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Title:

The Effects of Background Music on 4-6-Year-old Schoolchildren's Mood and Arousal States During a Free-play Period

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Abstract

Music is readily accessible and is part and parcel of any modern school programs for children. Oftentimes, the literature focuses on the benefits of learning, of playing, and of listening to music, citing improved behavioral and emotional regulation, both personal and social, enhanced academic and cognitive abilities, and other positive long-term individual developments. However, the data on the impact of background music, whether it would be in a school or in a different environment, is limited and in need of further investigation, for asserting how the stimulus affects those who are exposed to it (Santos & Freire, 2013). In this project, the researcher sought to study the effects of various genres of voiceless background music on the hedonic, the tense, and the energetic arousal states of 4-to-6-year-old schoolchildren, during free-play periods in their classrooms. A one-month-long experiment was conducted, during which the study groups were surveyed on their feelings, both before and while being exposed to background music. It was revealed that none of the groups experienced any significant changes, under any musical variables, in either hedonic tone or tense or energetic arousal state, between the pre-test stage and the treatment stage, when engaging in the games and activities of their choosing. The implications of that outcome, in light of maximizing mood and arousal states in the classroom, are addressed, and the key psychological factors involved are discussed in the final chapter of this paper.

Keywords: mood, tension, energy, background music, socio-emotional learning

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"Here is what I have found out: the best thing we can do is eat and drink and enjoy what we have worked for during the short life that God has given us; this is our fate" (GNTD, Ecclesiastes 5:18).

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THE EFFECTS OF BACKGROUND MUSIC ON 4-6-YEAR-OLD SCHOOLCHILDREN'S MOOD AND AROUSAL STATES DURING A FREE-PLAY PERIOD

CHAPTER 1: INTRODUCTION

As an artistic dimension of human life whose products technology has helped spread far and wide, music has become an integral part of any social environment. Being especially omnipresent in urban areas, the modern person comes across music on several occasions such as in elevators, lobbies, parking spaces, public bathrooms, stores, and even, sometimes, in the street. While these encounters may seem, at first glance, impromptu, they appear so only to the listeners. For the users, be it business, hospitality, or entertainment industry personnels, these are intentional attempts to attract people and to influence their moods, thoughts, behaviors, and decisions (Santos & Freire, 2013).

In the field of education, research on music often discusses some of the following points: methodology and content of musical instruction in school curricula; the effects of music, either exposure or learning, on cognition, on socioemotional wellness, on language development, on academic performance, and on physiology; and the differences in genres and their impacts, all of which are addressed in the subsequent sections of this paper. Interestingly, because human beings are born with an already significantly developed sense of hearing and ready to process surrounding sounds (Moore, 2002), research can and does involve young participants, as did the present experiment.

Before proceeding further, it is worth highlighting the role of socioemotional learning (SEL) objectives in young children's school programs. Concisely said, SEL refers to implementing an educational model that nurtures every child's social, emotional, and

personal development (DfE, 2023). In this regard, a significant number of studies have demonstrated the necessity to let SEL take precedence over academics in early childhood syllabi, for two main reasons: first, the benefits are numerous, lasting, well-researched, and highly desirable to have, both in and out of the classroom; second, SEL children ultimately catch up with non-SEL students on academics, whereas the opposite scenario is unlikely to happen, without the solid supporting network and the evidenced increase in academic achievements that SEL brings about (Durlak et al., 2022). As noted by CASEL (n.d.), "When students have supportive relationships and opportunities to develop and practice social, emotional, and cognitive skills across many different contexts, academic learning accelerates." Not only that, SEL also positively affects one's mental well-being, nurtures the development of healthy habits, improves the quality and safety of one's social environment, and contributes to reaching important milestones in life (CASEL, n.d.).

Simultaneous to the momentum for researching the account of SEL in schools in the late 90s, and as people were taking advantage of a newly-acquired, widespread access to music, scientists felt encouraged to study its effects on populations, and the trend continues to gain traction (Blasco-Magraner et al., 2021). The perception of the "connections" between musical learning and socioemotional skills kindled, in some researchers, enough curiosity to fuel new studies that sought to establish direct links between the two, something that, ultimately, happened (Campayo-Muñoz & Cabedo-Mas, 2017). A non-exhaustive list of the ways that music helps SEL develop comes courtesy of Pellitteri (2006) who points out the following five: by being an emotional trigger through actively listening to it and commenting on its characteristics; by providing a sensorial, transcendental, spiritual, and thought-provoking stimulus to its listeners, thus, opening a door to a new dimension of the human experience, through artistic perceptivity; by its capacity to soothe and to relieve tension; by

acting as a means of personal expression; and by creating opportunities for cooperation and collaboration among men (pp. 191-194).

To further illustrate the point, one may consider England's national framework for early childhood education (i.e.: EYFS; DfE, 2023), a trusted reference for organizing learning for preschools and kindergartens globally, in relation to the International Curriculum Association's early-years program (i.e.: ieyc; Fieldwork Education, 2016) and how their SEL outcomes overlap. Doing so, three main goals stand out as ubiquitous in both texts: demonstrating independence in familiar situations (personal goal), recognizing and expressing personal feelings and emotions (emotional goal), and developing positive friendships (social goal). Now, to turn to the main reasons that people consciously seek and utilize music, Schäfer et al. (2013) uncovered the following three, in order of prevalence: arousal and mood regulation, which could be called the emotional motive; self-awareness or self-gratification (the personal motive); and social relatedness (the social motive), all of which they chose to coin the "Big Three" of musical function. The relevance of music to the SEL domain is, therefore, evident.

1.1 Background of the Study

Although modern technologies such as, for example, magnetic resonance imaging (MRI), have offered new and remarkably precise insights into the mental and physiological responses to musical exposure (see Levitin, 2006), men from all cultures have felt and believed in the existence of this connection for several millennia, going back well into pre-history, as elaborated in Killin's work (2017). In Ancient Greece, philosophers such as Plato and Aristotle attributed ethical values to different keys, thereby laying the groundwork that the Renaissance writers later picked up, in their pursuit of defining the emotional properties

of musical keys (Arnn, 1983, p. 287). Pestalozzi (1827), one of the de-facto founders of the kindergarten that we know today (through Froebel), held the following views on the topic:

> It is the marked and most beneficial influence of music on the feelings, which I have always observed to be the most efficient in preparing, or as it were attuning, the mind for the best impressions (….) The simple and untaught grace of melody (…) speaks to the heart of every human being. (p. 96)

More recently, Balz (1914), in turn, addressed the idea of understanding the "emotional value" of sounds, in a manner that would allow one to systematically link the musical characteristics of a piece (e.g.: tempo, scale etc.) to resulting mental and bodily responses (p. 236). As he made clear, "The point of difficulty in understanding the connection of music and emotion is not the general fact that music arouses emotion, but the necessity of finding specific differences in the music-stimuli to account for the specific differences in the various emotions aroused" (p. 236). Although Balz only provided directions for future research, rather than attempting to make the breakthrough himself, one must look at Balz's writings in their historical context, if one is to appreciate his contribution. To put it simply, Balz was tackling the subject at a point in time where art-derived emotions were largely ignored by early psychologists who called them "artificial" or "pseudo-emotions," something which he deplored and to which he responded: "The universality with which music is utilized as a means of man's self-expression would afford indication of the accommodation of the organism to such stimuli" (p. 236).

Today, music is popularly known for having a disinhibiting effect, and one finds that musical exposure and instruction have been integrated into most modern early-years educational settings. A first-hand example comes from the researcher's professional experience as an early-childhood-education practitioner at Saisuda Kindergarten, Bangkok,

Thailand. In this instance, the quotidian morning assembly was punctuated by a 5-minute meditation session, during which breathing exercises were performed and which was accompanied by a calming instrumental in the background (Saisuda Kindergarten, personal correspondence, 2021). As the children adjourned, one group at a time, to their classrooms in the most peaceful and orderly manner, the music continued until everyone had reached his or her destination, thus generating efficient school-wide transitioning and mental and emotional poise in students. Another institution from Japan plainly advertises the use of "popular background music" in its setting (Kitty International School, 2015). Last, but not least, the Singaporean Kinderland Academy developed a musically-enriched preschool curriculum which: has been recognized for its quality and its research-based approach; offers unique learning experiences such as stage ensemble and marching bands for preschoolers; and has been successfully exported, with international branches opened in Australia, Japan, and other countries (Kinderland Academy, 2024).

1.2 Statement of the Problem

As previously hinted, and although primary, secondary, and, perhaps, even tertiary school environments would benefit from creating similar music-infused conditions, preschools and kindergartens are currently receiving a lot of attention, as an emerging, yet crucial formative stage in a person's life. According to the Perry Preschool Study that followed, from 1962 up to their 40th birthdays, two groups of 3 to 4-year-olds, of which only one attended preschool, early-years education leads to greater chances of graduating from high school, of stably holding a job, of being a home- and car-owner, and of earning higher income and to lesser chances of early pregnancy and of engaging in criminal activity (HighScope, 2024). Moreover, data showing that the global preschool enrollment rate has been slowly but steadily increasing, since the year 2000, attests to the fact that the importance

of pre-primary education, with its emphasis on SEL, is becoming general knowledge (UNICEF, 2019).

In spite of this, and while many educators are aware of the premise that music can positively affect the listeners' cognitions and emotions, further empirical research is warranted, in order to permit a more efficient harnessing of its power. Indeed, because music is an umbrella term for a large variety of experiences, it would be helpful for teachers to know the basic differences between genres and to understand how those could affect learners in a classroom situation.

Another point of consideration is that most of the research on the subject, longitudinal or otherwise, appears to study the impact of musical exposure on schoolchildren, in the context of completing an assignment or of attentively listening to the audio. As informative as it is, the present work, however, aimed to do something different, namely, to gather information on the arousing effects of music on young students, with the experiment taking place during a free-play period, in which the participants could pursue their own interests and with plenty of educational provocations and play opportunities at their disposal. As Schunk (2012) explained:

> When all task aspects are controlled, (…) it is accurate to speak of achievement behavior being "externally controlled" or "controlled by others." This type of situation results when a teacher gives students no latitude in methods, outcomes, and other conditions. The potential for self-regulation varies depending on choices available to learners. (pp. 405-406)

In consequence, creating the conditions for the highest potential for self-regulation became a crucial part of the design, as it was thought that the children would be more

genuinely “dancing to their DNA’s” and expressing their natural tendencies more freely than under somewhat-restricted circumstances, such as during a teacher-initiated activity.

1.3 Rationale for the Research

In their extensive review of educational research studies on the effects of music on 3- to 12-year-old schoolchildren, Blasco-Magraner et al. (2021) reported, “Music is described as multidimensional and researchers have categorized it by its arousal properties, emotional quality, and structural characteristics,” all of which were integrated into this research. To expand on the structural side, the elements of four genres were scrutinized and compared with one another, to ensure that the ones selected as independent variables would all differ in some noticeable ways, in an attempt to diversify the musical experience as much as possible. In the end, the ensuing four types were retained: percussion soloing (fast tempo, mostly loud sounds with various pitches), reggae instrumental (mid- tempo, highly reverberated sounds with a variety of pitches), epic orchestral theme (several instruments, richest variety of sound intensity, pitch, length, quality, and scales), and a piano canon (in D major scale, slow-paced).

Because the author wanted to know how powerful and influential instrumentals could be, without the subjects practicing active listening and with the experiment taking place during an unrestricted period and within a visually rich and enticing environment, the idea was to let the music be just an embellishment that children would naturally hear, but without any incentives to react, to respond, or to comment on it. With that in mind, and because vocals are too distracting, even when the lyrics are in a foreign language (Salamé & Baddeley, 1989), songs were deemed unfit to serve as independent variables in this project.

Additionally, it was anticipated that the participants would definitely be naturally perceiving the music as such and not simply as background noise. On this matter, Levitin

(2006) explicated: “In my laboratory we found strong activations in the cerebellum when we asked people to listen to music, but not when we asked them to listen to noise” (p. 170). Plus, he continues by informing the readers of differences in cerebellar activity, depending on whether a target piece of music is new or familiar to the subject listeners and whether they like or dislike it, but omitted to mention the level of those differences (p. 171). Suffice it to say, however, that this corroborates the fact that the human brain can tell apart musical sounds from noise, which is enough to rely on for the purpose of utilizing background music.

Conveniently, given that the cerebellum has been shown to be the oldest part of the brain (Levitin, 2006), its involvement with music also offers an explanation as to why humans have been able to make music and to value it, since pre-historical times. Moreover, the fact that generating sounds by tapping and stamping on resonating surfaces is a proclivity also displayed among apes supports the view of the origin of music being far more ancient than any time in recorded history (Kirschner & Tomasello, 2010).

While this study is experimental and meant to investigate the causal relationship between mood and arousal states and background music in young schoolchildren, it is helpful to keep in mind that, when furthering the discussion on the topic in the final chapter, the researcher will look at the outcome of this experiment from the standpoint of a class teacher. To develop, one of an early-years practitioner’s premier aspirations should be: to promote healthy social interactions, emotional well-being, the pleasure of being active, and the confidence of independently taking initiatives. To that end, and because it is pivotal to become acquainted with what constitutes healthy mood and arousal states in individuals, the author provides an overview of each one of those dimensions, as well as how they were integrated into the experimental design, in the theoretical and conceptual framework section of this paper (1.6).

1.4 Purpose of the Study

The purpose of the present study is to research the effects, or lack thereof, of background music on the mood and arousal states of 4-6-year-old schoolchildren, in the context of a free-play period. Through the designed experiment, the author precisely seeks to, first, establish whether there exists a significant causal relationship between any of the selected pieces of music and any of the measured mood and arousal states and, if so, to examine how various instrumentals differ in their impacts.

1.5 Research Questions

The following two questions have been used, to guide all subsequent steps taken in this research:

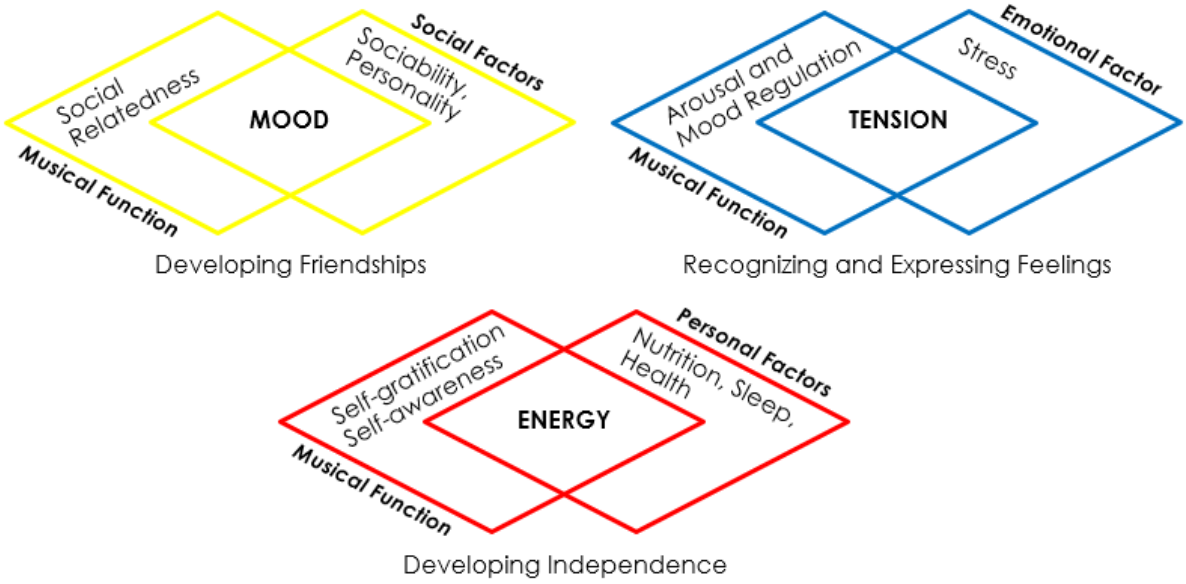
#1: Does exposing young schoolchildren to background music in a free-play period affect their moods and arousal states?

#2: If so, how do various genres differ in their impacts?

1.6 Theoretical and Conceptual Framework

Given the extent of the socioemotional component in young children's education, the driving force behind this endeavor was the hope of learning to utilize musical backgrounds and their potential effects on mood and arousal states, for subtly manipulating and moving social interactions, emotional regulations, and personal initiatives and independence among students toward high standards of health and well-being. With that goal in mind, it was necessary to link each one of them to some sort of measurable responses.

Figure 1: SEL Goals and Measurable Responses



As stated before, the target SEL outcomes revolve around acting independently (personal), knowing and expressing emotions (emotional), and developing positive friendships (social). Concerning the first one, measuring a child's energetic arousal level, namely, the "feelings ranging from energy and vigor to states of fatigue and tiredness" (Boehringer et al., 2010), seemed a sensible choice, based on the idea that tending to one's personal wants or needs requires having the energy to do so. By contrast, lacking such power to maintain a sufficient degree of activity for fulfilling one's basic needs would not be seen as healthy and is, in fact, a symptom associated with depression disorders (Stanford, 2009). More importantly, Levitin (2006) relates that, through the cerebellum, scientists were able to find "similarities between music perception and motor action planning" and, hence, to further surmise "a plausible connection among the cerebellum, timing, music, and [even] emotion" (p. 174). To clarify, this is not an attempt to attribute a causal relationship where there is, perhaps, none, but, granting that Levitin's (2006) claim is right, theorizing that a cerebellum that has been "warmed-up" on music makes motor action more readily executable appears tenable.

On the emotional side, it was decided to record tension levels, to appraise the potential effects of the key variables on the emotional states of the participants. In the words of Boehringer et al. (2010), tense arousal pertains to "feelings ranging from tension and anxiety to calmness and quietness." In some cases, because pressure may help one perform better, on the condition that one's energy level is equivalently high (Boehringer et al., 2010), it is possible to talk about "good stress." That said, exhibiting high levels of tension and anxiety, for a prolonged amount of time, is widely recognized as unhealthy, due to the well-researched detrimental consequences of stress on a person's health which, in the most extreme instances, can genetically decrease one's lifespan (see Farrell & Gray, 2018). Thus, for the purpose of this experiment, a relaxed, calm reported state of tense arousal would be viewed as a healthy occurrence.

Finally, regarding the third aspect, it is a person's mood that would help the researcher determine the capacity of a variable to influence social potentials in the class. As a word of caution, it is useful to know that the scientific data on the relationship between positive feelings and social interactions is "complex" and the results, "surprisingly mixed" (Taquet et al., 2019). On the one hand, the hedonic-flexibility principle proposes that people generally seek to socially interact, when they feel down and, conversely, tackle less instantly-gratifying tasks, which often involve solitude, when they feel good (Taquet et al., 2019). More to the point, "It appears [people] benefit from a balance of deciding when to engage in social interaction and the need to be on [their] own" (Rucker, 2022). Differently said, it is a person's degree of hedonic flexibility, which depends on one's ability to delay personal gratification, that determines whether that person is pursuing a meaningful, healthy social life or not (Rucker, 2022), a fascinating claim that exposes the interdependence between emotions and relationships and that offers an approach for managing both aspects.

On the other hand, as Peterson explained in Jordan B Peterson Clips (2022), respondents to a survey on personality who declared themselves happy consistently marked themselves as social, too. Therefore, favoring one approach over the other depends on the outcome of weighing the validity of both claims against each other. Upon considering Peterson's report (2022), one finds that the data had been collected through a survey, a method that is widely used for research in the social sciences, despite its introspective characteristic. In contrast, the information collected and analyzed in the context of hedonic-flexibility-principled studies originated from computer simulation models (Rucker, 2022), something that, arguably, does not equate empirical data (Peterson, 2024). As a matter of fact, Rucker (2022) cautiously reported, "We cannot be certain that this is what's happening. There might be other interpretations of the data with more validity." In the end, the researcher will view socially interacting during the experiment as attributable to a happy mood, rather than as a coping mechanism to a low mood state.

1.7 Definition of Key Terms

In the intent of making clear the ideas and concepts presented in this paper, it is paramount to define them, so as to enable the readers to follow the author's thought process throughout the study.

- **Arousal:** Arousal refers to the changes occurring in a person's physiology and can be measured in multiple ways. In the current work, the researcher is interested in tense arousal, which relates to "feelings ranging from tension and anxiety to calmness and quietness," and in energetic arousal, or the "feelings ranging from energy and vigor to states of fatigue and tiredness" (Boehringer et al., 2010).
- **Mood:** A person's mood is the expression of that person's temporary state of being. As one constantly processes the stimuli in one's surroundings, one experiences

feelings, as a form of response to those stimuli, which, in turn, affect one's mood. In general, people speak of good and bad moods which, respectively, mean feeling happy or feeling bothered by sadness and/or anger.

- **Background Music:** In the interest of this experiment, background music has been defined as an instrumental track, free of vocals, and played at a sufficiently-high volume level, so that it can be perceived by the respondents, when they are engaged in doing various tasks in the classroom which may, or not, involve social conversations.
- **Socioemotional Learning (SEL):** Although the definition of SEL may vary, depending on the age range of the population in focus, the concept of SEL as applied in this circumstance is the following: the implementation an educational model that nurtures the learner's social, emotional, and personal development (DfE, 2023).

1.8 Significance of the Study

Through revealing the conditions needed for influencing the mood and arousal levels of the learners toward healthy standards, this work can potentially convince early-years and lower-primary educators to utilize background music, as an integral part of their instructional designs and as a tool, for encouraging healthy interactions, states of being and states of mind, and confident industriousness and personal initiatives. On top of that, allowing for schoolchildren to evolve in a musically-rich environment could lead to developing a taste for instrumental music and an ambition to pursue musical education in the future, the physiological benefits of which are already well-documented and touched on in the next chapter.

1.9 Limitations of the Study

As far as limitations are concerned, a number of factors need to be taken into account, when reviewing this study. First off, the researcher had to resort to removing data from partial respondents who missed at least one day in the experiment, as it would have skewed the results. Consequently, the collected data was drawn from a smaller sample (i.e.: 26 people) than what was projected (i.e.: 30). Also, the non-probability sample turned out to be disproportionately female (73%), though gender is not a determining factor of musical perception.

Second, the data obtained during the experimental phase was collected through surveying the participants. While this method is commonly used in research and permits the respondents to actively take part in the project, this is also a method that relies on introspection which is, plausibly, more subjective than it is objective. What is more, it is obvious that some subjects may choose to submit preset answers to the survey, in an attempt to sway the outcome of the research in a certain way. Nevertheless, the fact that the experimenter interacted face-to-face with the respondents decreased the likelihood of having received bogus reporting, as might be more common with online surveys, as study participants tend to be more obedient to the researchers, when the two groups are in the same room (Lof Der Zotheid Psychologenpraktijk, 2016). In addition to this, 4-to-6-year-old schoolchildren would hardly gain anything in misrepresenting their feelings, as the majority of them usually welcome adult attention that is directed at their personal well-being.

Another point to note is that each data collecting session took place at 12.45pm on an allotted day of the experiment schedule, that is, shortly after lunch time. Therefore, personal nutrition could have impacted the mood and arousal states that were measured. Other personal factors that might have had an impact on the responses but which could by no means have been avoided include individual characteristics of neurodiversity and personality.

1.10 Alternative Hypothesis (H_1)

Exposure to background music during free-play periods significantly affects young schoolchildren's mood and tense and energetic arousal states.

CHAPTER 2: LITERATURE REVIEW

Music affects people, regardless of race, gender, educational background, socioeconomic status, and prior musical knowledge and skills. Whether the listeners be capable or not of describing the impact, they are emotionally, cognitively, and physiologically responsive to musical stimuli. Consequently, this chapter will look at the building blocks of musical compositions, from a scientific standpoint, and will also address the effect of music on social skills, emotions, cognition, and physiology.

In most people, music has been shown to affect feelings, focus, memory, intellectual faculties, and physiological processes (Florida National University, n.d.). That said, not all types of music affect their listeners in the same ways in every circumstance. For example, fast tempos combined with loudness decreases one's ability to concentrate on some reading material and disrupts the functioning of one's memory (Thompson et al., 2011). Still in the context of studying, lyrics seem to have a particularly debilitating influence on the learners (Salamé & Baddeley, 1989), whereas, as a coping means against anxiety, they appear helpful, as another study suggests (Florida National University, n.d). Therefore, in order to utilize music purposefully, Byron (2011) counsels: "[R]educe how distracting music can be, and increase the level to which the music keeps you in a good mood."

2.1 Physiological Impact

With regard to the human body, "Numerous studies affirm the ability of music to trigger physiological responses, such as changes in the heart rate, skin temperature, and conductance, respiration and hormone secretion" (Blasco-Magraner et al., 2021). Perhaps, the most puzzling case comes from acoustic bioengineering research, where the possibility of utilizing sounds for changing the organization of cells in the body has been revealed. In a

manner that is reminiscent of Faraday disturbances, “Utkan Demirci and Sean Wu [harness the power of] acoustics to manipulate heart cells into intricate patterns. A simple change in frequency and amplitude puts the cells in motion, guides them to a new position and holds them in place” (Armitage, 2018). To clarify, albeit the researchers jest that one can potentially shape cells into whatever one fancies, they also emphasize one key medical advantage of such practice: “Unlike other tissue engineering tactics, acoustics position the heart cells [in seconds] in a tight configuration that closely resembles natural cardiac tissue” (Armitage, 2018).

2.2 Designer Music

Although there may be divergences among musicians on what constitutes a suitable piece of music for a given purpose, researchers can help reconcile potential differences, by focusing on building a scientific consensus, rather than an artistic one. Using the relevant data on the topic, as well as information from their own research and professional practices, composers such as Dr. Daniel Amen and Barry Goldstein have succeeded in creating tracks, which they call “designer music,” that have relieved patients suffering from anxiety and insomnia disorders and that have been purposefully played in spas, in hospices, in maternity units, in hospitals, and in psychiatric programs (AmenClinics, 2020).

To dive into the specifics, some of the key features of their compositions are: the absence of vocals; the “consistency” of the music, in terms of, for example, chord progressions; the addition of specific sound frequencies, implying that headphones are needed for reaping all the benefits from the experience; and the use of slow tempos such as 60 BPM, as all of these parameters cause the listener’s heartbeat and respiration patterns to synchronize with the rhythm of the audios and the brain, to switch from beta to alpha waves or even delta ones (AmenClinics, 2020). What is more, “This alpha brainwave is what is

present when we are relaxed and conscious. To induce sleep (a delta brainwave of 5 hertz), a person may need to devote at least 45 minutes, in a relaxed position, listening to calming music" (University of Nevada, Reno, n.d.).

In addition to its influence on the body, the tempo of a piece is a "major factor" in conveying happy emotions, in the case of fast tempos, whereas slow ones seem to bring forth sorrowful sentiments (Levitin, 2006, p. 58). In a 1996-study where volunteers were asked to give a rendition of their favorite songs, Levitin (2006) observed, "A majority of people in our study—nonmusicians—were able to sing songs within 4 percent of their nominal tempo," a testament to its powerful impression on the memory (pp. 58-59). As for the time signature, and while Amen and Goldstein (AmenClinics, 2020) did not advocate for any distinct one in their "designer music" project, the relaxing music genre appears to favor the common time signature (i.e.: 4/4), the cut time (i.e.: 2/2), and, less frequently, 3/4 or 6/8, as does, in fact, most of Western music.

2.3 Cognition and the Brain

Admittedly, the notion of consistency being soothing is not particular to music but is also true of, for instance, a daily kindergarten schedule, as educators strive to establish a general sense of safety, by making the typical school day as predictable as possible for the learners. Perhaps, it is also the reason why, according to a study on the effect of background music on consumer behavior in a retail environment, familiarity with a piece "brings more positive responses," such as the willingness to remain in that environment for a prolonged period of time, the desire to come back, and a more approachable demeanor (Santos & Freire, 2013). To return to seeking relaxation through music, the less consistent the structure of a musical piece is, the higher the listener's brain activity will be, thereby lessening the chance of experiencing rest. As observed through MRI, multiple parts on both sides of the brain light

up, though especially on the right side, during a transition in the music, that is, when coming out of a section and just before entering into a new one (Baker, 2007). To put it differently, people unconsciously anticipate the progression of the track that they are listening to, riding along the cycle of musical tensions and releases.

Even though pinpointing the exact parts of the brain involved in this exercise would be beyond the scope of this research, it is helpful to acknowledge the concept of "distribution of function" whereby "regions […] perform component operations, and other regions […] coordinate the bringing together of this information" (Levitin, 2006, p. 85). Equally worth-knowing is neuroplasticity which, in general, pertains to "a physiological change in the brain in response to its environment" (Gersema, 2016). On the discussion about distribution of function, one relevant aspect of neuroplasticity "suggests that regional specificity may be temporary, as the processing centers for important mental functions actually move to other regions after trauma or brain damage" (Levitin, 2006, p. 85). Hence, an impaired brain area does not necessarily result in the loss of a faculty.

Cognition-wise, and based on the outcome of a 5-year study at the University of Southern Carolina, "Music instruction appears to accelerate brain development in young children, particularly in the areas of the brain responsible for processing sound, language development, speech perception and reading skills" (Gersema, 2016). In a "practice-makes-perfect" fashion, children who receive regular music training undergo a faster refining of their auditory systems which results in higher efficiency in the treatment of sounds, as shown through neuronal activity (Gersema, 2016).

To add to this, Levitin (2006) shared the following insights from his joint study on the effects of classical music:

> Listening to music caused a cascade of brain regions to become activated in a particular order: first, auditory cortex for initial processing of the components of the sound. Then the frontal regions […] involved in processing musical structure and expectations. Finally, a network of regions—the mesolimbic system—involved in arousal, pleasure, and the transmission of opioids and the production of dopamine, [which affect mood states]. And the cerebellum and basal ganglia were active throughout, presumably supporting the processing of rhythm and meter. (p. 187)

2.4 Tones and Emotions

Notes, too, affect people in a way that is measured emotionally. While the general rule is that major scales sound happy, whereas minor ones sound sad, many writers across history have endeavored to assign detailed commentaries for each musical key. Despite the ambitious nature of such an enterprise which can, by no means, become universally agreed upon, this recognized effort has not only earned the merit of rekindling the passion for this age-long discussion but has also offered social scientists and students of musicology a theoretical framework of understanding, for interpreting the effects of tones. As a concrete example, the author of this study referred to the following clue on the D major scale, while searching for a musical track that could potentially evoke an uplifting feeling in the listeners: “The key of triumph, of Hallelujahs, of war-cries, of victory-rejoicing. Thus, the inviting symphonies, the marches, holiday songs and heaven-rejoicing choruses are set in this key” (Legacy.wmich.edu, n.d.).

While Christian Schubart was the original author of the above example of “affective musical key characteristics” in his native German language (Steblin, 1983), he was certainly not the only contemporary composer with a thorough understanding of melodies. Possibly as a consequence of that, studies show that Baroque- and Classical-era music have a greater

effect on focus than other genres (Florida National University, n.d.). To demonstrate, Dr. Amen recalled in PragerU (2024) that his lab team ran an experiment in which teenagers were asked to play a memory game, while being exposed to either classical, rock, American country, or heavy music. In terms of outcome, the participants who listened to heavy metal gave the worst performance, whereas those exposed to classical music were able to complete their task with remarkable efficiency, followed, respectively, by listeners of country and of rock music (PragerU, 2024).

In another instance involving college students, it was uncovered that "music engages the areas of the brain involved with paying attention, making predictions and updating [events] in memory" and that "musical techniques used by composers 200 years ago help the brain organize incoming information," alluding to an information-processing phenomenon known by neuroscientists as segmentation, or the breaking down of data into smaller bits through securing details about the starts, the ends, and the links between those bits (Baker, 2007). As a result, this argument is, sometimes, employed, for justifying listening to background music while studying and is, in essence, the real meaning of the so-called "Mozart effect" (Byron, 2019).

2.5 Socioemotional Impact

When it comes to the effect of music on social aptitudes, Kirschner & Tomasello (2010) observed that a collective musical practice session organized before taking on a team-based task leads to an increase in prosocial and cooperative behaviors, for both genders, among 4-year-old respondents. To expand, in contrast with the children from the control group, the researchers witnessed an increased level of verbal communication among the participants, as they aimed to carefully coordinate their steps and to give one another empathetic oral reassurances of their commitments to the task at hand (Kirschner &

Tomasello, 2010). As underlined by Blasco-Magraner et al. (2021), one of the factors strengthening the cohesiveness of a group lies in its members' expressing themselves emotionally, while remaining perceptive, responsive, and empathetic toward their peers: "The social interactions required for music-making offer many opportunities for students to develop their abilities to evaluate their own feelings and, at the same time, try to relate constructively to the feelings of others." Thus, playing music with others seems to spur such socioemotional developments.

What is more, "Music has a remarkable capacity to express, transmit, and evoke various emotions and affections in human beings, regardless of their nationality or culture" (Blasco-Magraner et al., 2021). Possibly the most illustrative example, national anthems are often vivid compositions that purport to elevate their audiences with feelings of unity, belonging, and patriotism, although it can be argued that these emotions may, in this case, be acquired, rather than organically aroused. On top of stimulating a listener's senses and spirit, musical education students display higher proficiency in regulating "both positive and negative [emotions]" than pupils enrolled in music-depleted programs (Blasco-Magraner et al., 2021). Indeed, in keeping with the notion that music is a powerful means of self-expression, particularly for young children who have not yet honed literacy skills (Nagaoka, n.d.), and considering that a person's overall experiences during the early years of life largely shapes that person's evolution into adulthood (HighScope, 2024), the proposition that joining a music-enriched curriculum is a long-term investment in one's socioemotional health is sound.

CHAPTER 3: RESEARCH DESIGN AND METHODOLOGY

This chapter lays out all the essential information on the type, the design, the respondent population, the sampling method, the selection criteria, the data collection phase, the timeline and process of the experimental stage, the data analysis, and the ethical considerations of the present study.

3.1 Research Type and Design

To begin, this research on the effects of exposure to background music on mood and arousal states in pre- and lower-primary schoolchildren is quantitative, since it deals with the analysis of numerical values. Even though the raw data was qualitative (i.e.: sad-happy, nervous-calm, and tired-energetic), all gathered information has been quantified, through a coding process, before being input in a table representing the frequency of occurrences of the given responses and, later, employed for obtaining central-tendency figures and percentages. Notably, one of the advantages of utilizing numerical data is that it serves as a solid means for comparing various circumstances and for revealing and/or identifying "frequencies, patterns and trends" (Cohen et al., 2007, p. 398). As this project aimed, from its inception, at learning about the direct effects of different musical genres (independent variables) on the participants' mood and arousal states (dependent variables), it also seemed preferrable to opt for an experimental design, rather than a descriptive or a correlational one that, ultimately, would not have fulfilled the author's goal of investigating an anticipated causal relationship.

At this point, it is interesting to note that the idea of using parametric tests with ordinal data may raise some eyebrows, as is the case with Cohen et al. (2007) who declared, "One should not […] use t-tests and analysis of variances [with] ordinal data" (p. 503). From that angle, it is argued that either "(a) the sample size is too small, (b) the data may not be

normally distributed, or (c) the data are from [ordinal scales], so parametric statistics cannot be used" (Norman, 2010).

To address the sample-size concern, the author of this study determined that the within-group format of exposing every subject to every condition was the better choice. Albeit more painstaking to set up, the within-group design can offset the limitations of working with a small sample, as it is statistically stronger than a between-subject design and, also, permits "controlling extraneous participant variables" (Yang, 2023). On the apprehension of not having data normally distributed, Cohen et al. (2007) themselves admitted that there seldom is a normal distribution in psychological studies, thereby effectively dismissing the thought as a non-issue. In addition to this, "Parametric tests are generally more robust than nonparametric tests, when analyzing ordinal data such as that seen in Likert scales, even when statistical assumptions (such as normal distribution of data) are violated" (Awan & Dako, 2018), which, again, would be the case in the present educational psychology research project. Lastly, because parametric tests wield a more important analytical power than non-parametric ones, many researchers have been justifiably applying this method for nearly a century, bearing valid and reliable results along the way (Norman, 2010).

3.2 Population, Sample, and Selection Criteria

This study used a non-probability sampling method, for convenience and availability purposes. The total number of participants amounted to 26 Reception- to Year-1-students ($N_{male} = 9$, $N_{female} = 17$) from Saigon Star International School, Ho Chi Minh City, Vietnam. While a higher number of consented participations were originally registered, the information gathered from 4 partial respondents, that is, the children who missed at least one experimental session, was removed from the data pool altogether.

The schoolchildren who took part in the experiment all belonged to the same classes: Group 1 with 6 participants (4-5 years old), Group 2 with 4 participants (4-5 years old), Group 3 with 9 participants (5-6 years old), and Group 4 with 7 participants (5-6 years old). Prior to the study, the groups had been formed solely based on the age of their members, ranging from 4 to 6 years of age. Other than that, they did not differ in drastic ways but were organically representative of the many respects of the general international-school student population, including on nationalities, with 50% of locals (Vietnamese) and 50% of internationals (Polish, British, American, Irish, Indian, Chinese, Japanese, Taiwanese, Ukrainian, Russian, and Korean). On academic abilities, the sample was naturally diverse, and, to the researcher's knowledge, no child depended on special accommodations for their learning and for their participation in the experiment.

Finally, to join the study, the prospective respondents simply needed to provide a signed parental consent form and to have been certified "*fit to attend school*" by a licensed physician. Therefore, the only excluding criterion was failing to meet the basic medical requirements for pursuing an educational program on a physical campus.

3.3 Data Collection

For this study, the instrument of choice, for collecting data on mood and arousal states, was an adapted, child-friendly version of the University of Wales Institute of Science and Technology (UWIST) Mood-Adjective Checklist, also known as the UMACL test (Matthews et al., 1990). Simply said, the test provides a group of ordinal scales to be used in experimental studies where the participants self-report their mood and arousal states in the following 3 domains: energetic (tired-energetic), tense (calm-nervous), and hedonic (sad-happy). As a reminder, Cohen et al. (2007) reiterated, "The ordinal scale not only classifies but also introduces an order into the data" (p. 502).

While psychology researchers have differed on how many adjectives should be listed and on which ones should be selected for best conveying the reported feelings, a point was made to design pictorial scales, rather than textual ones, bearing recognizable emotion icons, or emojis, in order to render the self-reporting experience accessible to all children, regardless of their levels of literateness. That being said, the numerical codes were visible on the mood, tension, and energy (MTE) scale document (Appendix 1) and were notated under each corresponding emoji. Concerning the number of adjectives on the scales, Matthews et al. (1990) affirmed: "The large number of dimensions isolated in early studies […] are likely to be at least partially artifactual, resulting from psychometric weaknesses such as inappropriate response scale formats. [In fact,] more recent research appears to converge toward a two- or three-factor solution."

For this project, each scale offers 3 possible responses: negative effect (1), neutral or uncertain (2), and positive effect (3). Regarding the actual terminology, the MTE record form displays *sad* (1) and *happy* (3), for describing mood; *nervous* (1) and *calm* (3), for relating tension; and *tired* (1) and *energetic* (3), for expressing energy levels (Appendix 2). In view of effect 2, the MTE record form reads "*neutral, unsure*" on all scales, and the MTE scale document shows the same icon, for reporting a neutral effect or for being unsure. On top of this, the entire data collection phase was performed by the same researcher who, also, supported the respondents, by verbally presenting the scales and prompting either oral or physical responses, using body language and open- and close-ended questions such as, "*How are you feeling now? Are you feeling tired? Are you feeling full of energy?*" In some instances, the children made their reports, by citing the numbers attached to each icon on the scales. Another detail worth indicating is that the experimenter was a familiar face to all of the participating children. As a result, this, perhaps, made the task of individually approaching them effortless and natural, as early-years educators are often seen joining a

child's play, in order to enhance the learning side of the experience or to assess a child's progress.

3.4 Timeline and Process of the Experiment

In the present study, the researcher investigated how different genres of background music affect children's moods, tension, and energy levels, in accordance with a set of pre-established procedures, during the month of November 2023. In consideration of the timeline, the experiment was repeated 16 times, that is, four times over the course of a week (with exposure to only one independent variable per session), beginning on the Tuesday and ending on the Friday of that week—the experimenter feared the unwanted influence of a post-weekend "Monday effect"—and with every week being devoted to a single test group, hence a total of 16 sessions across four weeks. To clarify, one session was comprised of a pre-test reporting phase that was followed by a music-exposed reporting phase shortly after. Plus, the main reason for stretching out the experiment over several days and for limiting the sessions to a single treatment per day was to prevent fatiguing the respondents and to ward off any carry-over effects.

In view of scheduling, the researcher randomized the order of musical exposures, as informed by the principles of a controlled-experiment design, so that each subject group had a unique, personalized program.

Table 1: Randomized Treatment-session Schedule

	Session 1	**Session 2**	**Session 3**	**Session 4**
Group 1	Variable 3	Variable 1	Variable 4	Variable 2
Group 2	Variable 2	Variable 4	Variable 1	Variable 3
Group 3	Variable 4	Variable 3	Variable 2	Variable 1
Group 4	Variable 1	Variable 2	Variable 3	Variable 4

With regard to the independent variables, all the musical tracks are available on the leading video-sharing-and-streaming platform, YouTube, free of charge. In the intent of respecting copyright policies and of appropriately crediting all the artists whose works have been utilized in this experiment, it should be noted that:

- Variable 1 was uploaded to YouTube by Lantern on July 16, 2015, and the artist's profile can be found at https://animapins.com and at https://www.youtube.com/channel/UCBJqeySdzANjI5VqRXtCP_w;
- Variable 2 was uploaded to YouTube by Lantern on October 18, 2017, and the artist's profile can be found at https://www.youtube.com/watch?v=JyMxCPvdt7U&t=0s;
- Variable 3 was uploaded to YouTube by Epic Music VN on September 30, 2023, and the artists' profiles can be found at https://www.emvn.co;
- Variable 4 was uploaded to YouTube by Classical on March 22, 2016, and the author is Johann Pachelbel; the material is in the public domain and is not copyrighted.

Table 2: Independent Variables

Variable	Genre	Web Link
1	Percussions	https://www.youtube.com/watch?v=4hPCuMfMv50
2	Reggae	https://www.youtube.com/watch?v=TiAthQEaZCU&t=1207s
3	Epic	https://www.youtube.com/watch?v=bLSqn3J9fUY
4	Piano	https://www.youtube.com/watch?v=7tsiFrHM0q0&t=198s

When it came to running the experimental sessions, the main prerequisite was to coordinate with the classes' homeroom teachers, to ensure that they would allot 20-30 minutes for the participants to freely play or pursue the activities of their choosing. This took place from 12.45pm-1.15pm on each experiment day. In the pre-exposure phase, each participant was approached, for about 2 minutes, and asked to tell and show how he or she was feeling, using the MTE scale document with visual representations for the 3 dimensions

of interest: mood, tension, and energy. After collecting and recording all responses, the researcher, pretending to be taking a water break, went out of the classroom, at which point the homeroom teacher started playing the target music, as the children continued what they were doing. Upon returning to the classroom five minutes later, the experimenter repeated the inquiry, with the music running in the background, at the conclusion of which he left the room for good.

As far as participant awareness is concerned, this research would constitute a blind study. Indeed, to avoid potential biases, the children were only questioned about their feelings and were not asked to consider the background music that was being played in the classroom. While the chosen introspective data collection method implies that the schoolchildren knew that they were taking part in a formal survey, they were told, by the experimenter, that, because the school is like a second home to them, its staff, out of care and concern, wished to inquire about their feelings, during their time on campus.

3.5 Data Analysis

For analyzing the data and answering the research questions, the author looked at the collected information through the conventional lenses of both descriptive and inferential statistical interpretations. In light of the former, “Such statistics make no inferences or predictions, they simply report what has been found, in a variety of ways,” which may include all or some of the following parameters: the central tendency, the standard deviation and error, the variance, the range, the skewness, the minimum and maximum scores, and kurtosis (Cohen et al., 2007, p. 504).

Regarding the principal components of central tendency, all of the relevant modes, medians, and means were computed and presented in a table format, together with the raw

numerical information. To expand, the data for each of the three target dimensions, namely, hedonic tone, tense arousal, and energetic arousal, has been compiled into three distinct tables, each one showing all the participants' recorded responses, in the form of numbers that represent the frequency of a certain answer occurring within a given group, both pre- and during the treatments, before presenting the central tendency of that experimental group across all variables, in an extra row below the rest of the sample's data. In other words, a horizontal reading of the numbers shows any pre/post treatment variations, or lack thereof, whereas a vertical perusal of the data enables one to compare how the sample groups align or differ, in terms of their central tendencies. On the side of reliability, the results were divided into 2 random halves and contrasted, and the operation was repeated several times, to check the strength of the correspondence between the measurements.

In addition to this, the color-code displayed on the MTE forms has been applied to the tables and to other graphs, for maintaining consistency across all documentation and for easy referencing. Concisely, yellow communicates information about mood, whereas blue and red respectively convey measurements of tension and energy levels, and that system was applied to all figures. On utilizing graphs and charts, Awan & Dako's (2018) interestingly highlighted, "Reporting median values as opposed to means is a better expression for central tendency, because the data […] is ordinal." While the experimenter agrees that medians do effectively relate the tendencies of the data in table form, the use of means and percentages, for generating graphs, resulted in a more insightful representation of the recorded information. Plus, it should be noted that the numbers have been rounded off to the nearest tenth.

Further in the analysis, the researcher used inferential statistics, for testing the alternate hypothesis: Exposure to background music during free-play periods significantly

affects young schoolchildren's mood and tense and energetic arousal states. As Cohen et al. (2007) pointed out, "Sometimes simple frequencies and descriptive statistics may speak for themselves, and the careful portrayal of descriptive data may be important. However, often it is the inferential statistics that are more valuable for researchers, and typically these are more powerful" (p. 504). In this situation, the author believes that the study's descriptive data is indeed clear enough to rightly anticipate either the rejection of the null hypothesis or the failure to do so. Nonetheless, it is through the use of parametric testing that any variation can be determined to be statistically significant or not.

With that in mind, the analysis of data comprised conducting a series of paired *t*-tests with a statistical software, for contrasting the means of each experimental group pre- and post-treatment. Practically speaking, the *t*-tests will provide the answer to the first research question on whether exposing young schoolchildren to background music in a free-play period affects their moods and arousal states and will serve for testing the alternative hypothesis. In the event that the answer to the first research question be "yes," an analysis of variances (ANOVA) will assist the researcher in appraising how different musical genres vary in their impacts, thereby providing the basis for answering the second research question.

3.6 Ethical Considerations

In this study, the effects of different genres of background music on children's moods, tension, and energy levels were investigated. Simply said, this research did not pose any risks to the participants and did not involve any invasive procedures. In order to avoid disrupting the learning schedules of the classes, the experimental phase took place at the same time every day, that is, during transitions or break times, where children pursued their own interests. Moreover, the respondent information was kept confidential and was only used for research purposes. Only the children who had submitted their signed parental consent forms

were surveyed, and they could stop participating at any time, though none of them once refused reporting their feelings. Finally, it goes without saying that the researcher had, beforehand, asked for and obtained permission from the Direction of Saigon Star International School to carry out the experiment on its campus and with the registered respondents.

CHAPTER 4: DATA ANALYSIS & PRESENTATION OF RESULTS OF FINDINGS

This chapter offers a systematic review of the data from the experiment. The first section concentrates on a descriptive analysis of the information, whereas the second section presents the results obtained through inferential statistical work.

4.1 Descriptive Analysis

4.1.1 General findings

First of all, as indicated in the overall report tables (Tables 4, 6, and 8), most of the respondents, prior to exposure to music, marked themselves as happy (82%), calm (74%), and energetic (70%), whereas negative states scored 8.5% in mood, 16% in tension, and 22% in energy, the remainder being the neutral responses. When the background music was on, the schoolchildren were: still mostly happy, despite the fact that a few respondents reported having lost their cheerfulness to other non-positive states; still mainly calm, even though one fifth of the subjects marked themselves as nervous; and over two thirds of them noted that they were feeling positively energetic, with little-to-no variation from the pre-exposure data on energetic arousal.

4.1.2 Hedonic tone

Table 3: Hedonic Tone Data Table

Hedonic Tone		Pre-exposure to Music						During Exposure to Music					
		1	2	3	Mode	Median	Mean	1	2	3	Mode	Median	Mean
Group 1 (Out of 6)	Percussions	1	1	4	3	3	2.6	1	/	5	3	3	2.7
	Reggae	1	/	5	3	3	2.7	/	1	5	3	3	2.8
	Epic Music	1	1	4	3	3	2.6	/	/	6	3	3	3
	Piano Canon	/	/	6	3	3	3	/	1	5	3	3	2.8
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.7*	*Mode: 3*			*Median: 3*		*Mean: 2.8*
Group 2 (Out of 4)	Percussions	/	/	4	3	3	3	/	1	3	3	3	2.8
	Reggae	1	/	3	3	3	2.5	1	/	3	3	3	2.5
	Epic Music	1	1	2	3	2.5	2.3	/	/	4	3	3	3
	Piano Canon	1	/	3	3	2	2.5	1	/	3	3	3	2.5
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.6*	*Mode: 3*			*Median: 3*		*Mean: 2.7*
Group 3 (Out of 9)	Percussions	/	2	7	3	3	2.8	1	1	7	3	3	2.7
	Reggae	1	1	7	3	3	2.7	1	3	5	3	3	2.4
	Epic Music	1	1	7	3	3	2.7	1	2	6	3	3	2.6
	Piano Canon	1	/	8	3	3	2.8	1	3	5	3	3	2.4
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.7*	*Mode: 3*			*Median: 3*		*Mean: 2.5*
Group 4 (Out of 7)	Percussions	/	/	7	3	3	3	/	1	6	3	3	2.9
	Reggae	/	2	5	3	3	2.7	1	2	4	3	3	2.4
	Epic Music	/	1	6	3	3	2.9	/	1	6	3	3	2.9
	Piano Canon	/	/	7	3	3	3	/	/	7	3	3	3
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.9*	*Mode: 3*			*Median: 3*		*Mean: 2.8*
All (Out of 26)	Percussions	1	3	22	3	3	2.8	2	3	21	3	3	2.7
	Reggae	3	3	20	3	3	2.7	3	6	17	3	3	2.5
	Epic Music	3	4	19	3	3	2.6	1	3	22	3	3	2.8
	Piano Canon	2	/	24	3	3	2.8	2	4	20	3	3	2.7
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.7*	*Mode: 3*			*Median: 3*		*Mean: 2.7*

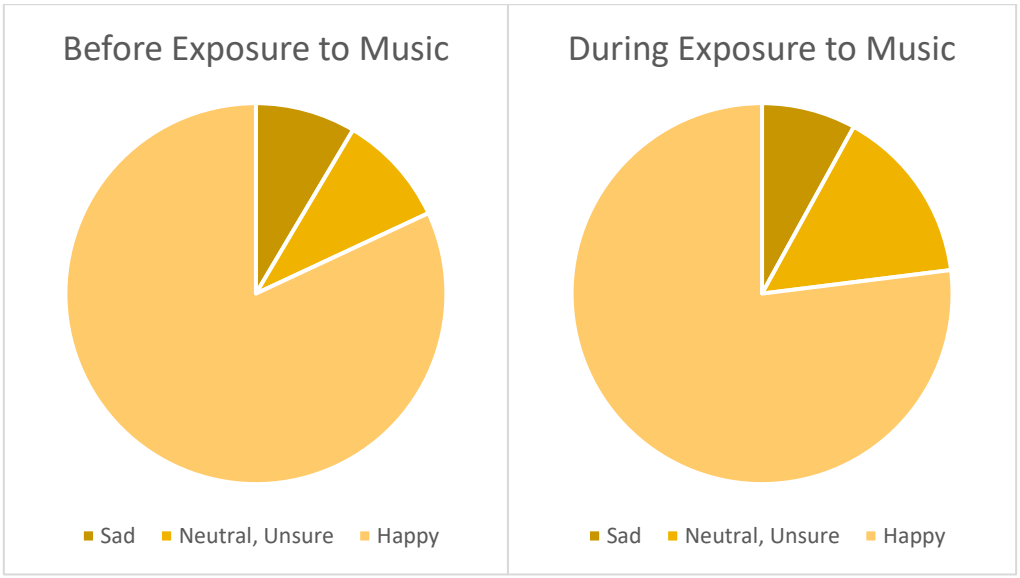
As indicated by both the modes and the medians, the hedonic tone was optimal throughout the experiment and across all groups, regardless of the treatment phase.

Table 4: Hedonic Tone Overall Report Table

Hedonic Tone	Pre-exposure to Music			During Exposure to Music		
	Negative State	**Neutral State, Unsure**	**Positive State**	**Negative State**	**Neutral State, Unsure**	**Positive State**
Frequency (out of 104 times)	9	10	85	8	16	80
Percentage (rounded off to the nearest one)	8.5%	9.5%	82%	8%	15%	77%

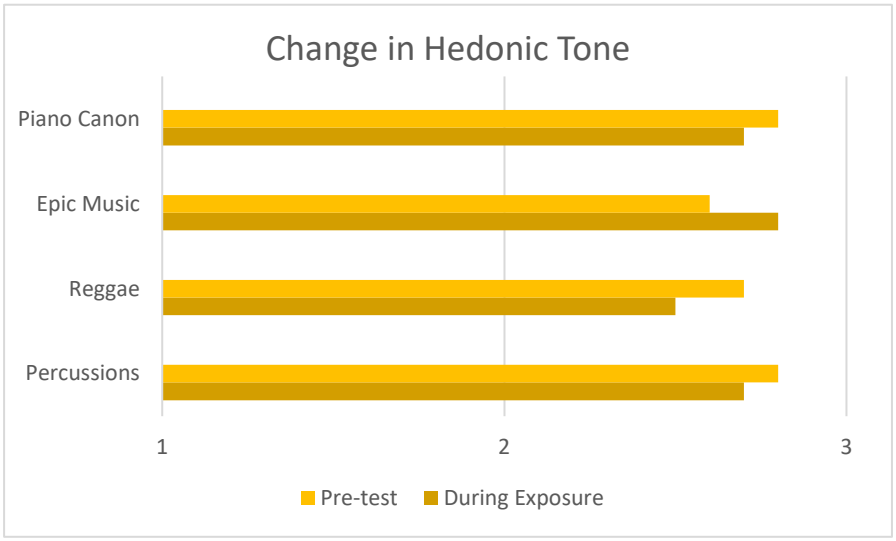
During the musical treatment, the reported positive-mood figure went down by 5%, in favor of neutral, unsure states which rose to a total of 15% of all participants. The negative mood percentage was nearly identical, though slightly lower (8%).

Figure 2: Hedonic Tone Overall Report Pie Graphs



A brief comparison of the pie graphs shows that a slight change occurred during exposure to music, as some children became seemingly less convinced of the exactitude of their mood states, under the influence of an instrumental background.

Figure 3: Mood Change per Genre



When contrasting the impact of each musical genre on the participants' moods, one detail worth noting is that the mood states appeared to improve under exposure to epic music, whereas, in every other circumstance, they decreased. Nevertheless, the general trend remains

unchanged, that is, most respondents retained the same moods during treatment as the ones reported beforehand.

4.1.3 Tense arousal

Table 5: Tense Arousal Data Table

Tense Arousal		Pre-exposure to Music						During Exposure to Music					
		1	2	3	Mode	Median	Mean	1	2	3	Mode	Median	Mean
Group 1 (Out of 6)	Percussions	2	/	4	3	3	2.3	2	/	4	3	3	2.3
	Reggae	1	/	5	3	3	2.7	/	1	5	3	3	2.8
	Epic Music	/	2	4	3	3	2.7	1	/	5	3	3	2.7
	Piano Canon	1	1	4	3	3	2.6	/	/	6	3	3	3
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.5*	*Mode: 3*			*Median: 3*		*Mean: 2.7*
Group 2 (Out of 4)	Percussions	/	/	4	3	3	3	2	2	/	1 and 2	1.5	1.5
	Reggae	1	/	3	3	3	2.5	2	/	2	1 and 3	2	2
	Epic Music	2	2	/	1 and 2	1.5	1.5	1	/	3	3	3	2.5
	Piano Canon	1	/	3	3	2	2.5	1	/	3	3	3	2.5
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.4*	*Mode: 3*			*Median: 3*		*Mean: 2.1*
Group 3 (Out of 9)	Percussions	2	/	7	3	3	2.6	3	/	6	3	3	2.3
	Reggae	1	3	5	3	3	2.4	3	1	5	3	3	2.2
	Epic Music	2	2	5	3	3	2.4	1	2	6	3	3	2.6
	Piano Canon	1	/	8	3	3	2.8	2	2	5	3	3	2.4
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.5*	*Mode: 3*			*Median: 3*		*Mean: 2.4*
Group 4 (Out of 7)	Percussions	/	/	7	3	3	3	/	2	5	3	3	2.7
	Reggae	2	/	5	3	3	2.4	2	/	5	3	3	2.4
	Epic Music	1	/	6	3	3	2.7	1	1	5	3	3	2.6
	Piano Canon	/	/	7	3	3	3	/	1	6	3	3	2.9
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.8*	*Mode: 3*			*Median: 3*		*Mean: 2.6*
All (Out of 26)	Percussions	4	/	22	3	3	2.7	7	4	15	3	3	2.3
	Reggae	5	3	18	3	3	2.5	7	2	17	3	3	2.4
	Epic Music	5	6	15	3	3	2.4	4	3	19	3	3	2.6
	Piano Canon	3	1	22	3	3	2.7	3	3	20	3	3	2.7
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.6*	*Mode: 3*			*Median: 3*		*Mean: 2.5*

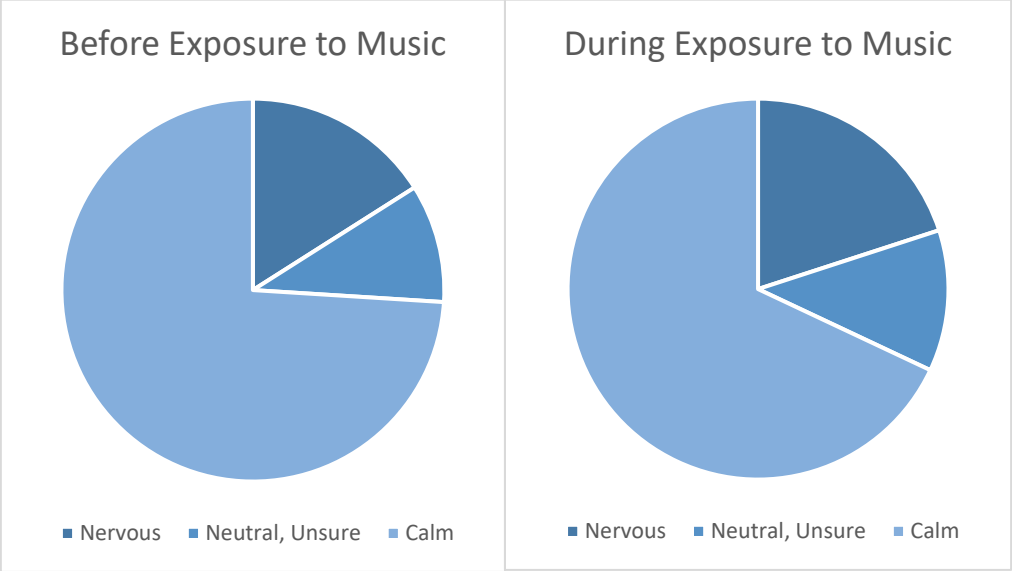
Similar to the data on hedonic tone, the modes and medians in the above table reveal a maintained state of calmness for all groups and under all conditions.

Table 6: Tense Arousal Overall Report Table

Tense Arousal	Pre-exposure to Music			During Exposure to Music		
	Negative State	Neutral State, Unsure	Positive State	Negative State	Neutral State, Unsure	Positive State
Frequency (out of 104 times)	17	10	77	21	12	71
Percentage (rounded off to the nearest one)	16%	10%	74%	20%	12%	68%

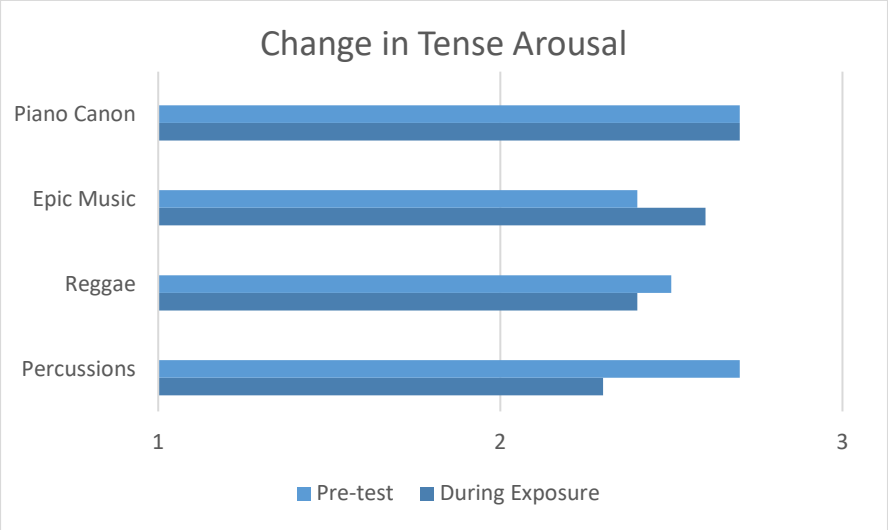
With regard to tense arousal, the biggest change was seen in a 6%-loss in feelings of calmness from before treatment, causing a 4%-rise of reported nervous states during exposure to background music.

Figure 4: Tense Arousal Overall Report Pie Graphs



In this case, there is a more important variation, between the two stages of the experiment, than those found in the other target dimensions. Coincidentally with the development seen in the hedonic tone graph (Figure 1), it appears that the background music disrupted the state of tranquility of some of the participating children which, perhaps, could explain the rise of simultaneously-reported undefined mood states.

Figure 5: Tension Change per Genre



In view of variations in tension levels, the bar chart again indicates some small but not drastic changes. On the one hand, the piano canon preserved the calmness of the participants, as the degree of tense arousal was unchanged and still heavily leaning toward a positive state. On the other hand, the percussion track seems to have had the most disquieting impact, resulting in an overall shift in reporting toward uncertainty of one's tense arousal state.

4.1.4 Energetic arousal

Table 7: Energetic Arousal Data Table

Energetic Arousal		Pre-exposure to Music						During Exposure to Music					
		1	2	3	Mode	Median	Mean	1	2	3	Mode	Median	Mean
Group 1 (Out of 6)	Percussions	1	2	3	3	2.5	2.4	2	/	4	3	3	2.6
	Reggae	1	2	3	3	2.5	2.4	1	2	3	3	2.5	2.4
	Epic Music	2	1	3	3	2.5	2.4	1	1	4	3	3	2.6
	Piano Canon	2	1	3	3	2.5	2.4	2	/	4	3	3	2.6
	Central Tendency	*Mode: 3*			*Median: 2.5*		*Mean: 2.3*	*Mode: 3*			*Median: 3*		*Mean: 2.4*
Group 2 (Out of 4)	Percussions	1	/	3	3	3	2.5	1	1	2	3	2.5	2.3
	Reggae	1	/	3	3	3	2.5	/	/	4	3	3	3
	Epic Music	/	1	3	3	3	2.8	2	/	2	1 and 3	2	2
	Piano Canon	2	/	2	1 and 3	2	2	1	/	3	3	3	2.5
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.4*	*Mode: 3*			*Median: 3*		*Mean: 2.4*
Group 3 (Out of 9)	Percussions	1	/	8	3	3	2.8	1	1	7	3	3	2.7
	Reggae	1	/	8	3	3	2.8	1	1	7	3	3	2.7
	Epic Music	1	1	7	3	3	2.7	1	/	8	3	3	2.8
	Piano Canon	1	/	8	3	3	2.8	2	1	6	3	3	2.4
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.8*	*Mode: 3*			*Median: 3*		*Mean: 2.6*
Group 4 (Out of 7)	Percussions	4	/	3	1	1	1.9	4	/	3	1	1	1.9
	Reggae	2	/	5	3	3	2.4	2	/	5	3	3	2.4
	Epic Music	2	/	5	3	3	2.4	1	/	6	3	3	2.7
	Piano Canon	1	/	6	3	3	2.7	1	/	6	3	3	2.7
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.4*	*Mode: 3*			*Median: 3*		*Mean: 2.4*
All (Out of 26)	Percussions	7	2	17	3	3	2.4	8	2	16	3	3	2.3
	Reggae	5	2	19	3	3	2.5	4	3	19	3	3	2.6
	Epic Music	5	3	18	3	3	2.5	5	1	20	3	3	2.6
	Piano Canon	6	1	19	3	3	2.4	6	1	19	3	3	2.4
	Central Tendency	*Mode: 3*			*Median: 3*		*Mean: 2.5*	*Mode: 3*			*Median: 3*		*Mean: 2.5*

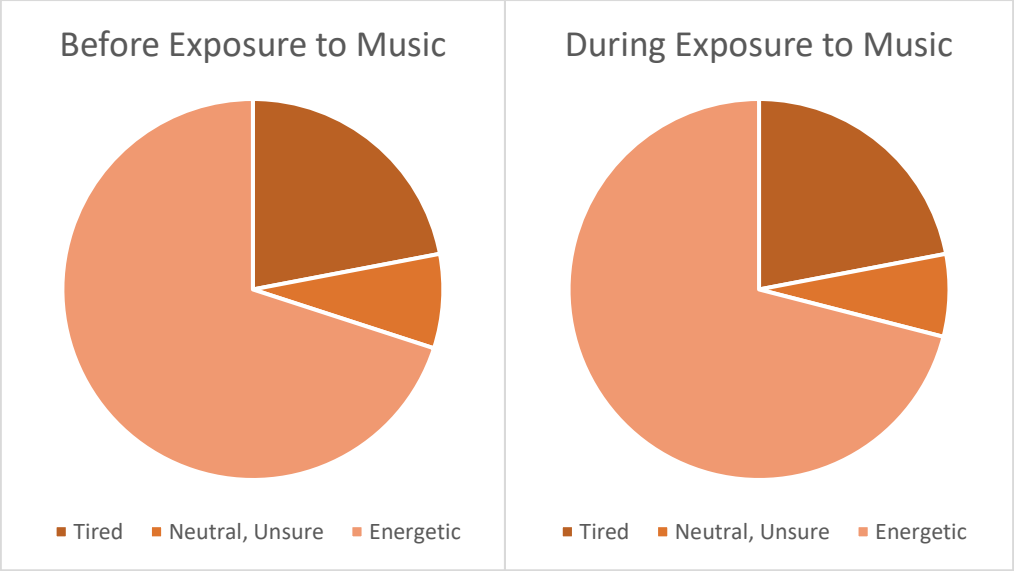
As an exception to the homogenous mode and median figures found in the results on mood and on tension, Group 1's median for energetic arousal is lower (2.5) than that of any other experimental groups, in any dimensions, and under any circumstances (3). Indeed, the feeling of tiredness (negative state) in this group was reported six out of 24 times, during the pre-exposure stage, which brought down the overall median of the group. However, the treatment phase shows the group's median back to 3, even though the participants marked themselves as tired 6 times, too. As it turns out, three respondents who had said that they were unsure, prior to exposure to music, twice reported feeling energetic during treatment: once while hearing percussion ensemble and once with the piano canon.

Table 8: Energetic Arousal Overall Report Table

Energetic Arousal	Pre-exposure to Music			During Exposure to Music		
	Negative State	Neutral State, Unsure	Positive State	Negative State	Neutral State, Unsure	Positive State
Frequency (out of 104 times)	23	8	73	23	7	74
Percentage (rounded off to the nearest one)	22%	8%	70%	22%	7%	71%

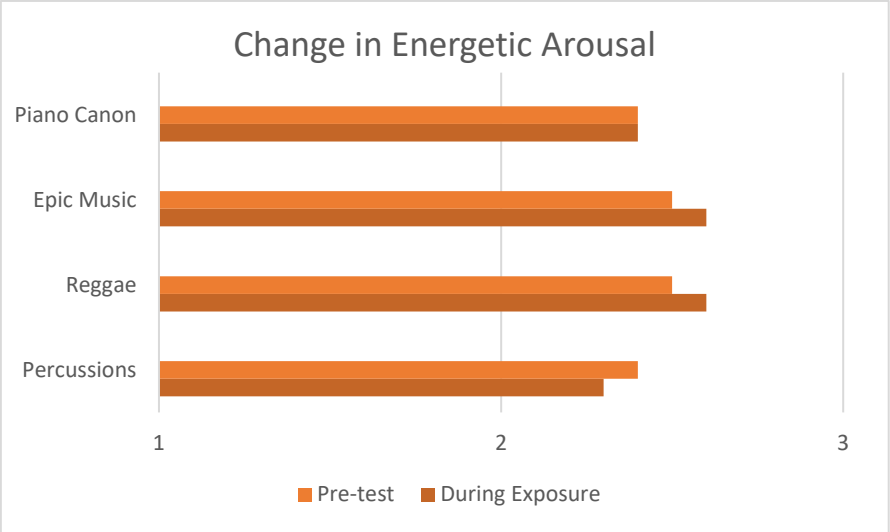
On the side of energy, the data indicates an insignificant influence, with just a 1%-increase in positive-state responses, from the pre-test to the treatment phase.

Figure 6: Energetic Arousal Overall Report Pie Graphs



The two pie graphs are nearly identical which strongly points to a lack of effect of background music on the reported energy levels.

Figure 7: Tension Change per Genre



In this instance, the bar chart shows little-to-no variation in the reported energy levels across all the different musical genres.

4.2 Inferential Analysis

In the intent of determining whether or not background music affects young listeners' mood and arousal states in a free-play period, 3 paired *t*-tests were performed, to compare all the pre-test mood, tension, and energy means with the post-treatment data. In view of the hedonic tone, the results revealed no major difference between the means of the pre-test stage and those from the exposure stage ($t(19) = 0.2896$, $p = 0.7752$). To expand, the mean of the pre-test phase was 0.02 lower than the mean of the treatment phase, with a confidence interval of 95% ranging from 2.685 to 2.705. Therefore, and according to the conventional criteria for appraising such metrics, the reported variation in mood is not statistically significant.

Tension-wise, the results, again, showed an unsubstantial difference between the pre-treatment data and that of the treatment stage ($t(19) = 0.9604$, $p = 0.3489$). Also, the mean of the pre-test phase was 0.100 higher than the mean of the treatment phase, with a confidence

interval of 95% ranging from 2.570 to 2.470. As a result, the reported variation in tension is not statistically significant.

Lastly, on the side of energy, the statistical results, once more, signaled an insignificant change, between the pre-exposure stage and the exposure one ($t(19) = 0.3856$, $p = 0.7041$). More specifically, the mean of the pre-test phase was 0.025 lower than the mean of the treatment phase, with a confidence interval of 95% ranging from 2.485 to 2.510. In consequence, the reported difference in energy is, also, not statistically significant.

Upon analysis of the results, and as evidenced by the outcome of the paired *t*-tests, the null hypothesis cannot be rejected. To put it differently, by revealing that there is no statistically significant difference in young schoolchildren's mood and arousal states in a free-play period, between before and during exposure to background music, the outcome of the first series of parametric tests effectively annulled the second research question, which was: "If there is a significant change in mood, tension, and energy, how do various genres differ in their impacts?" Therefore, because of the lack of meaningful effect, it can be concluded that various genres of background instrumentals do not differ in their impacts on 4-to-6-year-old participants' mood and arousal states, when these are engaging in free-play.

CHAPTER 5: CONCLUSIONS, IMPLICATIONS, AND RECOMMENDATIONS

5.1 Conclusions

As a reminder, the present endeavor centered on the potential effects of background music on children's mood and arousal states in the context of a free-play period, that is, a classroom time during which the learners are free to pursue their own interests. In opposition to what the experimenter had anticipated, exposing young schoolchildren to background music during a free-play period does not affect their mood and arousal states to a significant extent, that is, one that would prompt enough respondents to report a change in either hedonic tone, in tense arousal, or in energetic arousal during the treatment stage. When it comes to the participants, the analysis of the data clearly showed that the overwhelming majority of children experienced little-to-no changes in any of the target states of being and, thus, made their reports accordingly.

In order to draw tenable conclusions from the outcome of this study, it would be safe to start by reviewing the conditions of this experiment and to compare those with that of other research projects on music. To the researcher's knowledge, no other project, within the field of education, has attempted to study the impact of instrumental tracks on mood and arousal states in a similar circumstance. To put it differently, most of the research on musical exposure in educational institutions take place during learning periods or during teacher-initiated activities. To provide an example, Jucan & Simion (2014), whose study showed that preschool children being exposed to musical background had a stronger proclivity toward taking in new knowledge, acting cooperatively, and transitioning more efficiently, observed their participants in a lesson, where all the tasks were informed by the teacher's plan or by the class's daily schedule.

With regard to the information gathered from situations of music instruction and/or music therapy, those conditions are also at odds with that of the present experiment, since, in both cases, the students are prompted to pay close attention to or to listen deeply to the musical sounds. On the side of the former, practicing with a musical instrument requires extreme focus on the produced auditory stimuli, since it is how correctness and precision are determined. In the context of the latter, a special-educational-needs practitioner or school psychologist may introduce music therapy to a child with anxiety issues, in which case the listener is prompted to lie in a comfortable position, to place a pair of headphones on his or her head, and to concentrate entirely on the musical input. On the contrary, there was no call for attention to the music in this study, and no special effort was made to advertise the tracks to the participants.

In terms of generalizing the results, and even though a non-probability sample was used in this experiment, the results may still apply to other school settings, with the exception of the more traditional educational institutions, where the same conditions cannot be replicated. As Juncan & Simion (2014) put it, “Music is a universal language and accessible to children [from an] early age,” and personality types and neurodiversity have a more important role to play in musical perception than factors such as gender, age, or nationality. Indeed, one observation that does not transpire in the results is the hedonic, tense, or energetic individual sensitivities to music that were made clear to the experimenter, during the data collection process. To explain, there were a few isolated cases where the respondents had, seemingly, not moved from their spots or changed activities or activity partners, between the pre-test survey and the treatment stage. However, when those same participants were asked a second time about their feelings, under exposure to background music, they systematically reported experiencing a shift in either one of the target states of being and even talked about it to the experimenter, without making any mentions of the music.

However, while precautions were taken to prevent any carry-over effects (see Chapter 3), another thing to consider is that it is not irrational to think that some respondents were "fatigued" of being asked the same questions twice within the span of thirty minutes and that they, therefore, either gave the same responses as they did in the preceding session, without renewed introspection, or simply offered dismissive responses, as they might have felt that the experimenter was infringing upon their play time a little too much. Furthermore, the experimenter observed, in some rare instances, something that could be called "solidarity reporting," whereby a group of friends engaging in collaborative playing and whose members were taking turns in responding to the survey would playfully give the exact same answers.

5.2 Implications

Upon reflecting on the outcome of the study, from the viewpoint of a teacher, the final analysis indicates that the school environment at Saigon Star International School is conducive to children experiencing and maintaining positive mood, tension, and energetic arousal states. As highlighted in the previous chapter, over two thirds of students declared themselves feeling high in energy, while keeping their tension levels low, and more than three fourths of them marked themselves as happy. This accounts for all groups across the entire month of experiment.

From the researcher's point of view, however, the conclusion of the project leads to an obvious follow-up question: why doesn't background music affect children during their free-play time? After all, there is extensive literature on the advantageous use of music in a school setting. To name only a few of the associated benefits, a substantial body of research has concluded that usages, ranging from musical exposure, to music teaching, to music therapy, promote personal emotional balance and pro-social initiatives, enhance cognitive abilities and academic performance, and even boost higher-order thinking skills (Blasco-Magraner et al.,

2021). In addition to that, Blasco-Magraner et al. (2021) advised, at the end of their extensive survey, “It is therefore recommended that music be incorporated into the different curricular levels, educational contexts, and areas of knowledge.”

In light of the fact that background music had no reported incidence on the children’s mood and arousal states, the author believes that the following two psychological concepts may help to make sense of the results: selective attention and habituation to a stimulus. At first glance, selective attention appears to be the main culprit for the reported lack of musical impact on mood and arousal states. Concisely said, selective attention refers to one’s ability to concentrate on a selected stimulus and to ignore other surrounding stimuli and is a natural phenomenon in human and animal behavior. In terms of its origination, some of the factors that may trigger its occurrence include, but are not limited to: curiosity, as in the case of a child unwrapping a present and exploring its content; opportunity, such as a predator finding a prey within easy reach; or an assigned task, as with a pupil taking a formal academic examination. Another important feature of selective attention is that it is divisible but not multipliable. In other words, when one splits one’s attention between two, or more, stimuli, each stimulus receives a dividend of one’s attention, rather than one’s full focus (Schunk, 2012, p. 172), which also explains why one can only achieve so much when “multi-tasking.” In the end, the crucial idea is that people perform selective attention consciously and deliberately.

In light of its implications to the present experiment, selective attention might not only account for the reported lack of impact on either mood, tension, or energy state but also for the isolated exceptions. Simply put, the participants who did not report any changes did so, because they were not paying attention to the musical stimulus, whereas the few

respondents who felt and reported a change in one of the target states did pay attention to it. In support of this view, Schunk (2012) explicates:

> Most of a child's basic cognitive processes are well in place by early childhood. From this point onward, developmental changes primarily involve learning how to make better and more efficient use of existing perceptual and attentional processes. Some of the more important changes include the ability to make fine discriminations between stimulus objects, the development of automaticity and selective attention, and the ability to exert control over attentional processes. (p. 460)

Another factor that could have played a role in suppressing or diminishing the appeal of the background music is a psychological process called habituation. To define it, Levitin (2006) takes this simple, yet clear illustration: "If your refrigerator has a hum, you get so used to it that you no longer notice it. [….] Habituation is an important and necessary process to separate the threatening from the nonthreatening" (p. 182). One way to conceive of it is as a spectrum, with habituation on the one end and sensitization, or the "increase in responsiveness," on the other (Rankin et al., 2010).

Although the function of habituation in this study would be separating the, subjectively speaking, interesting from the uninteresting, rather than the dangerous from the innocuous, the key information, for determining whether habituation could have been an influencing factor in the experiment, is the average exposure time required for the response to occur. On this point, Rankin et al. (2010) noted, "If repeated series of habituation training and spontaneous recovery are given, habituation becomes successively more rapid," which, in a classroom situation, depends on whether the class teacher uses to play music in the background. While there is no doubt that modern educators incorporate songs in their

instructional designs, none of the teachers involved in this experiment followed a regular background-music-listening schedule for their children.

Equally important, Rankin et al. (2010) pointed out the fact that the process of habituation to a stimulus depends on the strength of that stimulus. Differently said, playing the music at a low volume leads to rapid habituation, whereas playing it loud disables it. In this experiment, the tracks were consistently played at Level 50 on the volume mixer of the teachers' devices, in the hope of exposing the children to a sufficiently noticeable degree that would still allow for conversations to run smoothly. Nevertheless, and because a single genre was used for each treatment session, it is safe to assume that the relative linearity of the tracks enabled the occurrence of habituation.

5.3 Recommendations

Having introduced the enterprise, explored the literature, laid out the experimental process, presented the results, and drawn conclusions from the study, final recommendations for future research and professional practice are warranted.

When it comes to running a similar experiment on the effects of music in a school setting, an alternate experimental situation that provides two classrooms connected through an open door would, perhaps, enable researchers to gain further insights into the power of background music. To expand, both classrooms should have the same resources, furnishings, and be nearly identical in all respects. Evidently, the one difference between the two would be the playing of background music in either one of these. Potentially, the experimenters would then be able to see where the children want to spend their time. In turn, this would force some changes in the design of the experiment. For instance, a second researcher would be needed, for collecting data, this time, through observation.

One aspect that was not a feature of this study is the participants' personal profiles. While it would not have impacted the outcome, it is recommended that future research collect additional individual information of the respondents beforehand, such as how much they are exposed to music over the course of a week and whether they take music classes or play an instrument. A questionnaire to the children's parents sent along with the consent form is a possible method, for gathering this data. Once acquired, it may help the researchers to verify whether the effect of prior-knowledge and of frequent musical exposure coincide with noticeable shifts in mood, tension, and/or energy arousal states.

Finally, adding songs to the list of independent variables could be, the author has come to believe, yet another possible area of interest for future research. With the benefit of hindsight, utilizing tracks with lyrics could have added to the scope of this study and have permitted the comparison of the results against those found in the contemporary literature.

References

Santos, E., B., A. & Freire, O., B., D. (2013). The Influence of Music on Consumer Purchase Behavior in Retail Environment. *Independent Journal of Management & Production*, Sept. 2013, v. 4, n. 2. Doi: 10.14807/ijmp.v4i2.111.

Moore, D. R. (2002) Auditory development and the role of experience, *British Medical Bulletin*, Volume 63, Issue 1, October 2002, Pages 171–181, https://doi.org/10.1093/bmb/63.1.171.

DfE (2023). *Development Matters.* Early Years Curriculum. Department for Education: London. Retrieved from: https://www.gov.uk/government/publications/development-matters--2/development-matters#personal-social-and-emotional-development.

Durlak, J., Mahoney, J., L., & Boyle, A., E. (2022). What We Know, and What We Need to Find Out About Universal, School-Based Social and Emotional Learning Programs for Children and Adolescents: A Review of Meta-Analyses and Directions for Future Research. *Psychological Bulletin*, Nov. 2022, 148(11/12):765–782. DOI:10.1037/bul0000383.

Collaborative for Academic, Social, and Emotional Learning (CASEL). (n.d.). *What Does the Research Say?* Casel.org., Fundamentals of SEL. Retrieved from: https://casel.org/fundamentals-of-sel/what-does-the-research-say/.

Blasco-Magraner, J.S.; Bernabe-Valero, G.; Marín-Liébana, P.; Moret-Tatay, C. (2021) Effects of the Educational Use of Music on 3- to 12-Year-Old Children's Emotional Development: A Systematic Review. *International Journal of Environmental Research and Public Health.* 2021, 18, 3668. https://doi.org/10.3390/ijerph18073668.

Campayo-Muñoz, E.Á.; Cabedo-Mas, A. The role of emotional skills in music education. Br. J. Music Educ. 2017, 34, 243–258. https://eric.ed.gov/?id=EJ1162943.

Pellitteri, J.S. (2006) The use of music in facilitating emotional learning. In *Emotionally Intelligent School Counseling*; Pellitteri, J.S., Stern, R., Shelton, C., Eds.; Erlbaum: Mahwah, NJ, USA, 2006.

Fieldwork Education, Limited. (2016). International Curriculum Association. In *IEYC Learning Strands and Learning Outcomes* (v. 7). Fieldwork Education, Nord Anglia Education. WCL Group, Limited.

Schäfer T., Sedlmeier P., Städtler C., and Huron D. (2013) The Psychological Functions of Music Listening. *Frontiers in Psychology.* 4:511. Doi: 10.3389/fpsyg.2013.00511.

Levitin, D. J. (2006). *This is Your Brain on Music: The Science of a Human Obsession* (1st ed.). NY, USA, 2006. Penguin Group Inc.

Killin, A. (2017). The origins of music: Evidence, theory, and prospects, *SAGE Journals, SEMPRE,* Music & Science, Vol 1: 1-23, 2017. https://doi.org/10.1177/2059204317751971.

Arnn, J. D. (1983). Review of A History of Key Characteristics in the Eighteenth and Early Nineteenth Centuries, by R. Steblin. Notes, 40(2), 287–289. https://doi.org/10.2307/941305.

Pestalozzi, J. H. (1827). *Letters on early education. Addressed to J. P. Greaves, Esq.* London: Sherwood, Gilbert, And Piper, Paternoster Row; Harris, Corners of St. Paul's Church Yard; Effingham Wilson, Royal Exchange, Dakton and Harvey, Gracechurch Street; and Hailes, Piccadilly. Retrieved from: https://archive.org/details/lettersonearlyed00pestiala/page/n7/mode/2up.

Balz, A. (1914). Music and Emotion. *The Journal of Philosophy, Psychology and Scientific Methods,* Journal of Philosophy, Inc, Vol. 11, No. 9 (Apr. 23, 1914), pp. 236-244.

Retrieved from: https://www.jstor.org/stable/2013114.

Saisuda Kindergarten. (2021). *Saisuda.ac.th.* Retrieved from: https://saisuda.ac.th/.

Kitty International School. (2015). *Kitty-International-School.com,* School Program. Retrieved from: http://www.kitty-international-school.com/e_sub/e_04.html.

Kinderland Academy. (2024). *Kinderland.com.sg*, MUSIC-INFUSED CURRICULUM FOR INFANTS & PRESCHOOLERS. Retrieved from https://kinderland.com.sg/music/.

HighScope. (2024). *Perry Preschool Study.* HighScope Educational Foundation, Early Childhood Education, Research Projects. Retrieved from: https://highscope.org/project/perry-preschool-study/.

UNICEF (2019). A World Ready to Learn: Prioritizing quality early childhood education. *Unicef.org.,* Publications. Retrieved from https://data.unicef.org/resources/a-world-ready-to-learn-report/.

Schunk, D. H. (2012). *Learning theories: An educational perspective* (6th Ed.). Boston, MA: Pearson.

Salamé P. & Baddeley A. (1989) Effects of Background Music on Phonological Short-Term Memory. *Quarterly Journal of Experimental Psychology. Sage Journals.* Volume 41, Issue 1. https://doi.org/10.1080/14640748908402355.

Kirschner, S. & Tomasello, M. (2010). Joint music making promotes prosocial behavior in 4-year-old children. *Evolution and Human Behavior 31 (2010) 354–364, ELSEVIER Inc.* Doi:10.1016/j.evolhumbehav.2010.04.004.

Boehringer A., Schwabe L., & Schachinger H. (2010). A combination of high stress-induced tense and energetic arousal compensates for impairing effects of stress on memory

retrieval in men. *Psychological Science, PubMed.* 2010 Sep;13(5):444-53. DOI: 10.3109/10253891003725256.

Stanford. (2009, November 11). *Stanford's Sapolsky on Depression in US (Full Lecture)* [Video]. YouTube. https://www.youtube.com/watch?v=NOAgplgTxfc&rco=1.

Farrell W. & Gray J. (2018). *The Boy Crisis* (1st ed.). USA, 2018. BenBella Books.

Taquet M., Quoidback J., Desseilles M., De Montjoye Y., & Gross J. J. (2019). Happiness and Social Behavior. *Psychological Science, PubMed.* 2019 Aug;30(8):1111-1122. DOI: 10.1177/0956797619849666.

Rucker, M. (2022). *Interview with Maxime Taquet about the Hedonic Flexibility Principle.* Michaelrucker.com. Thought Leader Interview. Retrieved from: https://michaelrucker.com/thought-leader-interviews/max-taquet-hedonic-flexibility-principle/.

Jordan B Peterson Clips. (2022, October 23). *How Personality Predicts Success in Different Fields* [Video]. YouTube. https://www.youtube.com/watch?v=rtNZxSKJ43s.

Jordan B. Peterson. (April 12, 2024). *Climate Lies – Dr. Patrick Moore – EP 439* [Video]. YouTube. https://www.youtube.com/watch?v=oxTBpds2dQA.

Lof Der Zotheid Psychologenpraktijk. (2016, April 26). *The Milgram Experiment 1962 Full Documentary* [Video]. YouTube. https://www.youtube.com/watch?v=rdrKCilEhC0.

Florida National University. (n.d.). *The Benefits of Studying with Music.* Retrieved from: https://www.fnu.edu/benefits-studying-music/.

Thompson, W. F., Schellenberg, E. G., & Letnic, A. K. (2011). Fast and loud background music disrupts reading comprehension. *Sempre: Society for Education, Music, and*

Psychology Research. Volume 40, Issue 6, May 20, 2011. https://doi.org/10.1177/0305735611400173.

Byron, T. (2019). *Is it OK to listen to music while studying?* University of Wollongong, Australia, Newsroom, Media Center, October 17, 2019. Retrieved from: https://www.uow.edu.au/media/2019/is-it-ok-to-listen-to-music-while-studying.php.

Armitage, H. (May 21, 2018). *Sound Research: scientific innovations harness noise and acoustics for healing.* Stanford Medicine Magazine, Bio-engineering, Spring 2018. Retrieved from: https://stanmed.stanford.edu/innovations-helping-harness-sound-acoustics-healing/.

AmenClinics. (2020, August 5). *Music Can Boost Your Brain | Dr. Daniel Amen and Barry Goldstein* [Video]. YouTube. https://www.youtube.com/watch?v=ZDtUBnnqRqw.

University of Nevada, Reno. (n.d.). *Releasing stress through the power of music.* Counseling Services, Virtual Relaxation Room. Retrieved from: https://www.unr.edu/counseling/virtual-relaxation-room/releasing-stress-through-the-power-of-music.

Baker, M. (2007). *Music moves brain to pay attention, Stanford study finds.* Stanford Medicine, News Center. Retrieved from: https://med.stanford.edu/news/all-news/2007/07/music-moves-brain-to-pay-attention-stanford-study-finds.html.

Gersema, E. (2016). *Children's brains develop faster with music training.* University of South Carolina, Science/Technology. Retrieved from: https://today.usc.edu/childrens-brains-develop-faster-with-music-training/.

Legacy.wmich.edu. (n.d.). *Affective Musical Key Characteristics.* Retrieved from https://legacy.wmich.edu/mus-theo/courses/keys.html.

Steblin, R. K. (1983). *A History of Key Characteristics in the 18th and Early 19th Centuries* (1st Ed.). USA, Ann Arbor: UMI Research Press.

PragerU. (2024, October 2). *Is Dr. Daniel Amen Unfairly Criticized by Psychiatrists and Big Pharma? | Real Talk | PragerU* [Video]. YouTube. https://www.youtube.com/watch?v=K2E5VWgjLuA.

Nagaoka, M. (n.d.). *Creative Musical Self-Expression Programs for Students on Teacher Training Courses for Childcare and Education.* Showa Women's University, n.d. Retrieved from: https://www.jstage.jst.go.jp/article/icme/8/0/8_66/_pdf.

Cohen, L., Manion L., & Morrison K. (2007). *Research Method in Education* (6th Ed.). USA, New York: Routledge.

Norman, G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Advances in Health Sciences Education: Theory and Practice. National Library of Medicine.* Feb. 10, 2010. PMID: 20146096. DOI: 10.1007/s10459-010-9222-y.

Yang L. Y. (2023). *5.1.: Within-Subjects Design.* Creative Commons Attribution 4.0 License BY-NC-SA 4.0. Retrieved from: https://stats.libretexts.org/Courses/Kansas_State_University/EDCEP_917%3A_Experimental_Design_(Yang)/05%3A_Within-Subjects_Design/5.01%3A_Experimental_Design.

Awan O. & Dako F. (2018). Reply: Use of Parametric Tests to Analyze Ordinal Data. *Society of Nuclear Medicine and Molecular Imaging. Journal of Nuclear Medicine Technology.* September 2018, 46 (3) 318; DOI: https://doi.org/10.2967/jnmt.118.211805.

Matthews G., Jones D. M., & Chamberlain A. G. (1990). Refining the measurement of mood: The UWIST Mood Adjective Checklist. *British Journal of Psychology 81(1).* DOI:10.1111/j.2044-8295.1990.tb02343.x.

Juncan D. & Simion A. (2014). Music background in the classroom: its role in the development of social-emotional competence in preschool children. *Procedia - Social and Behavioral Sciences 00 (2013) 000–000. Elsevier, inc.* Retrieved from https://www.researchgate.net/publication/277948088_Music_Background_in_the_Classroom_Its_Role_in_the_Development_of_Social-emotional_Competence_in_Preschool_Children.

Rankin C. H., Abrams T., Barry R. J., Bhatnagar S., Clayton D., Colombo J., Coppola G., Geyer M. A., Glanzman D. L., Marsland S., McSweeney F., Wilson D. A., Wu C. F., Thompson R. F. (2010). Habituation Revisited: An Updated and Revised Description of the Behavioral Characteristics of Habituation. *National Library of Medicine. PubMed Central, Neurobiol Learn Mem.* 2008 Nov 6;92(2):135–138. DOI: 10.1016/j.nlm.2008.09.012.

Appendix 1

MTE Scale Document

Experiment: Before Exposure – During Exposure Independent Variable: 1 – 2 – 3 – 4 Group:

Hedonic Tone



1 2 3

Experiment: Before Exposure – During Exposure Independent Variable: 1 – 2 – 3 – 4 Group:

Tense Arousal







1 2 3

Experiment: Before Exposure – During Exposure Independent Variable: 1 – 2 – 3 – 4 Group:

Energetic Arousal



1 2 3

Appendix 2

MTE Record Form

Class: **Group Name in the Study:** # **Total Number of Respondents:** **Age of the Respondents:**

Date of Experiment: / / **Start Time:** **End Time:**

Prerequisite: Participants must be allowed to freely play or pursue an activity of their choosing for the next 20-30 minutes
Process:

1- **Before playing any music,** approach each participant and ask them to show you how they are feeling, using the **MTE Introspection Scale** document with visual representations for the 3 dimensions of interest: mood, tension, and energy (5-10min).
2- After collecting and recording all responses on this form, **start playing the target music** in the background and let the participants resume what they were doing for 5-10 minutes.
3- Finally, **before turning off the music and ending the session, repeat step1** and record the results (5-10min).
4- End of experiment for the day.

Notes: Only ask participants about **their feelings** and do not ask about the music that is being played in the background.
Be sure to play the music at the **same volume level (i.e.: 50 on volume mixer)** throughout the experiment.

Dimensions / Experimental Stage	**Hedonic Tone**			**Tense Arousal**			**Energetic Arousal**		
	Sad (1**)	**Neutral, Unsure** (2)	**Happy** (3)	**Nervous** (1)	**Neutral, Unsure** (2)	**Calm** (3)	**Tired** (1)	**Neutral, Unsure** (2)	**Energetic** (3)
Before Exposure to Independent Variable ___	***								
After Exposure to Independent Variable ___									

*Moods taken from UWIST Mood-adjective Checklist. **See Mood Introspection Scale document for visual references. ***Please, input the relevant number of respondents in each box.