Submitted: 12th of August 2025
Published: 5th of December 2025
DOI: 10.26775/0P.2025.12.05
ISSN: 2597-324X

# The Impact of Music on Mental Health: A Quantitative Assessment of Well-Being and Academic Performance

Gabreen Randhawa* Collie Conoley†

**Abstract**

This study explored the relationship between musicianship, mental health, and coping strategies in adolescents, with particular emphasis on how music functions as a naturalistic self-regulation tool. Adolescents in academically rigorous environments face elevated mental health challenges, including anxiety, depression, and stress. Music has long been recognized in clinical music therapy practice as both a medium for emotional expression and a coping strategy. However, limited research has examined the role of musicianship in shaping mental health outcomes in high-achieving secondary school students. A cross-sectional, quantitative survey was administered to 87 high school students (grades 9–12) from an academically competitive private school in California. Participants were classified as musicians or non-musicians. Measures assessed psychological well-being, perceived academic impact of mental health, and the use of music as a coping mechanism. Data were analyzed using independent samples t-tests. Musicians reported significantly higher nervousness over the previous four weeks ($p = 0.0003$) and greater use of music to cope with personal problems ($p < 0.001$) compared to non-musicians. No significant group differences were observed for depression indicators, positivity, or perceived balance. Findings suggest that in academically pressured youth, musicianship may be associated with elevated performance-related nervousness but also increased reliance on music for emotional self-regulation. These results hold clinical relevance for music therapists designing interventions for adolescents, highlighting the dual role of music as both a stressor and a coping tool. Future research should incorporate validated measures, diverse populations, and intervention-based designs to inform evidence-based practice.

**Keywords:** mental health, musicality, emotional regulation

## 1 Introduction

Across large, synchronized datasets, executive functions follow a canonical non-linear trajectory, with rapid gains from late childhood to mid-adolescence (~10–15 years) and stabilization to adult-like levels by ~18–20 years. (1-2). Within this period of development, music emerges not only as a form of structured intervention, such as in music therapy, but also as a naturalistic role of musicianship in everyday life. By "naturalistic role," we refer to the ways in which young people engage with music outside of formal therapy settings. Whether through practice, performance, or informal listening, music is part of their lived experience. This perspective emphasizes musicianship as an organically embedded behavior that shapes identity, supports coping, and contributes to resilience. Yet, despite its pervasiveness, this naturalistic role remains underrecognized in research and clinical discussion.

Music therapy research indicates that approximately 21% of adolescents aged 12-17 report experiencing anxiety symptoms, while 13% of high school students are diagnosed with depression, and 15% contemplate suicide (3). In clinical practice, music-based interventions have been shown to foster coping skills, enhance self-regulation, and improve resilience in young people (4). Twin analyses in the ABCD cohort show music engagement is heritable and shares environmental influences with language and executive function, supporting population-scale links beyond small cross-sectional studies (5).

*Fairmont Preparatory Academy, Anaheim, California, USA
†Department of Counseling, Clinical, and School Psychology, University of California, Santa Barbara, USA

Adolescence is a developmental stage characterized by rapid neurological, social, and emotional changes, often compounded by heightened academic demands (1–2). Within this period of transition, music emerges not only as a form of structured intervention, such as in music therapy, but also as a *naturalistic role of musicianship* in everyday life. By "naturalistic role," we refer to the ways in which young people engage with music outside of formal therapy settings—whether through practice, performance, or informal listening—as part of their lived experience. This perspective emphasizes musicianship as an organically embedded behavior that shapes identity, supports coping, and contributes to resilience. Yet, despite its pervasiveness, this naturalistic role remains underrecognized in research and clinical discussion.

While much of the existing literature has focused on structured, therapist-led interventions, fewer studies have examined the naturalistic role of musicianship as it relates to mental health in real-world, academically demanding contexts. (6). A longitudinal study by Janurik and Jozsa investigated the predictive role of musical abilities on future success over a seven-year period. Their findings suggest that early rhythmic training and musical exposure facilitate the development of core skills that positively influence long-term academic achievement (7).

The impact of music on emotional regulation and stress reduction in adolescents is notable. Studies have shown that music listening activates brain regions associated with reward processing, such as the medial orbitofrontal and ventromedial prefrontal cortices (8). This engagement with music can serve as a coping mechanism for emotions, helping to alleviate stress and enhance mood (9). Cognitive benefits of musical training are also well-documented. Music education has been associated with improvements in memory, attention, and learning. These cognitive enhancements may contribute to better academic performance and increased ability to manage academic pressures (10). Additionally, music education has been linked to improved emotional intelligence, which can help adolescents navigate challenges and maintain psychological stability (11).

Despite the extensive body of research on youth mental health, much of the existing literature focuses on socio-cognitive, socio-somatic, socio-emotional, or cognitive-reflective frameworks. While these studies provide valuable insights, their interventions are often conducted under highly controlled conditions, limiting their applicability to real-world contexts. Furthermore, few studies have specifically examined the role of musical talent as a naturalistic factor influencing mental health, particularly within the context of academically rigorous environments. The present study investigates the mental health profiles and coping behaviors of musicians and non-musicians in a high-achieving secondary school, with the aim of generating insights that can guide adolescent-focused music therapy practice.

## 2 Methods

### *2.1 Design*

The study was conducted at the Fairmont Private School which is a five campus school located in Orange County, California. Ethical approval for the study was obtained from Fairmont Schools, and all procedures adhered strictly to institutional ethical guidelines to ensure the integrity and welfare of participants. The study was deidentified, anonymous and conducted as a digital survey.

Musicians were designated as the independent variable, while the mental health status of non-musician students served as the dependent variable. The experimental framework was chosen to explore these dynamics within the Fairmont Preparatory School population systematically. A comprehensive survey targeting a diverse demographic allowed for a compassionate assessment of the mental well-being of both musicians and non-musicians within a shared academic environment.

### *2.2 Participants*

The study sample consisted exclusively of students from Fairmont Preparatory School, spanning grades 9 through 12. Participants were selected through a random sampling process, resulting in 87 student responses. The demographic composition of the sample was predominantly Asian, which is noteworthy as cultural factors may contribute to elevated stress levels compared to broader high school populations. This demographic characteristic was considered in interpreting the findings, as it may influence both mental health outcomes and academic pressures.

## 2.3 Materials

Given no prior survey measure exists, survey questions were designed with close ended questions to provide quantitative outcomes. Word choice was restricted to limit particular musical genre bias or academic interest bias. See Table 1 for the survey assessment tool. To facilitate data collection, a technology-driven student survey was developed to assess three key domains: mental health status, academic performance, and musicians' level of commitment to their craft. Mental health status was measured using a Likert scale ranging from 1 (poor) to 5 (excellent). After data collection, Microsoft Excel was used for statistical analysis, including calculating averages and determining the significance of differences between musicians and non-musicians. This approach ensured a robust and efficient analysis of the collected data, providing insights into the potential influence of musical engagement on mental health outcomes.

**Table 1:** Survey questions and answer options

| Question | Answer options |
|---|---|
| Are you male/female? | Male, Female |
| What is your school name? (Full name of School?) | Freetext response |
| What is your school's highest GPA level? (Example: 4-point GPA is highest in some schools but a 5-point GPA is highest in others.) | Freetext response |
| What is your unweighted GPA range? | 2.7–3.0, 3.1–3.3, 3.4–3.7, 3.8–4.0, 4.1–4.3, 4.4–4.7, 4.8–5.0 |
| How many hours do you devote to your academics per day outside of school? | 30 minutes or less, 1–2 hours, 2–3 hours, 3–4 hours, 4+ hours |
| How many absences do you typically receive within a year? | 0–20, 21–40, 41–60, 61–80, 81–100, 100+ |
| In the last 4 weeks, have you been nervous? | None of the time, 1, 2, 3, 4, 5, All of the time |
| In the last 4 weeks, have you felt so down in the dumps nothing could cheer you up? | None of the time, 1, 2, 3, 4, 5, All of the time |
| Lately, have you felt downhearted and depressed in general? | None of the time, 1, 2, 3, 4, 5, All of the time |
| During the past 4 weeks, how often has your mental health affected your ability to get work done? | None of the time, 1, 2, 3, 4, 5, All of the time |
| How often do you feel positive about your life? | None of the time, 1, 2, 3, 4, 5, All of the time |
| Within the last 4 weeks have you felt balanced, where you are not feeling overwhelmed or too relaxed? | None of the time, 1, 2, 3, 4, 5, All of the time |
| Do you have trouble relaxing? | None of the time, 1, 2, 3, 4, 5, All of the time |
| Do you play an instrument? | Yes, No |
| How long have you been playing music? | less than a year, 1–2 years, 3–4 years, 4–5 years, 5+ years, Never |
| Does music in general allow you to relax? | 1 – Never, 2 – Almost Never, 3 – Sometimes, 4 – Fairly Often, 5 – Very Often |
| Do you practice music daily? | 1 – Never, 2 – Almost Never, 3 – Sometimes, 4 – Fairly Often, 5 – Very Often |
| When you practice, how much time do you usually spend on your instrument? | 15–30 minutes, 30 minutes–1 hour, 1–2 hours, 3–4 hours, 4+ hours, Never |
| During your practice time, do you work on the hard details? | 1 – Never, 2 – Almost Never, 3 – Sometimes, 4 – Fairly Often, 5 – Very Often |

| Question | Answer options |
|---|---|
| Does listening to music help you with your personal problems? | 1 – Never, 2 – Almost Never, 3 – Sometimes, 4 – Fairly Often, 5 – Very Often |
| What is your favorite type of music? | Classical, Rock, Pop, Jazz, Other, IDK/ I don't like music |

### 2.4 Statistical Analysis

All statistical analyses were conducted using Student's independent samples t-test to compare mean differences between musicians and non-musicians for each survey question. The t-test was chosen due to its suitability for assessing differences between two independent groups with approximately normal distributions.

Descriptive statistics, including mean ($M$), standard deviation ($SD$), and standard error of the mean ($SEM$), were calculated for both groups. Sample sizes ($N$) were equal or nearly equal across groups, ensuring appropriate power for the comparisons. Assumptions of normality and homogeneity of variances were evaluated using Shapiro-Wilk tests and Levene's test for equality of variances, respectively. In cases where Levene's test indicated unequal variances, Welch's t-test was applied to adjust for heteroscedasticity.

All statistical tests were two-tailed, with an $\alpha$ level of 0.05 set as the threshold for statistical significance. Effect sizes were calculated using Cohen's $d$ to assess the magnitude of group differences. Statistical analyses were performed using SPSS statistical software.

## 3 Results

### 3.1 Demographic Information

Table 2 presents the demographic characteristics of the musician and non-musician groups, including gender, self-reported GPA, school attendance, and daily hours of academic study

**Table 2:** Survey assessment tool

| Characteristic | Musicians ($n = 36$) | Non-Musicians ($n = 31$) | Total ($N = 67$) |
|---|---|---|---|
| **Gender** | | | |
| Male, n (%) | 22 (58.3%) | 13 (48.4%) | 41 (53.7%) |
| Female, n (%) | 12 (41.7%) | 13 (51.6%) | 36 (46.3%) |
| **Self-Reported GPA** | 3.63 ± 0.31 | 3.52 ± 0.33 | — |
| GPA Range | 3.1–4.0 | 3.1–4.0 | — |
| **Hours of Study/Day** | 2.66 ± 1.9 | 2.37 ± 2.1 | — |
| Study Hours Range | 0.5–4.0 | 0.5–4.0 | — |

**Table 3:** Differences between musicians and non-musicians on measures of psychological well-being and music-related coping

| Question | Group | M | SD | SEM | n |
|---|---|---|---|---|---|
| **A. Nervousness (past 4 weeks)** | Musicians | 3.29 | 1.23 | 0.19 | 41 |
| | Non-Musicians | 2.32 | 1.04 | 0.16 | 41 |

| Question | Group | M | SD | SEM | n |
|---|---|---|---|---|---|
| **B. Down in the dumps (nothing could cheer up)** | Musicians | 2.62 | 1.43 | 0.23 | 39 |
| | Non-Musicians | 2.51 | 1.19 | 0.19 | 39 |
| **C. Downhearted and depressed** | Musicians | 2.82 | 1.47 | 0.23 | 39 |
| | Non-Musicians | 2.67 | 1.42 | 0.23 | 39 |
| **D. Mental health impact on work** | Musicians | 3.05 | 1.36 | 0.22 | 39 |
| | Non-Musicians | 3.38 | 0.88 | 0.14 | 39 |
| **E. Positivity about life** | Musicians | 3.03 | 1.03 | 0.16 | 40 |
| | Non-Musicians | 2.73 | 0.93 | 0.15 | 40 |
| **F. Feeling balanced** | Musicians | 2.69 | 1.17 | 0.19 | 39 |
| | Non-Musicians | 2.74 | 1.23 | 0.20 | 39 |
| **G. Music helps with personal problems** | Musicians | 3.7 | 1.3 | 0.21 | 40 |
| | Non-Musicians | 1.5 | 0.22 | 0.03 | 40 |

The maximum number of student responses were collected from each group. Some students did not complete some answers. No clear pattern in absent results occurred indicating occasional oversight by survey recipients. Independent samples Student's t-tests were conducted to examine differences between musicians and non-musicians on measures of psychological well-being and music-related coping. Descriptive statistics, including means ($M$), standard deviations ($SD$), and standard errors of the mean ($SEM$), are presented in Table 3. Standardized group differences (Hedges' $g$) showing effect sizes and 95% confidence intervals for mental-health and coping outcomes among musicians compared to non-musicians are shown in Figure 1.

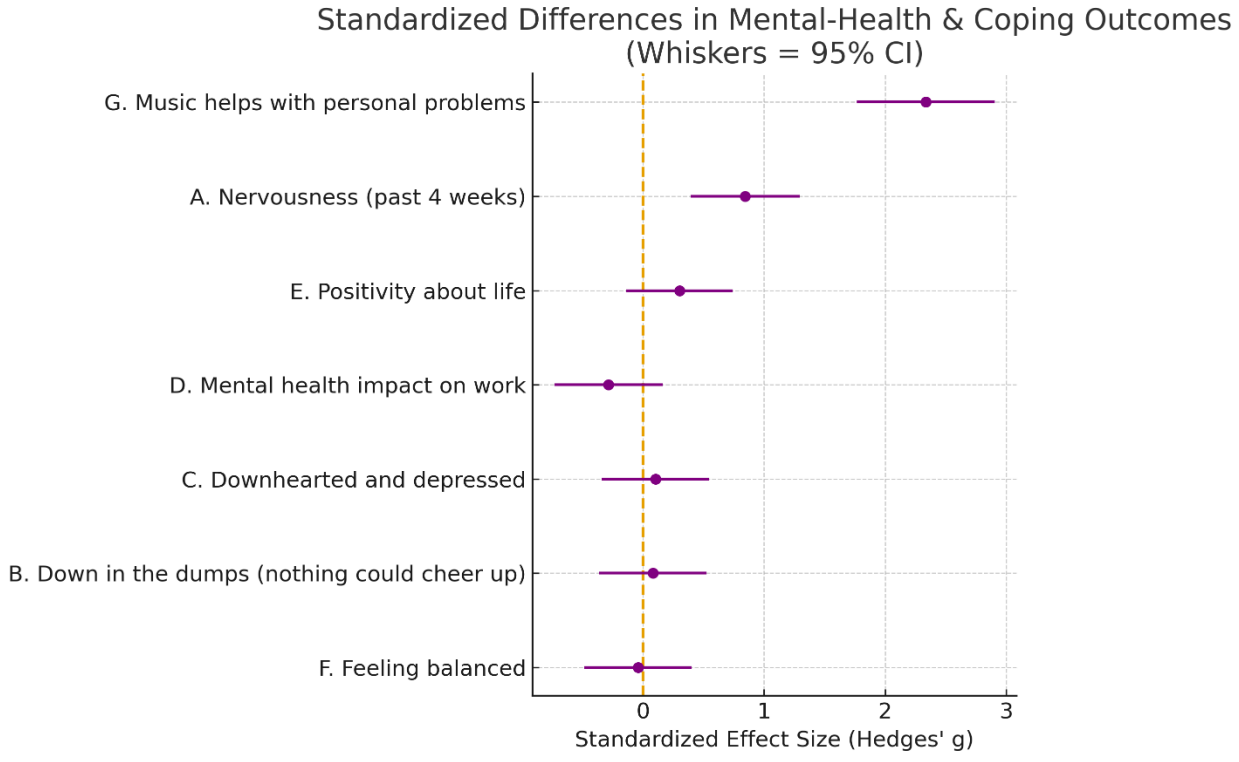


**Figure 1:** Standardized group differences (Hedges' $g$) showing effect sizes and 95% confidence intervals for mental-health and coping outcomes among musicians compared to non-musicians.

Correlation analysis showed musicianship was positively associated with nervousness ($r = .389$, $p < .001$). Daily practice was also positively correlated with nervousness ($r = .368$, $p = .001$). Other pairwise associations were

small. PCA supported a moderately unidimensional structure: PC1 explained 45.2% of variance; loadings were strongest for A–C (.48–.56), modest for D (.27), negative for E (−0.28), and near zero for F. Regression models controlling for GPA found no significant group effects on the PC1 factor score or most individual outcomes. Among musicians, daily practice did not predict distress once GPA was included. However, higher-GPA musicians reported less reliance on music for personal problems ($b = -2.36$, $p = .023$). Residual diagnostics indicated non-normality for Likert outcomes but generally acceptable homoscedasticity.

## 3.2 Mental Health Outcomes

### 3.2.1 Nervousness (Question A)

Musicians ($M = 3.29$, $SD = 1.23$) reported significantly higher levels of nervousness over the past four weeks compared to non-musicians ($M = 2.32$, $SD = 1.04$), $t(80) = 3.97$, $p = 0.0003$, indicating a moderate effect size and a statistically significant difference.

### 3.2.2 Feeling Down in the Dumps (Question B)

There was no statistically significant difference in reports of feeling "down in the dumps" between musicians ($M = 2.62$, $SD = 1.43$) and non-musicians ($M = 2.51$, $SD = 1.19$), $t(76) = 0.329$, $p = 0.743$, indicating no statistically significant difference.

### 3.2.3 Downhearted and Depressed (Question C)

Musicians ($M = 2.82$, $SD = 1.47$) and non-musicians ($M = 2.67$, $SD = 1.42$) reported similar levels of feeling downhearted and depressed, with no statistically significant difference, $t(76) = 0.448$, $p = 0.657$, indicating no statistically significant difference.

### 3.2.4 Mental Health Impact on Work (Question D)

Non-musicians ($M = 3.38$, $SD = 0.88$) reported slightly greater interference of mental health with work performance than musicians ($M = 3.05$, $SD = 1.36$), but the difference was not statistically significant, $t(76) = 1.35$, $p = 0.185$.

### 3.2.5 Positivity About Life (Question E)

Musicians ($M = 3.03$, $SD = 1.03$) reported slightly higher levels of feeling positive about life compared to non-musicians ($M = 2.73$, $SD = 0.93$), though this difference did not reach statistical significance, $t(78) = 1.41$, $p = 0.166$.

### 3.2.6 Feeling Balanced (Question F)

There was no significant difference in feelings of balance between musicians ($M = 2.69$, $SD = 1.17$) and non-musicians ($M = 2.74$, $SD = 1.23$), $t(76) = 0.179$, $p = 0.861$, indicating no statistically significant difference.

### 3.2.7 Music as a Coping Mechanism (Question G)

Musicians ($M = 3.70$, $SD = 1.30$) were significantly more likely to use music to cope with personal problems than non-musicians ($M = 1.50$, $SD = 0.22$), $t(78) = 12.42$, $p < 0.001$, reflecting a large effect size and a statistically significant difference.

### 3.3 *Robustness Analysis*

Adjusted comparisons for each dependent variable are summarized in Table 4, which illustrates consistent patterns between musicians and non-musicians across multiple mental-health and emotional outcomes as represented by MH_FactorScore_PC1 scores. Since we compared musician/non-musician groups on multiple outcomes, we used Bonferroni correction of p-values for multiple comparisons.

**Table 4:** Group Comparisons Across Mental Health and Emotional Outcomes (Adjusted Analysis)

| Dependent Variable | Mus mean | Mus SD | *n* Mus | Non mean | Non SD | *n* Non | Cohen *d* | CI95 lower | CI95 upper | *p* uncorrected | *p* Bonferroni |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Question A – Nervousness | 3.338 | 1.227 | 43 | 2.365 | 1.099 | 42 | 0.835 | 0.384 | 1.285 | 0 | 0.002 |
| Question B – Down in the Dumps | 2.713 | 1.452 | 43 | 2.536 | 1.171 | 42 | 0.134 | -0.298 | 0.566 | 0.537 | 1 |
| Question C – Downhearted and Depressed | 2.927 | 1.470 | 43 | 2.706 | 1.384 | 42 | 0.155 | -0.277 | 0.587 | 0.477 | 1 |
| Question D – Mental Health Impact on Work | 3.118 | 1.331 | 43 | 3.414 | 0.855 | 42 | -0.264 | -0.697 | 0.170 | 0.226 | 1 |
| Question E – Positivity About Life | 3.070 | 1.033 | 43 | 2.755 | 0.931 | 42 | 0.320 | -0.114 | 0.755 | 0.143 | 1 |
| Question F – Feeling Balanced | 2.760 | 1.171 | 43 | 2.780 | 1.200 | 42 | -0.016 | -0.448 | 0.415 | 0.941 | 1 |
| MH_FactorScore_PC1 | 0.184 | 1.917 | 43 | -0.188 | 1.335 | 42 | 0.225 | -0.208 | 0.658 | 0.302 | 1 |

*Note.* MH_FactorScore_PC1 refers to the first principal component representing overall mental health. "Mus" denotes musicians and "Non" denotes non-musicians. Values represent adjusted means and standard deviations (*SD*) for each group, with significance levels corrected for multiple comparisons.

## 4 Discussion

This study explored differences in mental health indicators between adolescent musicians and non-musicians in a high-pressure academic setting, with a particular emphasis on the naturalistic use of music as a coping tool. The results show two key findings: first, musicians reported significantly higher levels of nervousness than non-musicians; second, they reported a much greater tendency to use music to address personal problems. Although no statistically significant differences emerged in measures of depression, positivity, or perceived balance, the pattern of results highlights important considerations for music therapy practice.

The survey grouped multiple responses toward perception of depression, work-life balance, and coping strategies. The study clearly targeted high achieving academic students in both groups. The differentiation of musicians reporting higher levels of nervousness than non-musicians is of interest. Music performance anxiety is well described in this group (12). The heightened anxiety levels in musicians are associated with the pressure of public scrutiny and evaluation and high overall performance standards.

Alternatively, our study revealed the same group with increased anxiety/nervousness tied to musical performance utilizes music as a coping mechanism. This mechanism has only been reported in a recently published survey amongst experienced musicians. Listening to music, mental rehearsal, and increased practice are known to improve specific music performance anxiety (13-14). However, perhaps in this small cohort, early evidence suggests an underlying cognitive mechanism of musical engagement to combat general anxiety and stress of an academic lifestyle.

Beyond the group mean differences, the correlation and PCA results suggest a coherent "distress" dimension across several items (A–C), with "positivity" loading inversely and "balance" contributing minimally to the common factor. The positive association between daily practice and nervousness at the bivariate level likely reflects that students most engaged in musicianship—and most exposed to evaluative performance—also report more arousal/anxiety; within musicians, however, daily practice did not independently predict distress once GPA was included. The finding that higher-GPA musicians reported slightly less reliance on music for personal problems may index a broader repertoire of coping strategies in the most academically advanced subgroup.

Replication with validated scales, complete GPA data, and ordinal/robust modeling would help adjudicate these patterns.

Recent genetically informed and longitudinal research has challenged straightforward causal interpretations of music's effects on cognition and mental health. Mosing et al. demonstrated that when controlling for familial liability, associations between musicianship and mental health largely disappeared, indicating that shared genetic or environmental factors likely account for much of the observed relationship (15). Likewise, a cotwin-control analysis found no evidence that early music training causally enhances later verbal ability (16). These findings highlight the necessity of considering familial and genetic confounds when evaluating associations between music engagement and cognitive or emotional outcomes—factors that were not examined in the present study.

Additional limitations of this study include the small sample size, the cultural homogeneity of the participants, and the use of a non-validated survey tool. These factors restrict generalizability but also point to future research directions. Subsequent studies should employ validated mental health measures, diversify participant demographics, and test targeted music therapy interventions for adolescent musicians and non-musicians. Such work could illuminate how clinical music therapy can optimize music's natural coping potential while addressing potential performance-related stressors.

## 5 Conclusion

This study offers preliminary evidence that musicians in academically rigorous environments experience both heightened nervousness and a greater reliance on music for coping. For music therapists, these findings support the development of interventions that acknowledge and address the dual nature of music engagement in adolescent populations, leveraging music's therapeutic potential while mitigating its performance-related stressors. Larger studies with validated survey tools and population-genetic measures are needed to support our findings.

## 6 Acknowledgements / Funding

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors. The author(s) declare that there are no conflicts of interest with respect to the research, authorship, and/or publication of this article.

## 7 Data Availability

The dataset generated and analyzed during the current study is not publicly available due to privacy and institutional restrictions but is available from the corresponding author on reasonable request.

## References

1. Tervo-Clemmens, B., Calabro, F. J., Parr, A. C., et al. (2023). A canonical trajectory of executive function maturation from adolescence to adulthood. *Nature Communications*, 14, 6922. doi: https://doi.org/10.1038/s41467-023-42540-8

2. Patel, V., Flisher, A. J., Hetrick, S., & McGorry, P. (2007). Mental health of young people: A global public-health challenge. *The Lancet*, 369(9569), 1302–1313. doi: https://doi.org/10.1016/S0140-6736(07)60368-7

3. Merikangas, K. R., He, J. P., Burstein, M., et al. (2010). Lifetime prevalence of mental disorders in U.S. adolescents: Results from the NCS-A. *Journal of the American Academy of Child & Adolescent Psychiatry*, 49(10), 980–989. doi: https://doi.org/10.1016/j.jaac.2010.05.017

4. McLeod, J. D., Uemura, R., & Rohrman, S. (2012). Adolescent mental health, behavior problems, and academic achievement. *Journal of Health and Social Behavior*, 53(4), 482–497. doi: https://doi.org/10.1177/0022146512462888

5. Gustavson, D. E., Nayak, S., Coleman, P. L., et al. (2023). Heritability of childhood music engagement and associations with language and executive function. *Behavior Genetics*, 53, 189–207. doi: https://doi.org/10.1007/s10519-023-10135-0

6. Hallam, S. (2010). The power of music: Its impact on the intellectual, social and personal development of children and young people. *International Journal of Music Education*, 28(3), 269–289. doi: https://doi.org/10.1177/0255761410370658

7. Janurik, M., & Józsa, K. (2022). The role of music perception skills in predicting later success in school. *International Journal of Music Education*, 40(2), 185–201. doi: https://doi.org/10.3390/jintelligence10030036

8. Fasano, M. C., Cabral, J., Stevner, A., et al. (2023). The early adolescent brain on music: Analysis of functional dynamics reveals engagement of orbitofrontal cortex reward system. *Human Brain Mapping*, 44(2), 429–446. doi: https://doi.org/10.1002/hbm.26060

9. Chen, L. (2023). Influence of music on the hearing and mental health of adolescents and countermeasures. *Frontiers in Neuroscience*, 17, 1236638. doi: https://doi.org/10.3389/fnins.2023.1236638

10. Zaatar, M. T., Alhakim, K., Enayeh, M., & Tamer, R. (2023). The transformative power of music: Insights into neuroplasticity, health, and disease. *Brain, Behavior, & Immunity – Health*, 35, 100716. doi: https://doi.org/10.1016/j.bbih.2023.100716

11. Rodwin, A. H., Shimizu, R., Travis, R. Jr., James, K. J., Banya, M., & Munson, M. R. (2022). A systematic review of music-based interventions to improve treatment engagement and mental health outcomes for adolescents and young adults. *Child and Adolescent Social Work Journal*, 1–30. doi: https://doi.org/10.1007/s10560-022-00893-x

12. Fernholz, I., Mumm, J. L. M., Plag, J., et al. (2019). Performance anxiety in professional musicians: A systematic review. *Psychological Medicine*, 49(14), 2287–2306. doi: https://doi.org/10.1017/S0033291719001910

13. Taipala, M., Peltola, H.-R., Saarikallio, S., Minkkinen, G., Randall, W. M., & Carlson, E. (2024). Music listening for self-management of anxiety: A qualitative survey. *Music & Science*, 7. doi: https://doi.org/10.1177/20592043241264424

14. Herman, R., & Clark, T. (2023). It's not a virus! Reconceptualizing and de-pathologizing music performance anxiety. *Frontiers in Psychology*, 14, 1194873. doi: https://doi.org/10.3389/fpsyg.2023.1194873

15. Mosing, M. A., et al. (2019). Practice does not make perfect: No causal effect of music practice on music ability and well-being. *Scientific Reports*, 9, 11011. doi: https://doi.org/10.1038/s41598-019-49099-9

16. Mosing, M. A., et al. (2021). The cotwin-control design reveals no causal effect of early music training on verbal ability at age 18. *Psychological Science*, 32(10), 1575–1585. doi: https://doi.org/10.1177/09567976211024880