**Music education program, interpersonal synchrony, subjective well-being, and** **school climate in elementary school children from multicultural schools in Israel.**

In this project, we seek to understand how a music education program could create a positive social effect at multicultural schools in Israel, due to the dilemmas faced by immigrants that are especially frequent in countries such as Israel that have received massive waves of immigration. And how it could increase the level of empathy, subjective wellbeing and advance the school tolerant climate, since there is evidence that empathy is a protective factor against the development of violent behaviors in school children (Castro-Sanchez et al., 2019), and that empathy is flexible and amenable to behavioral interventions (Decety, 2015; Rabinowitch et al., 2013).

Our main question is as follows: Would a nine-month music education program improve interpersonal synchrony skills, the capacity for empathy, subjective wellbeing, and a better school climate for 3th and 5th-grade multicultural students from elementary school children in Israel?

During 2021, around 2,000 children and adolescents made Aliyah from 37 countries with assistance from The Jewish Agency for Israel. Of them, 31 Jewish children made Aliyah with their families in complete secret, in covert operations by the Jewish Agency, from countries with hostile relations with Israel, and started school in 2021 (New Olim Begin School in Israel 2021).

Immigration is a complex phenomenon, which can be voluntary or based on ideology, caused by necessity, such as war or disaster. Mostly immigration brings a change to the immigrant’s way of life (Berry, Phinney, Sam, & Vedder, 2006).

Immigrants face complex dilemmas regarding majority-minority relations, processes of identity formation and maintenance, norms and rules of behavior, and conflicting values of different groups (Goldstein & Laor, 2009).

Immigrants frequently lose their familiar social networks, which are the source of orientation and support for adequate functioning in a society and for personal wellbeing (Slutzki, 1998; Mirsky, 2007). The dilemmas faced for the immigrants are rising in importance in the twenty-first century, due to mass immigration processes all over the world, and are especially frequent in countries such as Israel that have received massive waves of immigration (Cohen, 2002; Raijman, 2019).

School violence in Israel remains high compared to other countries (Brants et al., 2020). Israel has developed a national system to monitor school climate and violence, by applying a survey to principals, teachers, and students (Benbenishty & Astor 2012b). The survey shows that one in every seven pupils in 4th to 6th grade reported severe physical violence from other pupils in school (Craig et al., 2007) and that marginalized or minority youth populations are at an even higher risk of violence (Erhard et al., 2008; López et al., 2018).

Immigrants children can learn how to cope with the adversities they faced and they can start building their own future, making meaning in their current social context through properly designed educational programs that support wellbeing (Shallow and Whitington, 2014; Nijs 2021). Recently, it has been underscored the importance of subjective well-being among children as a relevant component of overall well-being (Ben-Arieh & Shimon, 2014).

Israel is committed to the successful integration of those arriving under the Law of Return. The newcomers have access to specific integration policies and programs, including financial assistance during their first stage in Israel, free Hebrew instruction for adults (ulpan), and some special programs at schools (Raijman, 2020). However still is a great need in creating intervention programs and policies that are based on rigorous scientific evidence (Astor et al., 2009; Eisner et al., 2016).

**Music education programs and social-emotional capacities in elementary school children**

Social interactions are essential for social-emotional development during childhood, allowing children to understand the emotions, intentions, and actions of others (DeJaegher et al., 2010; Frith & Frith, 2007; Ilari, 2016). As children grow, they progressively discover ways to interact with others, and music has a relevant role in this process (Ilari, 2009; Ilari, 2016). Additionally, teachers can create safe spaces where children can experience personal wellbeing and engage in "Musicking" (Mouton & Moreli, 2021). Small (1998) suggests that "Musicking" can be considered as a verb, rather than a noun, which includes interpreting, listening, and moving to the rhythm of music (Mouton & Moreli, 2021). Indeed, when musicking, children perceive other children as cooperative and similar to themselves (Kirschner & Tomasello, 2010; Ilari, 2016). Group music education in early and middle childhood may positively affect self-esteem (Rickard et al., 2012), the sense of inclusion and belonging (Welch et al., 2014), and empathy (Rabinowitch et al., 2013).

A Kodaly music intervention program for elementary school children based on singing increased the children's overall self-esteem (Rickard et al., 2012). Also, another music program consisting of singing for elementary-aged children increased children’s sense of inclusion and belonging (Welch et al., 2014).

An extended music education program, consisting of singing in a choir or ensemble performance had a positive effect on the social aspects of schooling, especially in general satisfaction with the school (Eerola & Eerola, 2014). Furthermore, involvement in a musical group interaction program for children in elementary school increased their capacity for emotional empathy (Rabinowitch et al., 2013).

The Empathic process presumably has shared underlying mechanisms with musical interaction, including sharing affective experiences, imitation, and being synchronous and collaborative (Rabinowitch et al., 2013). Empathy originates and develops early in life and has been shown to be amenable to behavioral interventions (Decety, 2015). A recent study on school children aged 10–12 years demonstrated a negative relationship between affective empathy and relational aggression (Castro-Sanchez et al., 2019). These findings suggest that the level of empathy is a protective factor against the development of violent behaviors in school children (Castro-Sanchez et al., 2019; Wu et al., 2021). One of the mechanisms proposed to link music and social behaviour is synchronization, which is essential for making music together with other individuals (Rabinowitch et al., 2013). Interpersonal synchrony, which is an important component of musical interaction, is achieved when the movements of one person become temporally aligned with the movements of another person or persons (Cirelli et al., 2018). Rabinowitch & Meltzoff (2017) have demonstrated that swinging 4-year-old children together in synchrony increased their cooperative behaviour when compared to swinging asynchronously or not swinging at all. Furthermore, synchronous tapping enhanced 8-year-olds’ judgements of their perceived similarity and closeness to each other (Rabinowitch & Knafo-Noam, 2015).

The integration of perception and synchrony of body movements with rhythm (Phillips- Silver et al., 2010) is developed during infancy and childhood (Kirschner & Ilari, 2014). In addition, there are individual differences in children's rhythmic synchronization abilities, which are influenced by formal music education (Drake et al., 2000), culture (Kirschner & Ilari, 2014), and social context (Eerola et al. 2006). Considering the above, to design musical education activities as a joint activity would seem to be advantageous for fostering a positive and socially constructive environment, especially for children (Overy, 2012; Rabinowitch, 2020). Finally, longitudinal research is necessary to unravel the impact of music education on children’s social and emotional development. Taken together, the proposed study will be the first of its kind to explore how music education program for elementary school children, from an embodied perspective, might positively influence the subjective wellbeing and empathy through group behavioral synchrony.

Hypothesis:

A music education program for children from multicultural elementary schools in Israel will improve children’s interpersonal synchrony skills, their capacity for empathy, subjective wellbeing and school climate.

Specific objectives:

* To evaluate group interpersonal synchrony between school children from intervention and control groups.
* To evaluate the capacity for empathy and wellbeing between school children from intervention and control groups.
* To evaluate school climate between school children from intervention and control groups.

**Methodology:**

The design will be longitudinal in the form of a randomized control trial (RCT), with an experimental group (musical intervention), an active control group (visual arts), and a baseline group (no intervention; for the timeline see Figure 2). We will repeat all the evaluations one year after the end of the interventions.

**Participants:**

Children in 3th and 5th grade will be recruited through local schools in Israel and informed consent will be asked from parents or caregivers. We used GPower software to calculate the sample (Faul, Erdfelder, Lang, & Buchner, 2007) Effect size=.25, α err prob=.05, Power=.95 N = 198.

All the participants will be divided into three groups, and randomly assigned to either the music intervention group, the visual arts group or the baseline group.

**Interventions:**

The music group will be conducted as an extracurricular activity of 1-hour long, weekly for nine months in a room that will allow enough space for children to freely move around. The music intervention will be conducted in learning sequence activities through improvisation, body movement, singing, and playing percussion instruments.

Students will learn to identify various tonalities, meters, and rhythms (Gordon, 2007). We will use in all sessions an embodied perspective of music learning with body movement and group musical activities. Through specific tasks, students will be invited to select possible creative movement responses to the music. We will then progressively add activities as playing percussion instruments from an Orff's orchestra approach. The Orff approach is a method of teaching music that engages children through a mixture of singing, movement, and the use of percussion instruments like xylophones, metallophones, and glockenspiels (http://aosa.org/) (see Figure 1). In all sessions, the students will be encouraged to play, sing, and move together as a team.

For the visual arts group, the activities will consist of visual arts extracurricular activities. Activities will be developed through different techniques as drawing, painting, sculpture, crafts, etc. All of the activities will be elaborated as group creative arts activities where each of the children will play a central role in the activity. For example, children will be asked to create a sculpture of an animal. To achieve that goal, they will have to agree on the animal they will create, work as a team, and then report their experience.

The baseline group will not receive any extracurricular activity and will only be tested before the start, after the end of the music and visual arts interventions, and one year after as a retention study



**Figure 1.** Playing percussion instruments in an Orff's orchestra methodology. Extracted from https://www.youtube.com/watch?v=mmuABvcyyoY.

**Procedure:**

Before recruitment we will pilot all the tests. Once recruited, each group will undergo pre-intervention evaluations, which will be followed by the intervention program for the music and visual arts groups, followed by post-intervention evaluations. After one year of the post-intervention evaluations, we will perform a retention study, repeating all the evaluations.

**2 weeks**

**2 weeks**

**9 months**

 **2 weeks**

**Recruitment**

**Pre-intervention evaluations:**

**Pilot phase**

Behavioral group synchronization

Empathy (Bryant's Empathy Index)

Survey of Children’s Well-Being

School climate (Standardized self-assessment measure of QSL)

**Figure 2.** Research proyect timeline

**Intervention:**

Musical intervention

Visual art intervention

No intervention

**Post-intervention evaluations:**

Behavioral group synchronization

Empathy (Bryant's Empathy Index)

Survey of Children’s Well-Being

School climate (Standardized self-assessment measure of QSL)

**1 year post- evaluations**

Behavioral group synchronization

Empathy (Bryant's Empathy Index)

Survey of Children’s Well-Being

School climate (Standardized self-assessment measure of QSL)

**Measures**

**Synchronization.** Movement data for each participant will be collected using an accelerometer app installed on a mobile phone (Ellamil, et al. 2016) placed in a running belt centered on the waist. (v1.3.7; Vieyra Software). The task will be video recorded.

**Sociodemographic characterization questionnaire**, which will also include information on some previous conditions of each child, such as diagnoses associated with language, hearing, visual, motor disorders, as well as the medications they are taking. This information will not be used to exclude any participant, but it will be used for further analysis. Besides, questions about the musical experience of each child and their families will be included.

**Bryant's Empathy Index (Bryant, 1982):** This measure uses a 3-point scale, consists of 22 items related to emotional empathy (e.g., “People who kiss and hug in public are silly”; “It’s hard for me to see why someone else gets upset”). The instrument has a 3-point scale of agreement versus disagreement (1 = very strong disagreement to 3 = very strong agreement). Items are very short and of low meaning complexity, which facilitated children’s understanding.

**Survey of Children’s Well-Being (www.isciweb.org).** It is a quantitative measurement approach to exploring children's points of view. It is a self-administered survey that uses a questionnaire that children fill out. Due to the differences between children of different ages, the basic questionnaire was adapted for three age groups - 8 years old, 10 years old, and 12 years old.

**Standardized self-assessment measure of QSL (Linnakylä & Malin,1997; Eerola & Eerola, 2014)**. This instrument contains 29 items spanning six factors: general satisfaction for school (G), teacher-student relations (T), status in class (S), identity in class (I), achievement and opportunity (A) and negative affect (N). In order to evaluate effects of affiliation and pro-social and collaborative action, five new items were added to form a new factor called the classroom climate (C)

**Data analysis:**

All statistical analysis will be performed with R (v4.0.2, 2020) and RStudio (v1.0.153, 2016).

For rhythmic skills we will filter the signal and then transform it to phase angles. Each frequency sub-band time courses will be extracted from its corresponding complex analytic signal. We will perform linear and no linear analysis.

Questionnaires:

Alpha will be used as a measure of reliability for all the scales.

To examine the connections between interpersonal synchrony, empathy, and school climate we will use Pearson correlations and simple linear regressions. ANOVA will be used to examine the differences between groups. We will use the ‘mediation’ toolbox for Mediation analysis (Tingley et al., 2014).

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