The Use of Music Therapy Interventions to Improve Pre-Reading Skills and Reduce Off-Task Behaviors during Reading Tasks of a Child with Autism Spectrum Disorders

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Abstract

The purpose of this study was to examine the music therapy interventions used to improve pre-reading skills and reduce off-task behaviors during reading tasks of a 6-year-old child with Autism Spectrum Disorders (ASD). This study employed ABAB single-case experimental and qualitative case-study design. In the study, the music therapy interventions (B) were provided four days a week alternatively with non-music conditions each week including five days of baseline phase (A). The Word Reading Test (WRT) was used to evaluate pre-reading skills and Off-task Behavior Observation Form was employed to measure the off-task behaviors of the participant during reading tasks. The results were represented using visual inspection and qualitative case analysis.

The results showed that the word reading scores of the participant were increased during both music and non-music conditions, but the scores rapidly improved during participating in music therapy sessions. In terms of off-task behaviors, participant exhibited off-task behaviors about 50% of the sessions. On the contrary, the off-task decreased dramatically while engaging in music therapy sessions and also reduced during participating in the second non-music phase.

Keywords: Music Therapy Interventions, Pre-Reading Skills, Off-Task Behaviors, A Child with Autism Spectrum Disorders

[1]This study is a part of Master's thesis of Wiputh Kehasuwan submitted to Mahidol University

การใช้กิจกรรมดนตรีบำบัดเพื่อพัฒนาทักษะการอ่านคำและลดพฤติกรรมไม่มุ่งงานขณะเรียนในเด็กออทิซึม

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บทคัดย่อ

การวิจัยในครั้งนี้มีวัตถุประสงค์เพื่อศึกษาผลของการใช้กิจกรรมดนตรีบำบัดเพื่อพัฒนาทักษะการอ่านคำและลดพฤติกรรมไม่มุ่งงานขณะเรียนอ่านในเด็กออทิซึมอายุ 6 ปี โดยใช้ระเบียบวิธีวิจัยกรณีศึกษากรณีเดี่ยว (ABAB single-case design) ร่วมกับการวิจัยกรณีศึกษา (qualitative case study design) การทดลองประกอบด้วยระยะ Baseline คือการเรียนอ่านคำแบบไม่มีดนตรีสลับกับการเรียนอ่านคำแบบมีกิจกรรมดนตรีบำบัด เครื่องมือที่ใช้ในการวิจัย ได้แก่แบบทดสอบการอ่านคำ ใช้สำหรับประเมินการทักษะการอ่านคำ และแบบสังเกตการณ์พฤติกรรมไม่มุ่งงาน ใช้สำหรับวัดพฤติกรรมไม่มุ่งงานที่เกิดขึ้นขณะเรียนอ่านของผู้เข้าร่วมวิจัย ข้อมูลทั้งหมดถูกนำมาวิเคราะห์ในเชิง คุณภาพและได้รับการนำเสนอในรูปแบบของกราฟเส้นเพื่อแสดงให้เห็นถึงพัฒนาการด้านการอ่าน และการลดของพฤติกรรมไม่มุ่งงาน

ผลการวิจัยพบว่า คะแนนการอ่านคำของผู้เข้าร่วมวิจัยสูงขึ้นทั้งการเรียนอ่านคำแบบมีกิจกรรมดนตรีบำบัดและไม่มีดนตรี แต่คะแนนการอ่านคำจากการเรียนอ่านแบบมีกิจกรรมดนตรีบำบัดนั้นพัฒนาได้อย่างรวดเร็วมากกว่าการเรียนแบบไม่มีดนตรี สำหรับพฤติกรรมไม่มุ่งงานนั้น ในการเรียนอ่านคำแบบไม่มีดนตรีพบว่า ผู้เข้าร่วมวิจัยแสดงพฤติกรรมไม่มุ่งงานประมาณ 50 % แต่ในทางกลับกัน พฤติกรรมไม่มุ่งงานลดลงอย่างเห็นได้ชัดในการเรียนอ่านคำแบบมีกิจกรรมดนตรีบำบัด เมื่อการเรียนอ่านคำแบบไม่มีดนตรีย้อนกลับมาอีกครั้ง ผู้เข้าร่วมวิจัยแสดงออกพฤติกรรมไม่มุ่งงานเพิ่มขึ้นเพียงเล็กน้อย

คำสำคัญ: ดนตรีบำบัด, ทักษะการอ่านคำ, พฤติกรรมไม่มุ่งงาน, เด็กออทิซึม

[1]บทความวิจัยนี้เป็นส่วนหนึ่งจากวิทยานิพนธ์ของนางสาววิพุธ เคหะสุวรรณ ตามหลักสูตรการศึกษาระดับปริญญาโท มหาวิทยาลัยมหิดล

Introduction

Autism Spectrum Disorders (ASD) is a complex developmental disorder, which demonstrates core characteristics in social communication and interaction, and repetitive or restrictive behaviors (American Psychiatric Association [APA], 2013). ASD frequently co-occurs with intellectual disability, learning disabilities, language impairment (APA, 2013), and oral language impairment (Bishop & Snowling, 2004). These disabilities can lead the children with ASD to manifest reading problems, ranging from completely unable to read to read accurately but poor in comprehension (Nation, Clarke, Wright & Williams, 2006; Frith & Snowling, 1983). According to the studies on ASD children's reading skills, most of the children achieved the average scores in decoding words, nonsense words, and reading accuracy; on the other hand, the reading comprehension was very poor (Frith & Snowling, 1983; O'Connor & Klein, 2004; Nation et al., 2006). However, studies demonstrated that children with ASD have problem in reading accuracy rather than reading comprehension (Hambley, 2011; Aaron, Fantz & Manges, 1990).

Reading is important for children because it is a fundamental skill for learning, acquiring new knowledge, and has important roles in developing many skills such as oral language, vocabulary, and writing skills (Pang, Muaka, Bernhardt & Kamil, 2003). As stated in Mirenda and Erickson's (2000) study, reading related to language and social development because it enhances expressive and social communication. Moreover, reading helps increase overall cognitive development. There are many factors that lead children to become a successful reader. Being a good reader requires not only age-appropriate physical, mental, cognitive, and social skills, but also pre-reading skills (Snow, Burns & Griffin, 1998). Pre-reading skills refer to the important basic skills that need to be developed in order to be ready to learn reading (Jedsadawiroj, 1998; Scarborough, 2001). The skills that can affect later reading skills are spoken language, background knowledge, matching, print awareness, letter knowledge, and phonological awareness (Snow et al., 1998; Jedsadawiroj, 1998; Scarborough, 2001). Whitehurst & Lonigan (2001) explained based on a number of previous researches that phonological

awareness, print awareness, and oral language skills are the foundation skills that play an important role in learning to read. Pre-reading skills in this study refer to the ability to recognize alphabets and vowels, to blend consonant with vowel, to blend words, and to read the simple words. Additionally, having an interest and motivation to read is one of the important factors that help develop reading skills (Snow et al., 1998). Because of the symptoms of ASD, the children may exhibit short attention span, repetitive behaviors that can interrupt learning environment (Edelson, 2015). Therefore, they may not pay attention to reading.

Off-task behaviors can also cause reading failure in the children with ASD (Greenwood, Delquadri & Hall, 1984). Off-task behavior refers to the behavioral responses that interrupt the learning environment or break the rules of the class. Off-task behaviors can be *Verbal off-task* (V) such as talking to a peer, echoing, talking out of topic, or laughing; *Motor off-task* (M) such as getting out of the seat, running around, self-stimulating, playing with an object that is not involved in the activities, or throwing objects; and *Passive off-task* (P) is when the participant is involved in no response/interaction with the task or activities such as looking away from the task, staring into space, or looking something unrelated to the task/activities (Colwell & Murrless, 2002; Madsen & Madsen, 1981).

Music therapy is the professional use of music elements by a qualified music therapist to address individual's needs. Music therapy uses music based on client's music preference and uses research-based interventions in the area of physical, emotional, social, cognitive, and communication skills according to social, cultural, and religion contexts (World Federation of Music Therapy, 2011; American Music Therapy Association, 2014; Canadian Association of Music Therapy, 1994). Music is beneficial for enhancing academic skills and helps motivate children to be more on-task during learning (Colwell 1994; Madsen, 1991; Register, 2004). Moreover, music is also used as a mnemonic device that helps children memorize data or target information (King, 2004). Standley's (2008) meta-analysis indicated a positive effect of music on reading and pre-reading skills in children. There are various music methods used to access reading problems such as music

contingency, music instructions based on Kodaly's, Dalcroze's, and/or Orff's methods, and special music therapy activities emphasizing on reading (Corpans-Astrand, 2000; Kelly, 1981; Lu, 1986; Gordon, 1977; Eisenstein, 1974; Nicholson, 1971; Olanoff & Kirschner, 1969; Colwell, 1994; Register, 2004). The previous studies used singing, music instrument playing, movement with music, and song writing as tools to enhance reading skills in many children such as specific learning disabled children, at risk, and intellectual disabled children. Unfortunately, there was no music intervention for improving reading skills in children with ASD. Therefore, it is important to investigate the use of music therapy interventions to improve reading skills and reduce off-task behaviors during reading tasks of children with ASD.

Purpose of the study

The purpose of this study was to investigate the effectiveness of music therapy interventions using to improve pre-reading skills and reduce off-task behaviors during reading tasks in a child with Autism Spectrum Disorders (ASD). The research questions were 1) Does music therapy improve pre-reading skills of a child with ASD? and 2) Does music therapy reduce off-task behavior during reading tasks?

Method

1. **Design**

This study employed ABAB single-case experimental and qualitative case-study design in order to investigate the effectiveness of music therapy using to improve pre-reading skills and reduce off-task behaviors during reading tasks in a child with ASD.

2. **Participant**

The participant in this study was a six-year-old Thai boy with Autism Spectrum Disorders. Selection of the participant was based on the following criteria: 1) the 6 year-old child who was diagnosed as having Autism Spectrum Disorders, 2) the child who presented problem in reading, 3) the child who exhibited off-task behaviors during reading tasks, and 4) the child who was permitted to attend this study by the parents.

3. **Baseline**

During baseline phase in a private room, the researcher took a responsibility to teach reading with regular reading instructions to the participant in the 45-minute session, five consecutive days. The

session began with greeting. Then the activity board was presented to the participant to see the six reading activities of the day. Moreover, the activities were paired to address the same vowel (total 3 vowels) and the participant was taught with the regular reading instruction including phonic sounds, vowels and blending single syllable words. The reading materials such as colorful plastic alphabet letters, word cards, pictures, jigsaw puzzle, and games were also used. After finishing all of the reading activities, the participant was tested to reading 15 target words from the Word Reading Test. Finally, the session ended with the researcher and the participant saying goodbye to each other.

The participant's pre-reading skills and off-task behaviors were observed and scored by the researcher and a board-certified music therapist from video camera through the sessions.

4. **Music Therapy Interventions**

The music therapy sessions were in the music therapy room, College of Music, Mahidol University. The researcher, the music therapist, was responsible for teaching the participant with music therapy interventions emphasizing on reading in 45-minute session. There were also greeting, six music therapy activities emphasizing on reading, reading test, and goodbye. Music was integrated in most of the session except in reading test, but it might be if the participant refused the test. The researcher used the same reading instructions with colorful reading materials, pictures, songs, and music instruments. The music therapy interventions were created based on the Reporting Guidelines for Music-based Interventions (Robb, Burns & Carpenter, 2011). Moreover, six music activities of each session were designed based on the participant's familiarity and preference. This study used live music consisting of singing, dancing or movement to music, instrument playing with reading musical notes, and song writing.

Procedures

The participant's parents and the classroom teacher were interviewed about his reading skills, behaviors in the classroom, and music background and experiences. The information was used to assess the participant's reading skills and off-task behaviors; in addition, it was used to plan both regular reading instruction and music therapy interventions, and to

develop the research instruments that matched with the participant of the study.

This study employed ABAB reversal design. The participant was engaged in baseline sessions (phase A) for five consecutive days followed by four consecutive days of music therapy session (phase B), then repeated phase A and B once again. The researcher as a music therapist provided 45-minute sessions for the participant in both music and no music conditions at music therapy room, College of Music, Mahidol University. Word Reading Test (WRT) was used to assess the participant's pre-reading skills and Off-task Behavior Observation Form was utilized in order to assess off-task behaviors of the participant. A video camera was used to record all through the sessions; therefore, the researcher and a board-certified music therapist recorded the participant's reading skills and off-task behaviors from video camera all through the sessions.

1. **Dependent measures**

1.1 **The Word Reading Test (WRT)** was used to test the pre-reading skills of the participant in this study developed from the word-reading test of Chuaypan (2009). This test was used to assess whole word reading and reading by blending sound into words with the simple words. There were four sets of word lists and each set consisted of 15 words with three vowels. The Thai language teacher, the special educator, and the board-certified music therapist were invited to develop this test. Additionally, the inter-observer reliability of the Word Reading Test showed a strongly significant correlation ($r = 1$, $p < .01$).

1.2 **The Off-task Behavior Observation Form** is 10-second interval recording that was used to observe and record the child's off-task behaviors: verbal off-task (V), motor off-task (M), and passive off-task (O). The form was developed from Madsen and Madsen's (1981) the classroom behavioral observation strategies and Behavior Assessment System for Children (Kamphaus & Reynolds, 1998). The observers would code the behavior only once even the behavior happened repeatedly in the same category during the same interval. The researcher and a board-certified music therapist observed the participant's behavior for 10 seconds and then the video was paused for five seconds to let the observers record the observed behavior. The inter-rater reliability of this instrument produced a

strong significant correlation including verbal off-task ($r = .99$, $p < .01$), motor off-task and passive off-task ($r = 1$, $p < .01$), which showed high agreement rates between the two observers.

2. **Data analysis**

Visual inspection was used to evaluate the effectiveness of an intervention and display the data from baseline and intervention phases graphically (Kazdin, 1982). In this study, each session, the data of reading abilities and off-task behaviors were illustrated by plotting the simple line graph. The graph represented the changes in level, slope, and trend of the participant's reading abilities and off-task behaviors that associated with the data.

2.1 **Case study data analysis** was used to analyze the qualitative results of the participant's reading abilities and behaviors during the session from videotape. The case study analysis could in-depth narrate the happenings during participating in the sessions.

Results

1. **Pre-reading Skills**

The mean score of the baseline phase (A1) was 34 out of 75. In session 1-4 of the baseline, the scores gradually increased from 27 to 46. Yet, the score suddenly dropped to 34 in the last session. On the contrary, the average score of the music therapy phase B1 was 44.75, with a range of 24 to 57. The score improved immediately to 44 in the second session of the phase B1. However, the score of the non-music phase A2 increased slightly from 22 to 51, with a mean score of 36.5. The participant performed the best reading scores in the last music therapy phase B2 with a mean occurrence of 45.25. The score also improved dramatically from 29 to 47 in the second session, and reached 58 points in the last session.

2.2 **Off-Task Behaviors**

In this study, the participant's off-task behaviors were divided into three categories: (1) verbal off-task, (2) motor off-task, and (3) passive off-task behaviors. The data collection of off-task behaviors was calculated into percentage presented by the line graphic display. The results were shown into two parts: by overall number of off-task behaviors in figure 2 and by the three categories of off-task behaviors in figure 3.

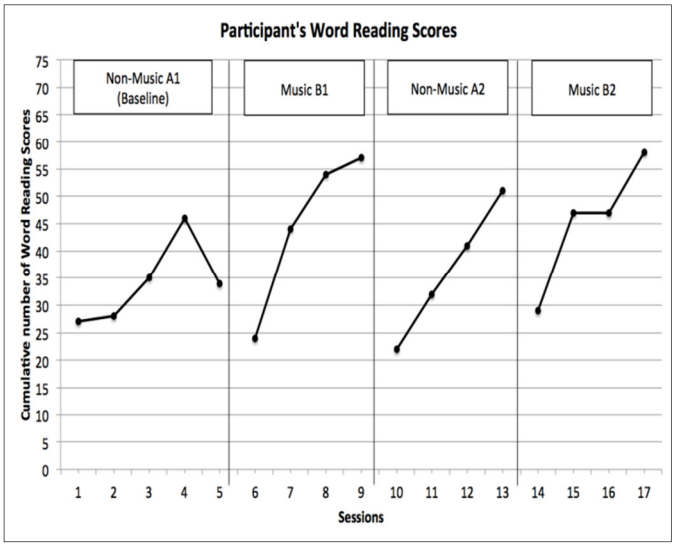

Figure: 1 Cumulative numbers of the participant's word reading scores during non-music and music phases.

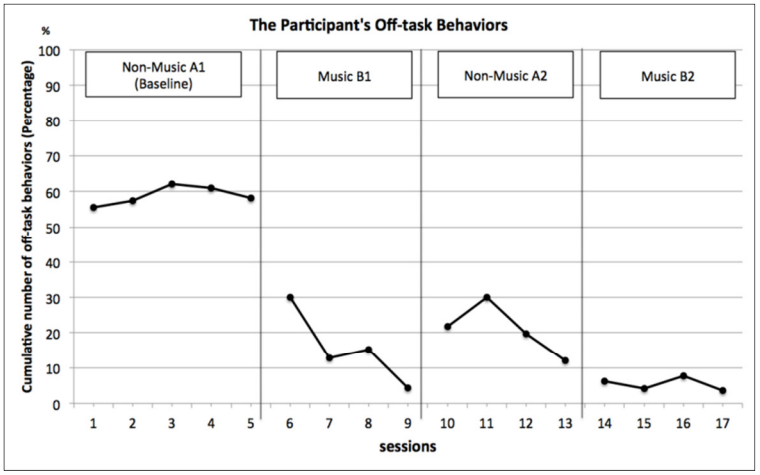

Figure: 2 Cumulative numbers of the participant's overall off-task behaviors during non-music phases and music phases

The cumulative numbers of overall off-task behaviors shown in figure 2 demonstrated that the participant exhibited the most off-task behaviors during baseline phase (A1), with a mean occurrence of 58.7%. The participant's off-task behaviors decreased dramatically in music phase B1, with a mean percentage

of 15.5%. The off-task behaviors increased again in the non-music phase A2 with a mean occurrence of 20.9%. Finally, the mean occurrence of off-task behaviors in the music therapy phase B2 was only 5.7%, with a range of 4.1 and 7.8%.

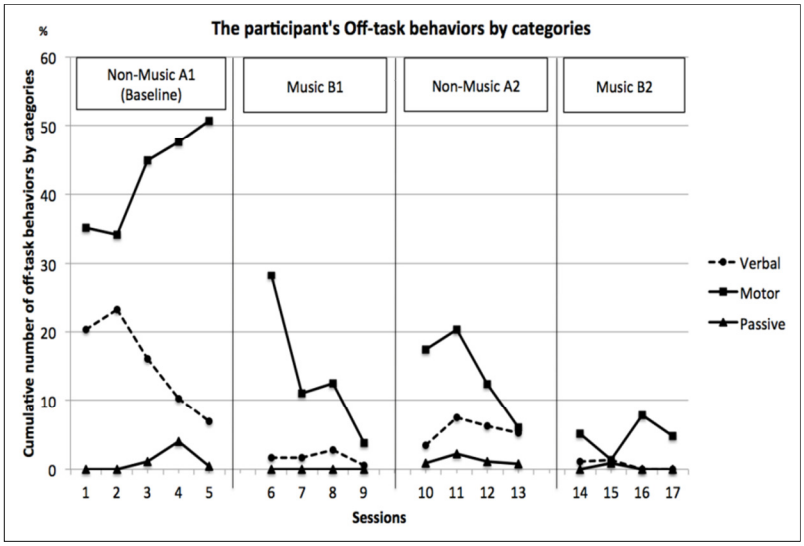

Figure 3: Cumulative numbers of the participant's off-task behaviors during non-music and music phases divided into three categories: verbal, motor, and passive off-task behaviors

The percentages of off-task behaviors were shown in figure 3 with further break down of off-task behaviors into verbal, motor, and passive off-task behaviors. The motor off-task was a prominent off-task behavior of all phases. The highest number of motor off-task during reading tasks was in the baseline phase (A1) with a mean occurrence of 42.5%. On the other hands, the participant exhibited the smallest number of motor off-tasks during music phase B2 (4.7%). In terms of the verbal off-task, the participant exhibited the most verbal off-task during baseline phase, with a mean occurrence of 12.1%. On the contrary, the less verbal off-task behavior was in music phase B2. However, passive off-task behavior was rare in this study. The participant exhibited passive off-task mainly in the baseline and non-music phase A2 with a mean occurrence of 0.317% and 1.23%. On the other hand, there was no passive off-task

presented during music therapy sessions in phase B1.

Summary of Qualitative Analysis

Background of the participant

The participant was a six-year-old Thai boy with Autism Spectrum Disorders diagnosed by a doctor in a hospital in Bangkok. He was in the kindergarten 3. He has been receiving music therapy for three years with other therapeutic goals such as increasing attention, following direction, and reducing repetitive behaviors. Before participating in this study, the participant was able to recognize all 44 Thai alphabet letters and some vowels (total 32 vowels). He could only read a very few simple words. Moreover, the parents or the classroom teacher had initiated him to read and also had to help him while reading. He only verbally repeated the words after the parents and the teacher, and he always ran away when he was asked to read. Generally, he always exhibited off-task behaviors and did not follow the direction of the parents and the teachers especially in reading time. At school, the teacher reported that he presented inattentive behaviors in the class. He frequently stared at another thing, and teacher had to call his name for many times to do the reading tasks. Also, it required a lot of conditions to make him read at home. The parents had to offer a lot of rewards such as snacks, games, or allowing him to ride a bicycle after completing reading tasks. However, he would run away before he could finish it.

Phase Baseline (A1): non-music

During learning time without music, he exhibited off-task behaviors such as running out of the task, playing with stuffs, looking at another thing, giggling, screaming, and talking out of the topic more than 50 percent of the sessions. He mostly verbally repeated after the researcher without looking at the words; moreover, his voice was soft and inattentive. The session contours were silent and flat even the researcher used a lot of large colorful stuffs and pictures in the reading activities. Even he frequently presented off-task behaviors, his reading skills were improved consecutively except for the last session that he refused to participate in the last sessions and the reading scores suddenly dropped to 34 points.

Phase B1: music therapy

With music therapy interventions, the participant engaged more in reading tasks. He looked at the word and read aloud actively while participating in musical activities such as playing piano and drums with favorite songs and moving along the music. The interesting point is that he seldom made mistakes in blending sound with the target vowels. However, he still exhibited the off-task behaviors but it was much shorter and less than in non-music sessions. When he ran away from the task, music was used to bring him back to the task easily. For example, the participant ran around the table non-stop during learning blending new word. He did not stop when the researcher spoke to him but he stopped when the researcher sang his favorite song to him and gave him a music cue at the end of the song to stop running. Then the new song was sung continuously to inform him the reading task.

Phase A2: non-music

In this phase, he paid more attention during learning to read. He ran away or verbally refused the task only at the beginning of each activity. The researcher just called his name once then he came back and completed the task. However, he still denied doing the tasks. Moreover, he was inattentive while reading the words, and often verbally repeated after the researcher without looking at the words. Therefore, the participant always pronounced words and vowels incorrectly, or read the words before looking at the word cards. For overall of this phase, he behaved much better and participated more in reading tasks without music; as a consequent, his reading skills were much improved.

Phase B2: music therapy

While participating in music therapy sessions in this phase, the participant paid the longest attention in the reading tasks of all phases. Even the number of the words was increased in each activity, he did not refused to read or write them. He was able to read the words repeatedly at the end of some activities when the researcher sang a song asking him to read them again. Sometimes music was used as a reward to motivate him to read. He seemed happy when he was playing music

instruments especially piano and drums. Additionally, he often read the words without prompting from the researcher because he would like to play the instrument early. Overall, he mostly participated in reading tasks attentively and is reading scores were improved rapidly.

Discussion

Music and pre-reading skills

The learning speed of the music phases was much faster than the scores of the non-music phases evidenced by the higher mean scores of both music phases (44.75 and 45.25). Many musical factors may pay parts in the better learning results. Engaging music activities and music elements such as melody and sustainability of the chosen musical instruments could play the role in higher mean scores in music phases.

Music activities were very engaging. Music could activate the attention system, which associated with many areas of the brain and was the memory and language foundation (Davis, Gfeller & Thaut, 2008; Jensen, 2000). Music especially preferred music provided an interesting and familiar environment that could grab one's attention and could shift the attention to a specific task (Davis et al., 2008). In every music session, the piano and the drum were used to motivate the participant to read words. During piano activity, he was eager to read words when the words were used to substitute his favorite song's written music. He was very cooperative in reading tasks during drumming activity whether the drumming was used as a reinforcer or as a mean to gather attention. Additionally, being successful in music making provided the sense of accomplishment, which encouraged future engagement (King, 2004). Reading tasks that were paired with successful music making experience inspired the participant to read more.

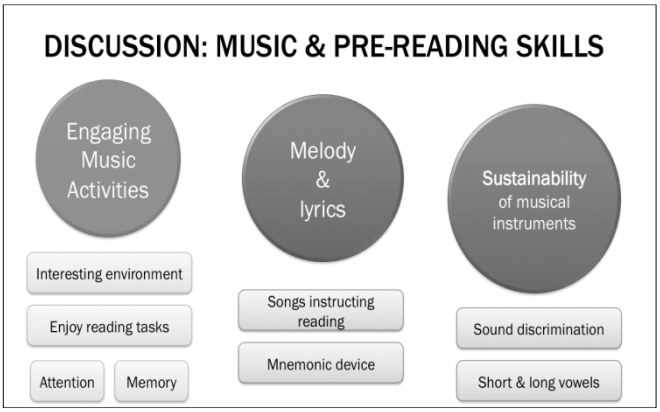

Figure 4: Discussion of music and pre-reading skills

Melody was one of the musical elements that may help improve higher pre-reading scores of the participant during music therapy phases. Taylor (2010) indicated that the perception of melody and rhythm is associated with the frontal cortex of the brain where stores working memory; therefore, the information set to melody was stored faster. Davis, Gfeller and Thaut (2008) explained that music could be used as a mnemonic device. The information would be encoded when the attention was stimulated by the familiar music. To store the information into long-term memory, it requires insufficient learning process. Additionally, the previous studies demonstrated that the information would be memorized and recalled faster if it was set with preferred or familiar melody (Wolfe & Horn, 1993; Colwell & Murrless, 2002). During the music sessions, the researcher repeatedly sang a song instructing the steps of blending word while the participant was engaging in reading tasks. As a consequence, the participant could correctly blend the words by himself much faster than when he participated in non-music sessions. In addition, the words set to the melody motivated the whole-word reading and support the word memorization. The participant could pick the word cards that match with the song lyrics sung by the researcher. Afterwards, he himself read aloud the words with a music cue.

The different levels of sustainability of the chosen musical instruments may help develop the pre-reading scores of the music therapy phases. During the participant looked at the letters of short

and long vowels, he pronounced the sounds alternatively in non-music phases. Conversely, the participant could verbally read word with the correct vowel sound after learning to read in music conditions. Some previous researchers used the different musical instruments to help develop reading skills (Colwell, 1988; Roskam, 1979). Colwell (1988) and Roskam (1979) taught music to their students in order to develop auditory discrimination, which was transferred into reading context later. In this study, the researcher chose the musical instrument that had different levels of sound sustainability to support the vowel discrimination. While the researcher was singing a short vowel sound, the wood block that also has short sustaining sound was presented to the participant to play with. On the other hand, the participant would play a tone bar that has long sustaining sound when the researcher sang long vowel sound. After singing the song and playing these two instruments, the participant could verbally blend the words with the correct vowel sound and also could choose the right words from the researcher's dictation.

Music and off-task behaviors

During the baseline phase, the participant exhibited the highest mean percentage of the three off-task categories. Moreover, even the reading scores of the baseline phase were not stable, the researcher could not expand the baseline phase more because he refused to participate in the non-music session. On the contrary, the participant's off-task behaviors rapidly decreased during music phases. There were many reasons why the participant's off-task behaviors were much less in music conditions.

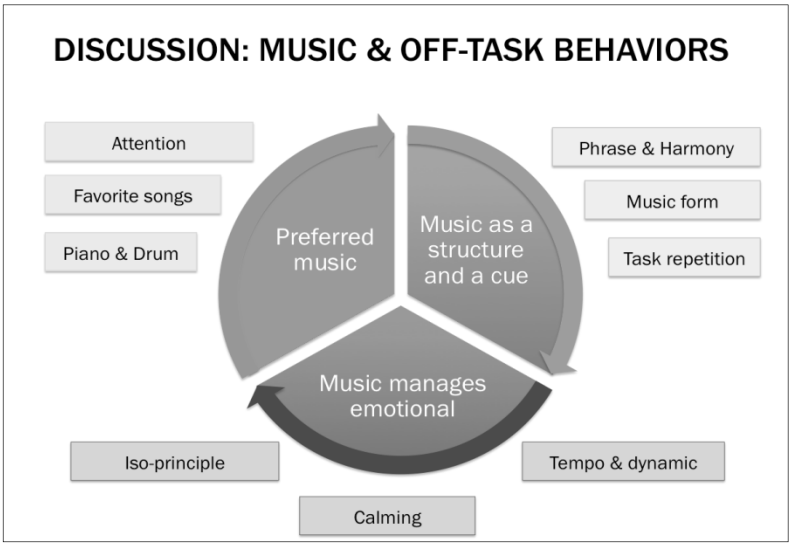

Figure 5: Discussion of music and off-task behaviors

As mentioned earlier in the discussion of music and pre-reading skills, the participant's attention could be drawn by music especially preferred or familiar music. The previous studies also indicated that music provided enjoyable and active environment, which could play an important role in reducing and preventing off-task behaviors during learning time (Colwell 1994; Madsen, 1991; Register, 2004). During music condition, the participant was very engaged in both reading and music tasks simultaneously. Various music activities such as singing, playing musical instruments, and moving with songs were used as a mean to remain attention and as a reward after completing a reading task. The piano and the drum were his favorite musical instruments used to draw his attention during learning to blend and read words. As a reward, many musical instruments such as egg shakers, a floor tome, maracas, hand bells, and ocean drum were used to motivate the participant to learn reading words. He responded very well to music as a reward because he read the word attentively with the facial expression of enjoyment. The motor and verbal off-task behaviors were reduced dramatically and passive off-task behavior also seldom happened during the music condition because the participant was involved in the session that was full of

enjoyment and interesting musical activities.

For the children who have difficulty in maintaining focus especially the children with ASD, repetition is boring and can cause frustration (King, 2004). Music can be used as a structure of time that could inform them about how long of the task they have to be involved. In this study, harmony, phrase, and form of music provided a clear structure of the activity that helped reduce and prevent off-task behavior of the participant. Songs were used to structure the time of reading tasks and then getting a music reward. When he knew the passage of reading time, he fully read the word without running away even he struggled in some words. During the time of playing musical instrument as a reward, the song could remind him about how long he could play music. He could stop playing without frustration and could continue the reading task again. Additionally, the verbal off-task behavior that decreased immediately might be the fact that he was involved in the structured music activities. Therefore, he would not have a chance to talk except when were cued to read aloud the words. Certainly, there would be the time that the participant exhibited off-task behaviors but music could handle those behaviors easier than without music. When the participant ran out of the task, music was used to bring him back quickly. The participant was given a chance to run for a moment with music. Then he stopped with music cue at the end of the song.

Not only music provided a pleasant atmosphere during learning time, it also helped manage the participant's emotion that could affect the behaviors. The iso-principle is one of the music therapy's principles that used to modify behavior. It is the use of music either live or recorded music to entrain with the client's current state and then it is gradually changed to match with the client's need (Michel & Pinson, 2012; Robb, 2008). At the beginning of every session, he was very active and energetic. Without music, he would run around the room and giggled non-stop. It was difficult to stop and bring him to the reading tasks. On the other hand, he was calm down and participated in the task easily during the music condition. When he came in with the over-stimulated mood, the drum was offered to him immediately. The researcher sang a song and played the drum as fast as his tempo. Afterwards, the

researcher gradually decreased the tempo and dynamic until he was calm, and then led him into the reading tasks.

Implications

The results of the study demonstrated that music therapy interventions can be used to improve pre-reading skills and reduce off-task behaviors during reading tasks of a child with ASD. Not only the participant benefited from the music therapy interventions emphasizing on reading in this study, but others also can take advantage of applying music applications from this study.

In the field of music therapy, music therapists can adapt the music therapy applications from this study to use in their clinical practice with the clients with ASD who are struggle in reading. Moreover, those applications can be utilized in order to reduce off-task behaviors during reading activities. Before creating the music interventions, the music therapist needs to assess the client's communication, cognitive, and reading skills. Also, the client's music preferences and abilities need to be assessed in order that the music therapist can serve the most appropriate music intervention for their client. There are diverse music activities including musical instrument playing, singing, moving with music, and song writing. Furthermore, reading tasks integrated with music activities should have a clear structure that would be easy for the client to follow with. For example, this study used the song that provided the tasks step by step, and each phase of the song had different melodies and rhythms. In addition, the length of each task should not be too long depends on the client's reading abilities and attention span. Melody instructing reading comes when the client is involved in the music tasks. Familiar melody would be the most appropriate element to teach the client to read and also remember the steps of blending words. Additionally, the song should not be too long but should be sung repeatedly. In order to have the client read the word, it necessary to give him/her a cue by leaving a second to last beat of the song for him/her to complete. To teach reading to the client who cannot recognize the vowel sounds, the sound of music can be used to develop the auditory discrimination. Choosing the musical instruments that have a contrasting sustainability level such as woodblock and

a tone bar can support vowel discrimination.

In the field of special education teachers or Thai language teachers can benefit from this study by adapting some music applications to use with their students with ASD. As mentioned earlier, it can be very difficult to provide various musical instruments especially the piano for integrating with reading activities. Therefore, using music to teach reading at school should be simple music activities such as singing, moving with music, or playing with small-sized musical instruments. However, the activities should be associated with the students' preference and ability. At school, there are many students in a class and the teacher can adapt the music applications from this study to use as a group. Not only the student will improve reading skills, but may also increase joint playing and social skills of the student with ASD. Music can be used to motivate learning environment and to empower the student to do the reading tasks; therefore, teachers can follow the functions of music used in this study. Normally, most of young children love fun music, familiar melody, fast tempo and these should be used to build structure of the reading activities; moreover, they can be used as a cue, a reinforce, and a reward. Live music is more flexible and adaptable than recorded music, which is difficult to adjust to the student's mood and needs.

Recommendation for Future Research

The results of this study demonstrated that music therapy interventions could improve pre-reading skills and reduce the off-task behaviors during reading tasks in a child with ASD. This study investigated the effectiveness of the music therapy interventions used with only one participant with a short period of collecting data. It may be valuable if the future research will recruit more participants and expand the period of data collection in order to see more reading problems in the children with ASD. It will be a good opportunity to explore the more effective music therapy interventions. Besides, the future research may group the participant together and examine the effectiveness of music interventions when are used with a group of the children with ASD.

This study was conducted in the clinical setting and the participant was

taught to read by the music therapist. The recommendation is that the future research may investigate the use of music to teach reading in the school setting. It can be in special classroom or mainstream classroom.

The reading ability of the children with ASD is various. They may struggle with reading accuracy or reading comprehension. The goal of this study was to teach pre-reading skills. The participant was taught to blend words and memorize the whole words. It would be valuable if the future research investigates the use of music to enhance reading accuracy or reading comprehension skills in the older children with ASD.

Finally, the future research may investigate the music interventions in different music conditions. For example, the researcher may compare singing with musical instrument playing for improving reading skills in children with ASD, The future research should explore the more effective intervention that might help improving the reading skills and reducing off-task behaviors of the children with ASD.

Acknowledgements

This study is a part of master's thesis, College of music, Mahidol University. I would like to express my deepest gratitude to Assoc. Prof. Dr. Dena Register, Dr. Somchai Trakarnrung, and Dr. Natee Chiengchana for their thoughtful guidance, invaluable encouragement, and motivation, which helped me bring this study into a reality. My sincere thanks also goes to my clinical supervisor, Miss Patchawan Poopityastaporn who was always willing to help and give insightful clinical suggestions and encouragement.

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