

Effects of Music Background on Engagement of Students with Mild Intellectual Disability

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Abstract

Background music played in the class is an educational intervention that has been proven to have a positive impact on student behavior management. By the way, several studies have highlighted the effectiveness of music when it is listened by students with special needs. To examine the effects of Mozart background music on the engagement behavior of 13 students with mild intellectual disability enrolled in a two self-contained gross motor activity classes an ABAB with drawl design was used to demonstrate a functional relationship between music background and student's engagement behavior. Visual analysis of a repeated-measures graph and statistical analysis for the two classes suggested that there is no significant effect of Mozart music background on the student's engagement during gross motor activities setting. There is not a significant difference between the first implementation of intervention B1 and baseline conditions A1 ($p > 0.001$). Likewise, there is not a significant difference between the second implementation of music background B2 and second baseline conditions A2 ($p > 0.001$). Results showed that Mozart music background did not influence student's engagement behavior.

Keywords: Music Background- Engagement behavior- Mild intellectual disability- Gross motor activities.

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INTRODUCTION

Managing behavior and keeping students engaged is critical to learning process. Although traditional behavior management techniques can have an immediate effect on student's behavior, they have a coercive aspect. While teacher use the coercive approach, the classroom atmosphere ruins (Van Tartwijk, denBrok, Veldman, & Wubbels, 2009).

Especially, when it comes to students with intellectual disabilities the mission of keeping them engaged becomes more difficult because in addition to their intellectual disability, other disorders can be associated. Indeed, intellectual disability is a disorder that includes an intellectual deficit as well as a deficit affecting adaptive functioning in conceptual, social and practices, beginning in the developmental period (DSM-5, p. 33). Behavioral disorders are common in children with intellectual disabilities, regardless of their underlying etiology (Ageranoti-Bélanger *et al.*, 2012).

Student with intellectual disabilities are distinguished by motivational characteristics that cause them not to actively engage in the task (Büchel & Paour, 2005). As a result, these students may be excluded from potential learning activities that enhance their knowledge and independence due to their difficulties in maintaining engagement. Whereas, the teacher should maximize the student's engagement time to increase learning time (James Levin & Nolan, 2014). According to Farrell, Smith, & Brownell (1998), the special education setting for students with intellectual disabilities can pose a great challenge for the educator because this student population is difficult to manage in the classroom.

Thus, background music played in the class is an educational intervention that has been proven to have a positive impact on behavior management. Several studies have highlighted the effectiveness of music when it is listened by students with special needs (Frisque, Niebur, & Humphreys, 1994; Gfeller, Darrow, & Hedden, 1990; Judith A. Jellison, Brooks, & Huck,

1984). Music has been used in educational programs for young children with disabilities to promote a variety of targeted behaviors (P. Kern, Wolery, & Aldridge, 2007; J. Kim, Wigram, & Gold, 2008; Orr, Myles, & Carlson, 1998). Moreover, its positive effect does not seem new in the field of scientific research (Alward & Rule, 1960).

(Lehmann & Seufert, 2017) defined background music as music that is played in the background in the classroom during the teaching process and the learners are intended to listen to this music but there is no relation between the music itself and the main task. It can be considered as an inexpensive strategy.

There is a growing body of empirical research regarding the role of music in the education of people with disabilities. (R. W. Schwartz, Ayres, & Douglas, 2017) identified twenty studies in a literature review that focus on the role of music in facilitating task engagement, improving performance and changing behavior.

There are various genres of music such as classical, blues, jazz, rap, rock, pop etc. For each type of music used, different impacts were found on students' behavioral responses. For example, Giles (1991) found that first and second graders students responded more positively to background music from classic Disney movies to calm them down after a recess period than to other musical selections. This confirms that the effect of the music depends on the genre of the music being played.

Then, Mozart's music has been widely applied and studied. The investigation of Mozart's music in learning context has been shown to have beneficial effects (Rashidi & Faham, 2011; Savan, 1999). Moreover, using music background is more economical than individual intervention in classroom.

Although there are several studies about using music background as a behavioral intervention, there aren't any studies that study the effect of Mozart, played as a music background, on student's behaviors and especially on engagement behavior.

The present study builds on previous investigations by incorporating music background as a behavioral intervention during gross motor activity setting. So, the purpose of the present study was to extend the literature by evaluating the effects of Mozart on on-task behavior for mild intellectual disabilities students.

METHOD

Participants and setting

This study took place in two Tunisian public centers of special education and rehabilitation for students with mild to moderate intellectual disabilities located in the governorate of Sfax. These associative centers welcome children in educational sections and young adolescents in training professional workshops. One self-contained gross motor activity class from each center was selected to participate in this study. In total, 13 participants were selected for this study (Table 1). In addition, all participants, to be included in the study, had to be diagnosed with a mild intellectual disability. They were diagnosed according to the DSM-5.

Table-1: Participant information's

Participant	Age	Sex	Diagnosis	Class
1	7	F	MID	1
2	8	M	MID, Autism Spectrum Disorder	1
3	8	F	MID	1
4	9	M	MID, Autism Spectrum Disorder	1
5	8	M	MID	1
6	7	M	MID, Down syndrome	1
7	7	M	MID, ADHD	1
8	8	F	MID,	2
9	8	M	MID, Epilepsy	2
10	7	M	MID, Autism Spectrum Disorder	2
11	8	M	MID,	2
12	9	M	MID, ADHD	2
13	7	F	MID	2

Note: ADHD = attention deficit hyperactivity disorder; MID = mild intellectual disability

None of the participants was physically impaired or receiving medication of any type. Two gross motor activities teachers participated to this study. The first is a male and has 15 years of teaching experience and the second is female and have 8 years teaching experience with this population of student.

Each teacher was assigned to teach in a public center of special education and rehabilitation for students with mild to moderate intellectual disabilities. Gross motor activities sessions for the two classes were scheduled in the morning and two hours per week sprinkled over two days for each class.

To ensure that participants would benefit from the intervention, the two classes were selected for the study because it met the inclusionary criteria for this study across three preliminary observations. Inclusionary criteria assumed that median level of disruption, including off-task motor and off-task verbal, must have occurred during at least 20% of the intervals and median levels of classroom engagement must have occurred during no more than 80% of intervals for inclusion (Wahl *et al.*, 2016). Observation did not begin once the child's parents have given consent.

Dependent Measures and Data Collection

Engagement served as the dependent variable. Engagement is coded as Active Engagement Time (AET) or Passive Engagement Time (PET) (Wahl *et al.*, 2016). Active Engagement has been defined as actively participate to the gross motor activities or use of material in an appropriate manner. Examples of Active Engagement run, throw, jump, launch ... and talk to a teacher or a peer about the assigned task. Passive Engagement has been defined when the student is following the activity or the teacher but is not engaged actively. An example of Passive Engagement is to watch a demonstration, wait for one's action turn.

Observations took place during a 46- to 50-mn academic period twice day per week for each classroom for an average of 48 minutes. Data were collected across consecutive 15s intervals. Engagement was coded using 15-s momentary time sampling. In order to observe all of the students in the classroom, a rotational system was used where each student was observed for one minute. For example, student number one was observed for one full minute, and then student number two was observed for one full minute, until all students in the class were observed. The sequence was then continuously repeated until the class period ended. The order in which students were observed was randomized each session (Kern *et al.*, 2002). The observer codifies the occurrence of the engagement of the student identified at the corresponding interval.

Data collection began when students entered the room of gross motor activities and ended when the teacher indicated that the lesson was over. During data collection, students were all present. There was no interaction between teachers and researchers regarding the aim of the study.

Inter-observer agreement

Before implementation of the baseline, two observers unaware of the study's purpose and phase changes were trained in data collection. They were initially trained in operational definition and observation procedures. Each observer co-observed with the principal investigator until an IOA of at least 90% was reached. Inter-observer agreement for the dependent measures was assessed during 50% of the observation, distributed across experimental and baseline conditions for each class. Agreement was calculated by dividing the number of intervals with agreement by the number of intervals with agreement plus disagreements and multiplying by 100. Agreement for engagement averaged 94.05 (range, 87.5% - 98.5%).

Social Validity Measures

To assess student's opinions of the intervention, each student independently responded verbally to three yes/no questions asked by data collector in a Class Evaluation Sheet at the end of the second intervention conditions. Questions are: Did you like the practice of physical activities accompanied by background music played during the physical activities session?"; "Did you like that sessions of other disciplines be animated by background music like the sessions of physical activities?"; "Did you like the style of music played during the physical activities session?".

Teacher's opinions of the using music background were also assessed with an Evaluation Sheet asking two yes/no questions: "I find that background music helps manage my students' behavior"; "I will use the background music with future classes". In addition, an open-ended question was added to encourage the teacher to provide any additional information regarding the intervention.

Procedures

Baseline

During the baseline phase, the classroom teachers manage their lessons as usual without change. Music background was not played during this phase.

Pre-intervention

Before starting the intervention, the researcher has selected four orchestral compositions by Mozart as shown in Table 2 and informs the teachers that their sessions will be animated by background music while preparing the lessons as well as habit and maintaining their usual organizational ritual.

Table 2: List of orchestral compositions by Mozart selected as background music

Orchestral composition title
Concerto for horn & orchestra no. 3 in E (K447)
Concerto for clarinet & orchestra in A (K 622)
Symphony no.41 in C, « jupiter » (K 551)
Symphony no.40 in G minor (K550)

Note: K refers to the index of (Von Köchel, 1862)

Intervention

During this phase, background music was played during the gross motor activity sessions for both classes. The musical piece performed is of a total duration of one hour and composed of all four orchestral compositions cited in Table 2, such that each composition lasts for a quarter of an hour. This same musical piece is played during all the intervention sessions. The selected selection has been saved as an mp3. The auditory recording was played on a mini mobile speaker with Bluetooth. Music is played as soon as students enter class and ends at the end of each session. The volume is adjusted so that the teacher's voice can be heard comfortably over the music. The sound intensity was stable throughout the intervention implementation sessions.

Return to Baseline

During these conditions, teachers return to delivering the lesson under normal conditions without listening to background music.

Re-intervention

During these sessions, playing Mozart music background during gross motor activity sessions was re-implemented.

Statistical analysis

All statistical tests were performed using IBM SPSS Statistics 23 Software. Mean and standard deviation (SD) values were calculated for each variable. The Shapiro–Wilk test revealed that percentage of Engagement intervals for class 1 and 2 data were normally distributed. Once the assumption of normality was confirmed, parametric tests were used. Percentage of engagement intervals data, for class 1 and 2, were analyzed using a one-way analysis of variance (ANOVA) across four conditions (baseline A1, intervention B1, baseline A2, intervention B2). When appropriate, significant differences between means were performed using the Bonferroni post hoc test. Significance was accepted for all analyses at the level of $p < 0.05$.

RESULTS

Table 3: Percentage of engagement intervals at the class-wide level for class ‘1’.

% Engagement intervals	Means ±SD	P-value
Baseline A1	36.39± 3.92	-
Intervention B1	37.05± 2.83	1.000
Baseline A2	36.73± 1.41	1.000
Intervention B2	36.61± 1.62	1.000

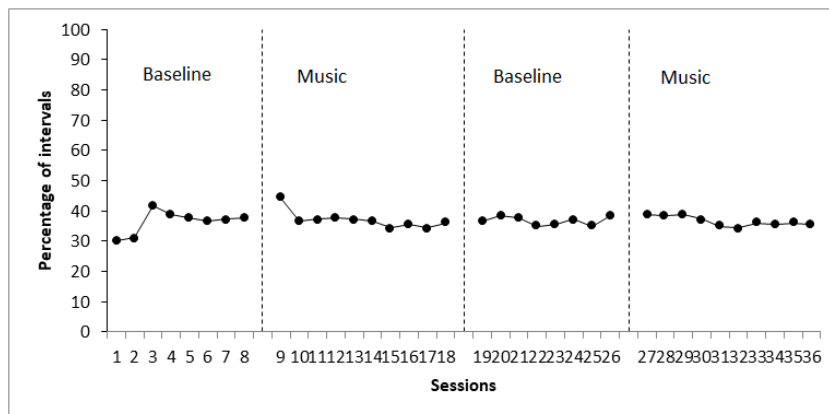


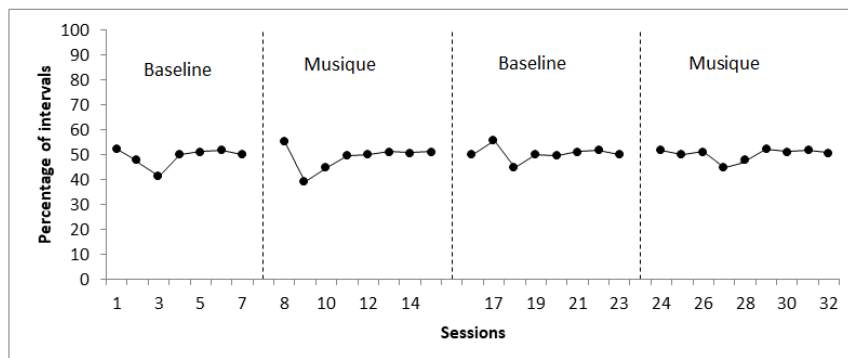
Figure 1: Percentage of intervals with engagement for class ‘1’

To examine the effectiveness of the intervention, engagement was examined through visual analysis of graphed data for class ‘1’ and class ‘2’. Results of the class-wide level of engagement for class ‘1’ are displayed in figure 1 and for class ‘2’ in figure 2. For the class ‘1’, during initial baseline phase A1, engagement level varied between 41.67% to 30% (mean= 36.39). At the implementation of Mozart music background, no variation was observed of the level of engagement in comparison with baseline A1 ($p > 0.001$),

ranging from 34.44% to 44.44% (mean=37.05). At the second baseline A2, level of engagement also does not change, in comparison with previous phase B1 ($p > 0.001$), with a range from 35% to 38.33% (mean= 36.73). During the final re-intervention phase B2, percentages values of engagement’s intervals again do not change, in comparison with previous phase A2 ($p > 0.001$), ranging from 34.44% to 38.89% (mean= 36.61).

Table 4: Percentage of engagement intervals at the class-wide level for class '2'.

% Engagement intervals	Means \pm SD	P-value
Baseline A1	49.05 \pm 3.86	-
Intervention B1	48.82 \pm 4.94	1.000
Baseline A2	50.28 \pm 3.06	1.000
Intervention B2	50 \pm 2.55	1.000

**Figure 2: Percentage of intervals with engagement for class '2'**

For class '2', during initial baseline phase A1, percentage of engagement's intervals converged between 41.11% to 52.22% (mean= 49.05). At the implementation of intervention, no variation was observed of percentage of engagement's intervals in comparison with phase A1 ($p>0.001$), ranging from 38.89 % to 55 % (mean= 48.82). At the second baseline phase A2, level of engagement is still stable in comparison with previous phase B1 ($p>0.001$) with a range from 44.44% to 55.55% (mean= 50.28). During the final intervention phase, level of engagement again still stable compared with phase A2 ($p>0.001$), ranging from 44.44% to 52.22 % (mean= 50).

The social validity results of students and teachers for this study are also presented. All participating students responded that they enjoyed the physical activity accompanied by background music. Whereas, twelve students out of a total of thirteen students replied that they did not like the style of the music played in the background. Regarding teachers, they found that background music did not help manage student behavior. Therefore, they were dissatisfied about the effect of the chosen background music on the behavior of the students. However, they like the strategy of playing the background music and they will use it with future classes. Depending on the question for additional information, they suggest the use of another style of background music different from that of Mozart.

DISCUSSION

According to the visual analysis and statistical analysis of the data in the graph, the results of the present study showed that there is no observable variation in the values of the percentages of the intervals of engagement of the students between the baseline conditions and the conditions of intervention.

This result is the same for the two classes "1" and "2". As a result, the background music played during gross motor activity sessions for students with a mild intellectual disability has no significant effect on their engagement in the two classes in addition to the teacher's dissatisfaction about the effect of the chosen background music on the behavior of the students. To our knowledge no study has studied the effect of Mozart music background on the engagement of students with mild intellectual disability and not during physical activities courses.

The absence of a significant effect of background music on student engagement is consistent with very few studies such as (McCarty *et al.*, 1978) which has shown that music has no significant effect on behavior. In contrast, other researchers have found that music can increase problematic behavior in individuals. For example, the presence of music increased the stereotypical behaviors exhibited by a boy with Down syndrome and moderate intellectual disability (Rapp, 2004) and increased the disruptive behaviors exhibited by a seven-year-old boy with a pervasive developmental disorder (Buckley & Newchok, 2006).

However, the results of the present study are in disagreement with several studies that have shown a beneficial effect of background music on the behavior of participants such as that of (Hallam & Price, 1998) which found a significant improvement in student behaviors due to the background music being played. Moreover, it improves the degree of engagement in activities in a global way (Paul & Ramsey, 2000) and in physical activities in a specific way (Darrow, 2010).

Thus, all the participating students responded that they enjoyed the practice of physical activity accompanied by background music. Whereas, twelve

students out of a total of thirteen students replied that they did not like the style of the music played in the background. So, we can extract that Mozart's lack of significant effect on student engagement is related to the poor appreciation of this genre by students. Certainly, there is a relationship between the type of music used and the behavioral responses of the students and the effect of the music depends on the genre of the music being played. In fact, when music is appropriate at the right time, it provides a favorable advantage and can make students less stressed, more relaxed, happier and more productive (Giles, 1991).

Therefore, to benefit from the benefits of background music, two necessary criteria that the teacher must take into account for the implication of this strategy in the classroom, which are the choice of the right music and the right time. Mozart's lack of significant effect could be explained by the cultural impact factor. As such, Mozart's music has a low degree of ubiquity within Tunisian society and students are not familiar with listening to this musical genre. It may be that if another musical style was selected it could have a positive impact on engagement.

Given the exploratory nature of this study, several challenges were raised for future research. First, it is essential to involve favorite background music to take advantage of its beneficial effect on student engagement as the Mozart musical selection for this study was not appropriate with student preference. Indeed, future research must take into consideration the importance of making a preliminary assessment of the musical genre preferred by students and subsequently the student will be an active pole involved and has a certain degree of self-determination in educational action. Moreover, the intervention should be applied to a larger sample and to other populations such as children in elementary and secondary ages, with other disorders, etc.

CONCLUSION

Results of this study showed that Mozart music background class had no significant effects on student's engagement during gross motor activity session adopted for mild intellectual disability students.

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