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RESEARCH ARTICLE

# Influence of Music Engagement and Movement on Daily Living Skills in Children with Down Syndrome

**Hanwei He[1], Poon Chiew Hwa[2*], Cheong Ku Wing[3]**

[1]Department of Music, Faculty of Creative Arts, University of Malaya, 50603 Kuala Lumpur, Malaysia.
Email: 17221888@siswa.um.edu.my
[2]Department of Music, Faculty of Creative Arts, University of Malaya, 50603 Kuala Lumpur, Malaysia.
Email: chiewhwa.poon@um.edu.my
[3]Institute of Music, UCSI University, 56000 Cheras, Kuala Lumpur, Malaysia.
Email: cheongkw@ucsiuniversity.edu.my

**CORRESPONDING AUTHOR (*):**
Poon Chiew Hwa
(chiewhwa.poon@um.edu.my)

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## ABSTRACT

Many studies have found that Orff-Schulwerk music activities can be used to help children with special needs learn various skills; however, little research has been conducted on Orff-Schulwerk as a tool for helping children with Down syndrome (DS) learn skills of daily living. To fill this research gap, a collective case study was conducted. This study recruited five children with DS aged 7–10 years to participate in an 8-week class to develop two skills of daily living through music engagement and movement (MEM) based on Orff-Schulwerk. Four participants nearly or fully mastered the two skills, and only one did not have complete mastery and needed prompting to perform both daily living skills correctly. This finding suggests that MEM can help children with DS learn skills of daily living. Thematic analysis showed that the fun of musical activities kept DS children interested and enjoying the MEM program. Meanwhile, MEM helped children to concentrate, understand and memorize daily living skills in the class. In addition, the encouragement and affirmation given by the teacher helped them to increase their self-confidence in classes and not to give up easily due to difficulties.

**Contribution/Originality:** The paper's primary contribution is to emphasize the potential benefits of music engagement and movement based on Orff-Schulwerk in helping children with Down syndrome learn daily living skills, and to provide teachers and parents with new ways of thinking about skill acquisition for children with special needs.

## 1. Introduction

It is well known that, due to an abnormal number of chromosomes, children with Down syndrome (DS) congenital mental retardation and motor impairment, among other issues (American Psychiatric Association, 2013). For children with DS, experts focus on the development of a range of skills, such as motor, communication, and social skills, in individuals with DS (Fidler, 2009; Griffith et al., 2010; Marchal et al., 2014). Among

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these, skills of daily living occupy a crucial place in the lives of people with DS (Matthews et al., 2018). As health care has improved, life expectancies for people with DS have increased from an average of 26 years in 1950 to an average of 53 years in 2010, and they continue to rise (Graaf et al., 2017). The ability of people with DS to master skills of daily living is closely related to their quality of life and that of their families. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V, 2013), people with DS require continuous and daily assistance to complete tasks of daily living. However, they can acquire sufficient basic life skills and learn to independently perform simple tasks over time through patient education. In addition, studies of adults with DS demonstrated independence in various skills such as housework, cooking, dressing, and eating (Carr, 1994; Hawkins et al., 2003). Typically, the majority of people with DS exhibit mild to moderate intellectual impairment (Matthews et al., 2018). Some experts refer to moderate intellectual impairment as trainable mentally retarded and to intellectual impairment above the moderate level as educable mentally retarded (Pektaş, 2019).

A rich and stimulating environment can exert a significant and positive impact on children's education. A variety of messages can be delivered to children, using different methods and diverse formats, to positively influence the learning process (Cooper, 2016). Only through rich stimulation in teaching and learning activities can children with special needs be helped to overcome their difficulties in learning. Music provides various stimuli. Musical activities create a joyful learning atmosphere and educational environment for children. Scholars have found that music can be used to support the development of children with special needs (Pektaş, 2019).

## 2. Literature Review

Less but not uncommon research has been conducted on the use of musical activities to help children with special needs learn various skills (Albin, 2016; Imankhah et al., 2018; Juntunen, 2020; Kaikkonen & Kivijärvi, 2013). Of these activities, Orff-Schulwerk music activities, such as songwriting and singing (Kern et al., 2007) and the use of Orff instruments (Duffy & Fuller, 2000) and bodily rhythms (Eren et al., 2013) are most frequently used. However, there has been only limited research on helping children with DS learn various skills through Orff-Schulwerk music activities.

Filianou and Stamatopoulou (2013) explore the effectiveness and advantages of music programs based on Orff-Schulwerk for use for children with special needs. In their study, the participants were five children between the ages of 7 and 10 years who had special needs, including DS, autism, and autism with violent behavior; Angelman Syndrome; and developmental and cognitive disabilities. A music teacher selected songs naming body parts to enable the children to identify body parts and recognize their shape, position, and function to enable them to control their bodies. That study yielded positive results. However, because it was taught in a group setting, it was necessary to determine group similarities among the children to enable them to benefit from the instruction. Nevertheless, the participants displayed different symptoms and needs and few similarities. These limitations of the study restricted the design of the music program.

In addition to this, Choi (2013) conducted a case study of music therapy for DS and autism and found that musical activities helped develop communication and interaction skills in two children. The average age of the participants was 3 years and 8 months. A

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music therapist provided an intervention of 30–60 min per week for 8 weeks. Although the study was focused on the usefulness of family music drama for parent–child interactions, the researchers employed Orff instruments, including rattles, drums, and xylophones in the music activities during the intervention, used music whose melodies were familiar to the children, and wrote lyrics to target activities, such as "I'll catch you" and "Jump." Activities of this type are enjoyable ways of helping children learn movements and develop basic skills. Choi (2013) emphasized that parents should praise their children using such expressions as well done after a task is completed to provide positive reinforcement and help children improve their self-confidence and enable the activity to run smoothly.

Subsequently, Eren (2014) conducted a study of the use of Orff music activities in a mixed population with special needs. This study included three children with autism, one child with DS, and one child with intellectual and physical disabilities. Their ages ranged from 4 to 7 years. The study was conducted once per week for 1.5 h for 3 months and was intended to the children learn new words and concepts through Orff music activities, such as teaching through songs with lyrics and a few dance rhythms. It was found that Orff music activities helped children to learn and improve their social skills.

Recently, Pektaş (2019) explored the impact of writing social stories in terms of musical activities with respect to teaching social skills to children who have developmental disabilities. That study recruited two children with autism and one child with DS, aged from 7 to 15 years. Before the activity, the researchers identified three social skills in which the children were underperforming according to their parents' report. The author then included these social skills in social stories covering various situations that the children may encounter during socialization that provide them with accurate information and positive support for their reactions to various social scenarios. Further songs were written for the study that mixed Orff-Schulwerk principles, Dalcroze eurhythmics, and Kodaly music pedagogy to teach important words and phrases based on social stories. The instruction continued for 8 weeks. Each weekday, the children participated in a 15–20-minute one-on-one music session, for which the author emphasized and complimented correct responses, ignoring incorrect ones. As a result of this, one child with autism and one child with DS made very significant progress in acquiring the targeted social skills. However, one child with autism did not achieve the expected results, perhaps due to his concurrent disorders, which may have influenced his ability to learn. While the study did not only use Orff-Schulwerk and was the result of a combination of various music teaching methods, it can be argued based on this evidence that Orff-Schulwerk is an effective method for teaching children with developmental disabilities.

Experts have affirmed that rich musical activities can help children with DS learn skills effectively. For example, Clark (2011) proposed that it can help improve learning performance in children with DS who, combining a few of their physical movements with music, expressed positive emotion and satisfaction. Certain physical dance rhythms can go beyond improving muscle tone, motor skills, and balance but to enhancing children's ability to participate in daily activities, their quality of life, and their ability to live a nearly normal life. Similar to Clark (2014) found that movement and dance activities helped children with special needs, including those with DS, learn to control large and small muscles in an appropriate manner and to recognize their own body parts. In addition, songs including concepts of everyday life, such as clothing, transportation, food, and numbers, helped these children solve problems in their lives.

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However, the author recommended that researchers should design activities in relation to the type of disability and the individual needs of these children. In summary, using music enrichment activities related to Orff-Schulwerk, incorporating songwriting, singing, Orff instruments, and bodily expression of rhythm or dancing can help children with DS learn various skills.

However, from these studies, only one focused on instruction of skills of daily living. A case study of three children with DS by Wylie (2006) showed that singing through a sequence of actions to be performed through simple songs helped children better understand the tasks to be completed. For example, parents and teachers can sing the different steps of getting dressed using a simple melody. These descriptive songs helped children with DS perform daily tasks better, learn skills of daily living, and improve their quality of life, while reducing parental stress. However, this study used cotherapy, in which up to six therapists, including speech, physical, and cognitive developmental specialists, collaborated to provide the best possible outcome for children with DS. Although music was an important and integral part of the study, the focus of the study was not on exploring the effects of the musical activities.

This study uses a program called music engagement and movement (MEM), based on song singing using Orff instruments and bodily movement to explore the impact that music enrichment activities can have on the learning of skills of daily living among children with DS. To fill these research gaps, the study addressed the following research question:

What is the influence of MEM program involving song singing with Orff instruments and bodily movement on the learning of daily life skills in children with DS?

## 3. Research Methods

The qualitative method of collective case study was used in this research. Collective case study is defined as being applicable when cases share common research questions and use the same approach to data collection and analysis, but at the same time, they are treated as separate cases, each of which deserves to be studied in depth (Cardella, 2014). In this study, all the participants received the same music program, but since each DS child is unique and there may be differences in the effects of the same program for them, therefore, the qualitative method of collective case study was considered very suitable for this study.

### 3.1. Participants

The collective case study used purposive sampling to recruit five children with DS (male: 2, female: 3) whose ages ranged from 7 to 10 years (mean = 8.2, SD = 1.17). They exhibited moderate IQ and above, language skills, and healthy limbs and were without hearing/visual impairment or physical disability. Recruitment of DS children is announced via WeChat (the most popular social software in China) within the Hangzhou Down Syndrome Association, which is one of the largest Down Syndrome organizations in China. Parents of eligible children who volunteered to participate in the study could contact the researcher by phone and email. These five DS children who participated in this collective case study were selected from a preseries study as high-performing participants because they displayed extremely positive and good responses to musical activities. The Research Ethics Committee of the University of Malaya provided ethical

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approval of the study prior to the initiation of recruitment or of data collection procedures.

### 3.2. Procedure

Before the collective case study was begun, the researchers convened with the parents or caregivers of the five participants with DS to determine what skills of daily living the children required to improve. The researcher designed a music curriculum based on these needs, applying simple melodies to these skills of daily living, and taught the children about the Orff instruments and bodily movements. The study used nonparticipant observation methods and video recordings for class observation. Video recording is an advantageous tool for data collection because it can repeat information for data analysis using features such as slow motion and still images. High-quality video recordings can help researchers to capture detailed information concerning more than one participant (Hao, 2018). Each child participated in a single one-on-one MEM session per week lasting for 30 min. This experiment was conducted over 8 weeks. Every lesson was videotaped. After each lesson, the researcher played the video back to capture details. These observations were used to adjust the timing and content of the following lesson, according to the performance of each child. The parents or caregivers were asked to refrain from teaching the participants at home or from requiring them to use the skills of daily living that they were being taught in class during the intervention to ensure the accuracy of the results.

### 3.3. Tasks and materials

After consulting with five parents or caregivers, the study selected two skills of daily living, namely, towel washing and table wiping, for the following reasons. The first was that they are related, as towels are typically washed before and after they are used to wipe a table, and they are coherent actions. Thus, remembering the two skills was easier for the participants relative to two completely unrelated skills. The second reason was that these two skills include the basic actions of many other life skills. For example, the steps used to wash a towel are similar to those for washing a rag, socks, or clothes, although there were certain variations in the details. In addition, the steps for wiping a table, a chair, or a window are nearly the same. The researcher matched towel washing and table wiping to the melodies of Twinkle, Twinkle Little Star and I am a Paintbrush, respectively, songs that were very familiar to the five participants. Finally, the study used a guitar, Orff silk scarves, floor drums, cowhide drums, wrist bells, and a stereo set to demonstrate the steps of the two skills of daily living.

### 3.4. Data Analysis

The methods of analysis varied across case studies, and no one clear, fixed method was used (Stake, 2005; Yin, 2014). However, thematic analysis is a flexible method that can be used to analyze the qualitative data collected through observations (Jason & Glenwick, 2016). Therefore, in this study, thematic analysis was used to treat classroom observations.

## 4. Results

Of the five participants who participated in the MEM skills of daily living class, after 8 weeks of instruction, three participants, P12, P14 and P16, met the teaching objectives

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and had fully mastered two skills of daily living. One participant, P10, mostly met the instructional objectives, with only a small error. One participant, P3, did not fully meet the instructional objectives and required prompting to correctly complete the activities. The fact that 80% of the participants in this study mastered both skills of daily living suggests that teaching these skills through MEM can help children with DS learn and master them. The thematic analysis of the collective case study identified four key themes, including interest and persistence, memorization, concentration, encouragement and affirmation.

### 4.1. Interest and persistence

In almost all of the cases, the participants' interest and positive response to the MEM daily living course was recorded. For example, Case P3 showed significant excitement at the sight of the Orff instruments and immediately clapped her hands happily as soon as the melody began, swaying her body along with the teacher's singing and rhythm. A similar behavior was seen in case P10, who bobbed his head to the music and enjoyed the process of skills practice. P12 was also very curious and interested in the MEM class of skills of daily living, as well as being excited to imitate the teacher's bodily movements in the demonstration. These cases demonstrate the high level of interest in the MEM program on the part of the participants. In turn, the interest in the MEM course helped them persevere in learning skills of daily living. For example, case P16 did not show any negative emotions during the MEM class in spite of being asked by the teacher to perform a limited set of exercises over and over again, which she was very happy to do so long as the music was playing. Even P12 and P14, who came to class with negative emotions for personal reasons, nevertheless cooperated with the teacher to complete the lessons without showing aversion to or rejection of the MEM skills of daily living class. Thus, pleasure and interest in the MEM course maintained the participants' persistence in learning the skills of daily living.

### 4.2. Memorization

In the collective case study, the majority of the cases indicated that MEM was effective for helping participants learn and repeat skills of daily living. The melodies the two skills of daily living were adapted from "Twinkle, Twinkle Little Star," and "I'm a Paintbrush," melodies that were familiar to all participants. When the participants heard melodies that they were familiar with, showed no need to spend additional time studying the music melodies and quickly memorized part of the lyrics. For example, P16 was able to sing the first phrase of "Towel Washing" and "Table Wiping" at the end of the first session. P16 missed a lesson in the third week due to a fever, and when she returned to the class the following week, she was able to quickly recall the phrases that she had learned. A similar process was seen in case P12, who sang along with the teacher at first hearing the teacher performing "Towel Washing" and "Table Wiping," and was able to memorize some complete phrases by the third lesson. By the end of the 8 weeks of practice, four out of five participants could remember what they had learned, indicating the effectiveness of MEM for memorization.

### 4.3. Concentration

Almost all participants showed a high level of concentration during the MEM class. For example, Cases P3 and P14 both showed a high level of concentration, looking at the teacher with full attention while the teacher was singing songs with the Orff instruments

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and bodily movement. Similarly, once the music was playing, P10 was fully attentive, listens well, and is ready to cooperate with the teacher and focus on the teacher's instructions. Case P16 also demonstrated a high level of concentration in these classes. When the teacher presented the two skills of daily living to P16, she was completely captivated and watched the teacher attentively and quietly. These cases show that MEM can help children with DS focus their attention while learning skills of daily living.

### 4.4. Encouragement and affirmation

In almost all cases, the participants had a great need for affirmation and encouragement in their process of learning skills of daily living. For example, P3 is easily feels frustrated, but even though she did not achieve in each session, encouragement by the teacher still made P3 feel happy, and she often had a smile on her face. Case P10 was eager to receive affirmation by the teacher, and she looked at the teacher expectantly for praise every time that she performed a task correctly. When the teacher provided her praise, she smiled happily. On the other hand, P14, who is introverted, shyly turned her head to the side and covered her mouth with her hand upon receiving encouragement and praise from the teacher. In this collective case study, when the participants felt frustrated as a result of finding the task too difficult, the teacher's gentle encouragement helped them change their negative mood and continue to persevere in the lesson. Another participant, P14, who was afraid to sing in class because due to lack of confidence, gradually broke through and began to sing in a low voice with the teacher's repeated encouragement. These cases indicate that children with DS require encouragement and affirmation in learning skills of daily living.

## 5. Discussion

First, all participants in this study showed an interest in the MEM skills of daily living program. For example, case P3 showed excitement at the sight of the Orff instruments and clapped her hands as the melody was played. A similar observation was made for case P10, who shook her head to the music and enjoyed the teaching process. P12 also imitated the teacher's bodily movements on the Orff instruments with great enthusiasm during the demonstration and was very curious and interested in the MEM skills of daily living class. This may because of the fun nature of music, which makes children like and enjoys MEM classes. As some report, the Orff elements and rhythms are in line with children's nature and instincts, following their physical and mental development, allowing them to learn, explore, and perceive through the process of playing music (Calvin-Campbell, 1998; Cary, 2012; Fillips, 2005). In this study, the combination of skills of daily living with song singing using Orff instruments and bodily movements was used to create a curriculum that not only made the knowledge interesting but also created an interest in learning skills of daily living. MEM is more likely to help children with DS understand these skills of daily living than traditional teaching models and is more accessible to them. In this study, through musical activities, all participants were able to quickly understand the concept of the connection and sequence between the two skills of daily living of washing towels and wiping the table. In the MEM classes, the teacher led the participants in a musical activity that could allow them to learn and accept a new concept in a more interesting way than through traditional teaching models, where knowledge is imparted through words only. Second, the interest of the MEM classes and the participants' enjoyment of the classes allowed them to attend and focus. While some participants came to class with negative emotions, they still cooperated with the teacher in their lesson and did not exhibit any resentment or

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rejection of the instruction. It has been shown that intrinsic to continued persistence in learning is personal interest (Huang & Hew, 2017). Therefore, it can be argued that the interestingness of the MEM skills of daily living program can help children with DS acquire new knowledge in a happy learning atmosphere, becoming interested in the new knowledge and persisting in the class.

Eighty percent of the participants in this study remembered two skills of daily living, suggesting that teaching skills of daily living through MEM does help children with DS remember these skills of daily living. As some expert studies have found, using a combination of a familiar melody and a text for participants can help with memory, while combining the text with an unfamiliar melody may give the opposite result (Broadley & Macdonald, 1993; Norris, 2017; Wallace, 1994). In the collective case study, two skills of daily living were adapted from the melodies of "Twinkle, Twinkle Little Star" and "I am a Paintbrush," which were familiar to all participants. Thanks to their familiarity, the participants did not require any time to learn the melodies, and they were able to quickly memorize new lyrical content. For example, P16 was able to sing the first phrases of "Towel Washing" and "Table Wiping" by the end of the first lesson, and P12 could hum along with the teacher at the first demonstration of "Towel Washing" and "Table Wiping." Experts have specifically emphasized that music integrated with a text should be simple, to aid memory, and that if the music contains complex structures and rhythms; this may not be helpful for text recall (Broadley & Macdonald, 1993; Norris, 2017; Wallace, 1994). In line with this, a Chinese scholar has suggested in a study on music therapy for children with DS that the music therapist's choice of music should conform to the following considerations: 1. the phrase length of the song should be 4–12 phrases; 2. it should have a simple 2/4, 4/4, or 3/4 meter; 3. the tempo should be between 52 and 116 beats per minute; 4. the interval between the highest and lowest notes of the piece should be within one octave; and 5. the piece should predominantly be in C major, E major, or G major (Xia, 2010). The melodic characteristics of the pieces "Twinkle, Twinkle Little Star" and "I am a Paintbrush" used in this collective case study are perfectly in line with these requirements: 1. the lengths are 6 and 8 phrases; 2. the meter of the pieces is 4/4; 3. there are no requirements regarding tempo, with the speed of the piece being determined by the comfort of the participants; 4. the interval between the highest and lowest notes of the piece is 6 and 5 degrees; and 5. both pieces are in C major. In addition, the participants' demonstration of accurate pitch, intonation, and pace were not requirements for in this study. During the 8 weeks of the study, no participant indicated to the teacher that the pieces were difficult for them. In addition, the results are also consistent with some previous research findings that constant repetition builds strong and stable memories (Broadley & Macdonald, 1993; Norris, 2017; Wallace, 1994). As previously noted, in this study, the participants did not show any negative emotions, in spite of being asked by the teacher to perform repetitive exercises due to the fun nature of the lessons and their enjoyment of the MEM lessons. The review exercises helped the participants form memories, and at the end of the 8 weeks of practice, four of the five participants remembered what they had learned.

In this collective case study, the participants responded well to song singing, Orff instruments, and bodily movement, with almost all participants paying full attention to the teacher while she demonstrated the songs, showing a high level of concentration and interest. Previous studies have found that music is closely related to the regulation of emotion, and auditory musical stimulus can transmit happy messages and cause dopamine to be secreted in the brain. This pleasurable, positive mood forms part of a dopamine reward system that is strongly associated with cognitive functions, including

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increased productivity and attention; to some extent, it can aid memory (Badgaiyan et al., 2009; Rawana et al., 2014). As noted, musical activities can generate happy emotions and engage the attention of people with intellectual disabilities. This positive emotion enables them to participate more actively in their activity and to focus their limited attention on the learned material (Tyng et al., 2017). The results of this study are grounds for speculation that singing with Orff instruments and bodily movement may help those with DS improve their mood and focus their limited attention on learning skills of daily living, helping them understand and remember what was taught in class.

In this collective case study, it was found that all participants had a strong need for affirmation and encouragement as they learned skills of daily living. For example, case P10 smiled happily when she was affirmed by the teacher during the learning, while introvert P14 would shyly turn his head to the side and cover his mouth with his hand to quietly laugh when he received encouragement and praise from the teacher. For children with DS, who often experience failure and feel easily defeated, encouragement and affirmation are important for helping them gain self-confidence. Other studies suggest that the strategic use of praise can help improve a child's sense of competence and confidence (Brummelman et al., 2014; Cimpian, 2010; Henderlong & Lepper, 2002; Mueller & Dweck, 1998; Zentall & Morris, 2010). Praise for competent performance may have adverse effects if it makes the child feel pressure, believing that praise will only be forthcoming upon adequate performance. It may take children with DS a long time to master new skills, when it is more important to praise effort than ability. The focus of praising effort falls on the process of trying to learn, not on the end result (Davison et al., 2021; Mueller & Dweck, 1998; Nicholls, 1984). This form of praise helps children persist in their studies and not give up on their efforts, and it also helps them build self-confidence. For example, in this collective case study, where cases P3 and P12 felt lost because they found the task too difficult, the teacher's gentle encouragement helped them to exit their negative mood and continue with the lesson. In addition, P14, who had been afraid to sing in class due to his lack of confidence in singing, gradually broke through and began to sing in a low voice after the teacher encouraged him several times. Children with DS may find it difficult to learn skills of daily living, and encouragement from parents and teachers is especially important as they do so.

## 6. Conclusion

After 8 weeks of MEM instruction on skills of daily living, three out of the five participants fully mastered the skills, one participant obtained basic mastery, and one participant still required prompting to correctly perform the two skills of daily living. The fact that 80% of the participants mastered the two skills indicates that teaching children with DS through singing with Orff instruments and bodily movements in MEM classes is beneficial for learning and mastering activities forming pats of skills of daily living. This may be because the enjoyable nature of the music activities kept the children interested and enjoying the MEM program, and persisting in their studies. In addition, the encouragement and affirmation provided by the teacher helped them to increase their self-confidence in the class and not to give up easily because of difficulties. The teaching of skills of daily living through MEM helped the participants concentrate in the class and understand and memorize the activities of the skills of daily living. However, a point of clarification is that the MEM curriculum is only an aid to teaching skills of daily living; that is, it can help children with DS understand and learn the procedures and steps of skills of daily living more quickly and in a fun way. However, it cannot replace the actual teaching of skills of daily living. Knowledge learned in the classroom must be

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applied to reality, requiring the joint effort and cooperation of teachers and parents. In addition, the study had its limitations. First, the sample size was small, with only five participants, which limits the generalizability of the results. Thus, we recommend that future studies in this line be conducted in larger groups. Second, the curriculum in this study focuses on gross motor skills, which include postural control, mobility, balance and coordination, as opposed to fine motor skills, including hand movements, hand-eye coordination, and the use of tools, such as grasping tools. Since many skills of daily living require fine motor skills, such as tying shoelaces and buttoning clothes, for curriculum design, we suggest that future studies design musical activities to emphasize fine motor skills, such as, for example, adding gesture games, such as finger snapping, to help children with DS develop finger dexterity.

## Ethics Approval and Consent to Participate

The researchers used the research ethics provided by the Research Ethics Committee of Universiti Malaya (UMREC). All procedures performed in this study involving human participants were conducted in accordance with the ethical standards of the institutional research committee. Informed consent was obtained from all participants according to the Declaration of Helsinki.

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The authors reported no conflicts of interest for this work and declare that there is no potential conflict of interest with respect to the research, authorship, or publication of this article.

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