

## **Study Protocol and Statistical Analysis Plan**

**Unique Protocol ID:** REC/24-25/0141

**Brief Title:** Continuous Music and Sports Training for Children

**Official Title:** JC Project MuSE: Continuous Music and Sports Training for Primary School Children

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## **Abstract**

JC Project MuSE is a multi-year project aimed at initiating transformative changes in the lives of young learners in schools with a lower socio-economic background through the integration of music and sports education. The research project posits that engaging in structured music and sports programmes can lead to significant improvements in educational performance through the enhancement of executive functions. The research further explores the longitudinal effects of continuous music and sports training, examining the impact of these interventions on developing a greater sense of appreciation for these activities in these young learners. This research is a 3-year study that examines theoretical underpinnings, methodological approaches, and the impact of music and sports interventions to empower youth in schools of lower socio-economic background and promote holistic development through the synergistic effects of sports and music education.

## **Background of the Project**

JC Project MuSE is a school-based music (Mu) and sports (S) education (E) programme, initiated and funded by The Hong Kong Jockey Club Charities Trust. The programme offers free, high-quality, and tailored music and sports programmes to primary school children in the most impoverished areas of Hong Kong. It aims to develop children's artistic and physical literacy and to enhance their positive whole-person development, emotional well-being, and academic advancement, thereby endowing them with the best opportunities for future growth and development.

## **Project Aims and Objectives**

The aim of this research is to examine whether there is improved overall youth development through enhanced participation in structured programs (i.e., music and sports) leading to better emotional, cognitive, and social outcomes.

The overall research will study the impact of the sports and music interventions provided in Tier 2, Continuous Music and Sports Training, of the project and aims to bring transformative changes to underprivileged children by enhancing their social, emotional, and cognitive development through sports and music education:

1. foster positive youth character development and enhance physical wellbeing;
2. strengthen educational performance through improved cognitive functions resulting from developing physical and musical skills;
3. increase social opportunities by developing strong social networks;
4. improve exposure to different forms of music and sports with continuous trainings;
5. enhance motivation and appreciation in music and sports participation.

# Methodology

## Study Design

This proposed study adopts a parallel-group, 4-arm randomized controlled trial design. Outcome measures will be assessed on six time-points (T0: Baseline, the start of the first school year; T1: the end of the first school year; T2: the start of the second school year; T3: the end of the second school year; T4: the start of the third school year; and T5: post-intervention, the end of the third school year) to assess the effects of the 3-year continuous music and sports training on the students' psychological well-being, executive functioning, social-emotional competence, and academic performances. Figure 1 presents the CONSORT flow diagram of the present study.

## Participants and Recruitment

Participants are students recruited from local Hong Kong government schools or aided schools with 30% or more of the total student population receiving Comprehensive Social Security Assistance (CSSA) and School Textbook Assistance. All students entering primary 2 to 4 in the 2026/2027 academic year and provided informed consent to participate will be eligible, unless the students present significant physical, psychological, and cognitive comorbidities that will hinder participation in research procedures and the designed interventions of continuous music or sports training. Recruitment will be conducted in each participating school through mass invitations circulating within the schools and conducting parents' workshops. Screening for eligibility will be conducted by the research team at the university and the corresponding staff at each school.

## Sample Size

The study involves multiple outcomes, and the required sample size was estimated by using multivariate analysis of variance global effects, using the power analysis software G\*Power 3.1. We assume an attrition rate of 40% over three years and a relatively small effect size (Cohen's  $d = 0.3$ ). A total size of 620 students (i.e., 155 per arm) will provide 80% statistical power to detect an effect size of 0.3 in the 4-arm RCT at 5% level of significance.

## Group Allocation

Eligible students will be randomly assigned to one of four groups (Continuous Music Training (CMT), Continuous Sports Training (CST), Continuous Music and Sports Training (CMST), and treatment-as-usual (TAU)) on a 1:1:1:1 basis using block randomization with a block size of 4. The allocation list will be generated by an independent research staff. The list will also be concealed from other researchers and participants until the group assignment.

- (a) Continuous Music Training (CMT): Students in this group will receive weekly group class, ensemble class, and guided practice sessions. Optional summer classes will also be available.
- (b) Continuous Sports Training (CST): Students in this group will receive weekly sports training.
- (c) Continuous Music and Sports Training (CMST): Students in this group will receive both continuous music and sports training concurrently.

- (d) Treatment-as-usual (TAU): Students in this group will continue with their routine and will not receive specific continuous music and/or sports training offered by the research team.

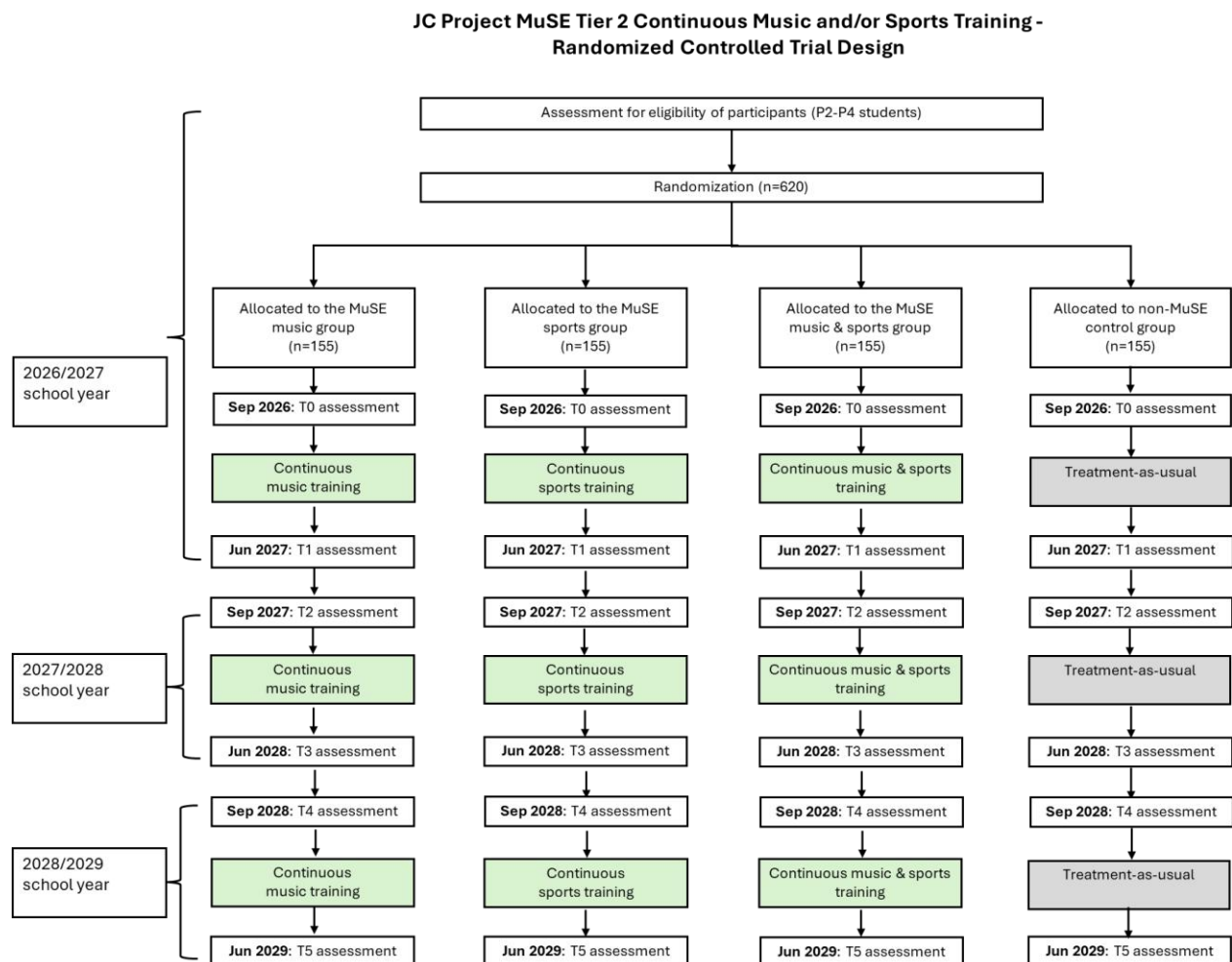
## Treatment Fidelity

All music and sports instructors are qualified instructors with a bachelor's degree or equivalent qualifications in their respective domains – Sports or Music. All instructors will receive training sessions covering the details of the curriculum and other techniques, such as classroom management skills, instrumental pedagogies, teaching eurhythmics, etc. Regular meetings and retreats will also be hosted to support the instructors. Videos were also taken during music lessons for the research team to keep track of the intervention progress and assess the adherence to the curriculum.

## Research Ethics

Ethical approval has been obtained from the Research Ethics Committee at the Hong Kong Baptist University (Reference no. REC/24-25/0141). The protocol of the study will also be registered in the ClinicalTrials.gov under the National Institutes of Health.

Figure 1. The flow diagram of the randomized controlled trial design



## Outcome Indicators and Measurement Tools

Outcome Indicator	Measurement Instrument	Data Collection Timeline
<b>1. Demographic characteristics</b>	<ul style="list-style-type: none"> <li>Demographic characteristics (e.g., age, grade, class, gender, ethnicity, family financial status, education level of the parents, any special educational needs, date of birth, any prior music and/or sports training, any other extra curriculum activities*)</li> <li>*Will collect at each wave of data collection</li> </ul>	-2026/09-10
<b>2. Psychological Well-Being</b>	<ul style="list-style-type: none"> <li>The World Health Organization-Five Well-Being Index (WHO-5) (Lin et al., 2013) <ul style="list-style-type: none"> <li>WHO-5 includes 5 items and items are rated from a 6-point Likert scale, ranging from 0 “at no time” to 5 “all of the time”.</li> </ul> </li> <li>The raw score ranges from 0 to 25 and is converted to a percentage score, ranging from 0 to 100. Higher scores demonstrate a higher level of well-being.</li> </ul>	-2026/09-10 -2027/06-07 -2027/09-10 -2028/06-07 -2028/09-10 -2029/06-07
<b>3. Executive Functioning</b>	<ul style="list-style-type: none"> <li>Childhood Executive Functioning Inventory (CHEXI) (Thorell &amp; Nyberg, 2008; Thorell et al., 2013) <ul style="list-style-type: none"> <li>CHEXI consists of 24 items, rating from a 5-point Likert scale, from 1 “definitely not true” to 5 “definitely true”.</li> <li>CHEXI yields four total scores of 4 subscales, working memory, planning, regulation, and inhibition. Higher scores indicate a higher level of difficulties in executive functioning.</li> </ul> </li> <li>CHEXI will be filled in by parents or guardians of the students who participated.</li> </ul>	-2026/09-10 -2027/06-07 -2027/09-10 -2028/06-07 -2028/09-10 -2029/06-07
<b>4. Social Emotional Competence</b>	<ul style="list-style-type: none"> <li>Devereux Student Strengths Assessment mini Second Edition (DESSA 2 mini) (Aperture Education, 2024) <ul style="list-style-type: none"> <li>DESSA 2 mini consists of 8 items, rating from a 5-Likert scale, from 0 “never” to 4 “very frequently”.</li> <li>DESSA 2 mini yields a social emotional competence score.</li> </ul> </li> </ul>	-2026/09-10 -2027/06-07 -2027/09-10 -2028/06-07 -2028/09-10

	o Alternative forms will be administrated to minimize practice effects.	-2029/06-07
	o DESSA 2 mini will be filled in by teachers of the students who participated.	
<b>5. Academic Performance</b>	• End-of-year report cards and grades	-2026/09-10
	o Assess the scores of the core and related subjects (Chinese Language, English Language, Mathematics, General Studies, Music, Physical Education (Physical Fitness Record (if any))	-2027/07 -2028/07 -2029/07
	o Assess the students' behavioral indicators (conduct, punctuality, and attendance) and teachers' comments	

## Data analysis

Data from the randomized controlled trial will be analyzed using one-way ANOVAs (for scale variables) and Chi-squared tests (for categorical variables) to compare baseline demographic characteristics across the four groups (Continuous Music Training (CMT), Continuous Sports Training (CST), Continuous Music and Sports Training (CMST), and treatment-as-usual (TAU)). The effects of continuous music or sports training will be assessed using linear mixed models (LMMs) for repeated measures to examine time-by-group interactions, controlling potential confounders such as age and grade. Supplementary paired t-tests will be conducted for pairwise comparisons between two time points. All analyses will be performed using statistical software such as SPSS, JASP, or R. Tests will be two-tailed, with statistical significance set at 0.05.

## Considerations

As the participants are under 18 years, informed consent will be collected from the parents or guardians of the students. Student assent forms will also be collected from the students. As data will also be collected from parents and teachers, informed consent will also be obtained from the respective stakeholders.

Part of the participants involved in the randomized controlled trial will be assigned to the control group and will receive no treatment. The research team will explain the procedures with the parents and students clearly to ensure that they understand the procedures of the study.

Consent forms and questionnaires will be collected via paper or web format. Video and/or audio recordings will be involved throughout the research and study process. The research team will ensure that the research data will be stored properly with encryption.

## References

- Aperture Education. (2024). *What you need to know about the DESSA*.  
<https://apertureed.com/research/about-the-dessa/>
- Lin, C. H., Lee, S. M., Wu, B. J., Huang, L. S., Sun, H. J., & Tsen, H. F. (2013). Psychometric properties of the Taiwanese version of the World Health Organization-Five Well-Being index. *Acta psychiatrica Scandinavica*, 127(4), 331. <https://doi.org/10.1111/acps.12040>
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