. Overall musical ability	1496	42.91	7.42	.595**	.655**	.779**	.750**	—			
6. Depression	1496	11.91	5.29	-.053*	-.111**	-.063*	-.124**	-.123**	—		
7. Anxiety	1496	17.32	7.28	-.040	-.105**	-.058*	-.121**	-.115**	.794**	—	
8. Stress	1496	19.21	7.09	-.030	-.071**	-.035	-.082**	-.077**	.750**	.836**	—

Note. $p < .05$ (*), $p < .01$ (**).

Significant positive correlations were found between all musical ability subscales, as well as among the psychological distress dimensions themselves.

Regarding psychological distress, higher musical ability (both overall and in subscales) was generally associated with lower levels of depression, anxiety, and stress. Specifically, significant negative correlations were observed between rhythm ability and depression ($r = -.111$), anxiety ($r = -.105$), and stress ($r = -.071$). Timbre ability was also negatively correlated with depression ($r = -.124$), anxiety ($r = -.121$), and stress ($r = -.082$).

The analysis revealed a small but statistically significant negative correlation between melody perception and depression ($r = -.053$). Regarding pitch perception, small but significant negative correlations were observed with both depression ($r = -.063$) and anxiety ($r = -.058$).

Overall musical ability was negatively correlated with depression ($r = -.123$), anxiety ($r = -.115$), and stress ($r = -.077$). Although some correlations were small, their statistical significance supports the notion that higher musical ability is associated with lower psychological distress levels.

5. Discussion and conclusions

The findings of this study reveal a modest but consistent relationship between musical ability and psychological distress among primary and secondary school students. Specifically, higher scores in musical ability—particularly in rhythm and timbre perception—were associated with lower levels of depression, anxiety, and stress. These results align with previous research suggesting that music-related skills and engagement with music can play a role in emotional regulation and stress reduction (Perlovsky et al., 2013; Wang et al., 2022).

Of particular interest is the negative correlation observed between melody perception and depression, as well as between pitch perception and both depression and anxiety. Although the effect sizes were small, these findings support the notion that more refined auditory discrimination abilities may contribute to emotional resilience in youth. It is plausible that the cognitive and emotional processes involved in musical perception—such as attention control, memory, and emotional processing—could enhance students' ability to manage negative emotional states (Zhao & Gao, 2025). Future studies should explore these mechanisms in greater depth to better understand the underlying processes.

The overall musical ability score was consistently associated with lower psychological distress, suggesting that a general proficiency in music may serve as a protective factor. These findings reinforce the growing argument that music education should not only be valued for its artistic and cognitive contributions but also for its potential benefits for student well-being, as previous research has shown (Wang et al., 2022; Zhao & Gao, 2025).

Nonetheless, these results should be interpreted with caution. The correlational nature of the study precludes causal conclusions, and although the associations were statistically significant, their magnitude was modest. Additionally, potential confounding variables such as differences in musical exposure, socioeconomic status, and emotional support systems were not controlled, which may have influenced the observed relationships (Perlovsky et al., 2013; Sun, 2022).

Despite these limitations, the findings underscore the potential of music education as a valuable tool for promoting emotional well-being and supporting mental health in the school context. Future research should investigate these relationships longitudinally and assess whether targeted interventions aimed at developing musical skills can contribute to reducing psychological distress among students. Expanding the role of music education within school curricula could therefore offer a promising avenue for fostering emotional resilience and enhancing overall student well-being.

6. Practical applications

Taking our findings into account, a wide range of practical applications could be implemented in the educational setting in order to prevent and reduce psychological distress in students. Participation in music-related initiatives, such as the ones suggested in the following paragraphs, could be monitored and correlated with students' perceived emotional well-being, academic performance and other relevant variables.

First of all, access to music education could be expanded, making group and individual lessons available to all students, offering tuition fee waivers in cases of financial need. Music programmes could be started in the early years in order to build musical and emotional skills over time. In addition to music lessons, participation in music ensembles, clubs and informal spaces for music making could be encouraged in educational institutions. Collaboration with music therapists in the design and implementation of programmes in schools and universities, as occurs in an increasing number of initiatives reflected in academic literature (Chen et al., 2024; Ponce de León & Del Olmo, 2021) could be key in achieving greater reductions in students' psychological distress.

Music could play a greater role in mental health campaigns in the educational setting. Activities involving music could be integrated in events related to health awareness, such as stress-relief days and wellness weeks (Corbin, Kulinna, Dean & Reeves, 2013). Specific workshops focusing explicitly on the potential benefits of music on emotional well-being could be held to increase awareness on the subject.

Short music activities could be integrated in school schedules, acting as brain breaks to support mood and motivation (Vigl, Talamini & Zentner, 2023). To ensure the sustainability and effectiveness of such initiatives, it would be desirable to include these aspects in teacher training and professional development programmes.

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References

- Bhatia, R., & Kaur, J. (2024). Studying the Psychological Effects of Stress, Anxiety, and Depression on Secondary School Students. *International Journal For Multidisciplinary Research*, 6(1), 1-9. <https://doi.org/10.36948/ijfmr.2024.v06i01.14193>
- Chang, J. J., Ji, Y., Li, Y. H., Pan, H. F., & Su, P. Y. (2021). Prevalence of anxiety symptom and depressive symptom among college students during COVID-19 pandemic: A meta-analysis. *Journal of Affective Disorders*, 292(June), 242-254. <https://doi.org/10.1016/j.jad.2021.05.109>
- Chen, Q., Mao, C., Qi, L., Luo, Y., Yang, G., Wang, L., Liu, C., Zheng, C., Zhang, J., & Fan, C. (2024). Music-based therapeutic interventions for medical school students with emotional regulation and mental health: A pre-post cohort study. *Frontiers in Psychology*, 15, 1401129. <https://doi.org/10.3389/fpsyg.2024.1401129>
- Corbin, C. B., Kulinna, P. H., Dean, M., & Reeves, J. (2013). Wellness Weeks: A Total School Approach for Promoting Physical Activity and Nutrition. *Journal of Physical Education, Recreation & Dance*, 84(6), 35-41. <https://doi.org/10.1080/07303084.2013.808128>
- Janurik, M., & Józsa, K. (2022). Long-Term Impacts of Early Musical Abilities on Academic Achievement: A Longitudinal Study. *Journal of Intelligence*, 10(3). <https://doi.org/10.3390/jintelligence10030036>
- Law, L. N. C., & Zentner, M. (2012). Assessing Musical Abilities Objectively: Construction and Validation of the Profile of Music Perception Skills. *PLoS ONE*, 7(12). <https://doi.org/10.1371/journal.pone.0052508>
- Lovibond, S. H., & Lovibond, P. F. (1995). *Manual for the Depression Anxiety Stress Scales* (2nd. Ed.). Sydney: Psychology Foundation.
- Muyor-Rodríguez, J., Caravaca-Sánchez, F., & Fernández-Prados, J. S. (2021). Covid-19 fear, resilience, social support, anxiety, and suicide among college students in Spain. *International Journal of Environmental Research and Public Health*, 18(15). <https://doi.org/10.3390/ijerph18158156>
- Perlovsky, L., Cabanac, A., Bonniot-Cabanac, M. C., & Cabanac, M. (2013). Mozart effect, cognitive dissonance, and the pleasure of music. *Behavioural Brain Research*, 244, 9-14. <https://doi.org/10.1016/j.bbr.2013.01.036>
- Ponce de León, L., & Del Olmo, M. J. (2021). Diseño e implementación de un programa de musicoterapia de improvisación en un conservatorio de música. Análisis de las percepciones de los participantes. *Revista Electrónica Complutense de Investigación en Educación Musical*, 18, 217-233. <http://dx.doi.org/10.5209/reciem.69085>
- Sun, J. (2022). Exploring the Impact of Music Education on the Psychological and Academic Outcomes of Students: Mediating Role of Self-Efficacy and Self-Esteem. *Frontiers in Psychology*, 13, 1-13. <https://doi.org/10.3389/fpsyg.2022.841204>
- Vigl, J., Talamini, F., & Zentner, M. (2023). Melody for the mind: Enhancing mood, motivation, concentration, and learning through music listening in the classroom. *Music & Science*, 6(2), 1-13. <https://doi.org/10.1177/20592043231214085>
- Wang, F., Huang, X., Zeb, S., Liu, D., & Wang, Y. (2022). Impact of Music Education on Mental Health of Higher Education Students: Moderating Role of Emotional Intelligence. *Frontiers in Psychology*, 13(June). <https://doi.org/10.3389/fpsyg.2022.938090>
- Wuthrich, V. M., Belcher, J., Kilby, C., Jagiello, T., & Lowe, C. (2021). Tracking stress, depression, and anxiety across the final year of secondary school: A longitudinal study. *Journal of School Psychology*, 88(July), 18-30. <https://doi.org/10.1016/j.jsp.2021.07.004>
- Zhao, J., & Gao, P. (2025). The role of music in improving academic performance and reducing stress among Chinese youth: a quantitative and qualitative study. *Current Psychology*, 44, 4831-4851. <https://doi.org/10.1007/s12144-025-07526-3>