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The Effect of Music-Based Intervention on Linguistic Skills: A Systematic Review

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Abstract

Music-based approaches, including singing and movement, have received an extensive examination by researchers. Previous study results have revealed that music-based approaches improved young children's music skills and enhanced social, linguistic, and logical thinking skills. This review characterizes and compares existing studies to investigate the use of music and movement to improve linguistic skills. This systematic review followed the SPIDER search tool by investigating the samplings (S), the phenomenon of interest (PI), design (D), evaluation (E), and research type (R). This systematic review includes studies published between 2001-2018 with participants ranging from 4 to 12 years old. The authors investigated the designs of 20 articles.

Keywords: music and movement, young children, linguistic skills, song-based, music education

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INTRODUCTION

In ancient Greek, Plato and Aristotle articulated the importance of music and gymnasium within their music education philosophy. Plato claimed that infants started to learn music and movement by singing and dancing with their mothers. The balance of music and movement played a crucial role in young children's music knowledge and in "cultivating their souls" (Stamou, 2002). Aristotle elaborated and recognized the "gymnasium" approach as physical training (Burkholder, Grout & Palisca, 2019; Stamou, 2002). Lewis (1998) defined the music and movement approach as the combination of music and dance. Educators such as Dalcroze, Orff, and Laban incorporated various approaches and methods that utilizing music and movement in their curricula.

Music-based approaches which included singing and movement have received an extensive examination by researchers. Various researchers investigated the effectiveness of music and movement intervention on young children's abilities. Michelaki and Bournelli (2016) examined how creative movement improved kinesthetic skills among preschool children. Anna (2016) claimed that musical activities were beneficial in early childhood education, especially in the development of linguistic, mathematical, and communication skills. Bharathi, Venugopal, and Vellingiri (2019) studied the Orff- Schulwerk appro-

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ach on social skills among children with autism. They identified that music and movement approaches successfully improved the participants' understanding, responding, and interactions with their peers.

Linguistic skills play a crucial role in children's growth development. According to the Multiple Intelligence (MI) theory by Gardner (1999), linguistic intelligence involved communication skills that allowed learners to engage in society and utilize language to achieve goals. From the existing research studies, many researchers identified that the music and movement approach significantly improved language skills. However, many studies involved children with special needs as their subjects, such as children with down syndrome (Pienaar, 2012), children with dyslexia (Katsarou, 2018), and children with autism (Bharathi, Venugopal & Vellingiri, 2019). In general, few studies exist that focus on typical young children (Moorehead-Carter, 2015; Davis & Fan, 2016). Further, linguistic skills play a crucial part in children's developmental cognitive abilities.

From the existing studies, the proliferation of the music and movement intervention should be well explored by identifying the appropriateness of music-based intervention in different settings of the classroom. This study aimed to contribute to the music education industry by allowing future researchers or educators to compare the interventions and designs listed in this systematic review. The purpose of this systematic review was to investigate existing studies involving music-based intervention on linguistic skills among young children using the SPIDER search strategy tools to address the research questions by investigating the following criteria: samplings, the phenomenon of interest, design, evaluation, and research type on this particular research topic.

METHOD

The method used in this systematic review was adopted according to the SPIDER search strategy tools which included the sample (S), phenomenon of interest (PI), design (D), evaluation (E), and research type (R) (Cooke, Smith & Booth, 2012). The main purpose of this review was to identify the purpose, methodology, and inclusion criteria to evaluate the validity of conclusions (Higgins & Gren, 2005).

Search Strategy

The systematic literature search was conducted from five online databases: Semantic Scholar, Research Gate, SAGE, Science Direct, and JSTOR. Additionally, the authors utilized a manual search through Google Scholar to detect any additional related literature. The following search terms were used: music and movement, singing and dancing, young age children, linguistic skills, and language learning. As the search revealed a large number of recent studies, the authors then limited the studies to those using participants from kindergarten to elementary-age children with typical physical and cognitive abilities published between 2001 to 2018.

Inclusion and Exclusion Criteria

Studies selected were based on the following inclusion criteria: (1) involved participants who were kindergarten age to elementary age with typical physical and cognitive abilities; (2) researchers examined the effects of music intervention, either music-based or music and movement-based, on linguistic skills; (3) methodology included pre- post-test experimental or quasi-experimental.

The focus of this review aimed to study the effects of music and movement intervention on linguistic skills among children. Therefore, the studies compiled various researches design which included quantitative, qualitative studies, and mixed-mode articles that evaluated participants who were not English native speakers, articles that involved various dependent variables which also included linguistic skill variables, or articles that used other interventions combined with music.

The study excluded studies that failed to provide completed demographic data about the participants and others with a focus on special needs children and teenagers. Studies with the non-experimental design were also excluded.

Table 1. Data Analysis

Sample Group Age	Small Sample Size N<30 (%)	Large Sample Size N>30 (%)
Kindergarten	20	40
Elementary	10	25
Kindergarten and Elementary	5	0

From our coding of the data found in the literature, few studies investigated the effectiveness of the music-based intervention on young age children's linguistics skills. This study only focused on music-based intervention with typical children. From the selected studies, there were various methods of music-based intervention discussed to improve linguistic skills. In addition, different dimensions of linguistic skills were evaluated, and a wide range of methodologies were investigated. Thus, the review aimed to review the samplings, phenomenon of interest, design, evaluation, and research type of the studies which focused on music and movement intervention on young children's linguistic skills. The samplings involved children of kindergarten age through elementary age; The range of music-based interventions included (a) music, movement, and play strategies, (b) song-based intervention, (c) existing music-based method, (d) rhythm-based intervention, and (e) music instrumental program; The dimensions of linguistic skills involved (a) reading achievement, (b) pronunciation and fluency, (c) communication skills, (d) vocabulary acquisition, (e) grammatical understanding, and (f) immediate recalling; The different measurements of linguistic skills included (a) daily observation, (b) survey form, (c) vocabulary test, (d) language development test, (f) interviews, and (g) teacher and parent reports; There were three methodologies were conducted which were (a) quantitative method, (b) qualitative method, and (c) mixed-mode case study

RESULT AND DISCUSSION

The search identified 103 articles, with 20 that met the inclusion criteria. Data analysis and comparison between the 20 articles were conducted to investigate the effectiveness of the music-based intervention on linguistic skills. Table 1 lists the selected articles according to the SPIDER method.

Samplings (S)

Tables 2 and 3 show the participants' samplings from the twenty existing studies. These studies were categorized by investigating the age group of participants and the sample size.

Table 2. The Age Group of the Samplings

Sample Group Age	N	Percentage (%)
Kindergarten	11	55
Elementary	8	40
Kindergarten and Elementary	1	5

Table 3. The Sample Size of the Samplings

Sample Group Age	Small Sample Size N<30 (%)	Large Sample Size N>30 (%)
Kindergarten	20	40
Elementary	10	25
Kindergarten and Elementary	5	0

Eleven studies involved Kindergarten children ages four to six as their study participants. Four studies conducted small group samples with less than 30 participants, and eight studies included large group small group samples with more than 30 participants. Most small sample sizes involved qualitative methods such as interviews and observation. The authors conducted daily observations and tracked each participant's daily progressi-

on (Cochran, 2008; Loell, 2001). The large sample groups mostly utilized quantitative methods which involved assessment and test (Davis & Fan, 2016; Lee & Lin, 2015; Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi, 2018).

Compared to the samples using only kindergarten-age participants, most other studies involved larger samples. Coban and Dubaz (2011) involved 52 students and 52 students' parents, Schellenberg, Corrigall, Drys, and Malti (2015) included 83 participants, Maneshi (2017) included 300 students, and Reifinger (2018) involved 170 participants. Two studies with smaller sample sizes which were not more than 30 participants (Carter, 2015; Long, 2014) included recommendations for future studies to use a larger sample size study to increase the data's generalizability. Seven studies involved elementary-age participants but included different participant age ranges. Studies involving a broad age range of participants such as Long (2014) selected participants ages 9 to 13 which had affected the reliability and accuracy of the result due to the different ability and growth development of participants. The intervention was also unsuitable for broad age group participants as it might be overly easy or challenging. Some studies involved a limited age range. For example, Schellenberg, Corrigall, Drys, and Malti (2015) examined 3rd to 4th-grade participants, and Maneshi (2017) had participants who grade 5 and 6. These studies had minimized the participants' age range, presenting more reliable results as it showed the efficiency of the intervention with specific age group participants. Three studies only involved one grade level of participants: grade 3 (Moorehead-Carter, 2015), grade 2 (Reifinger, 2018), and grade 1 (Cochran, 2008). These studies presented more focused and accurate data on the effectiveness of the intervention. However, there was a study that had not stated the age group of participants specifically but only stated elementary-age children (Coban & Dubaz, 2011). This might confuse future researchers with the effectiveness of the intervention on specific age group participants.

One study involved kindergarten and elementary-age children. Maroti et al. (2018) had gathered six to seven years old participants. The study involved 63 participants, and the participants were assigned to three experimental groups: Creative Playing with Music and Movement intervention, Creative Music Appreciation with Movement method, and Kodaly's singing-based method. The authors provided a clear view of the effectiveness of different interventions on young children's linguistic skills.

The phenomenon of Interest (PI)

Various music-based interventions were introduced from the selected studies. The two main interventions were song-based. The song-based intervention was utilized in seven studies, and the participants were guided to sing without movement (Cochran, 2008; Good, Russo & Sullivan, 2015; Maneshi, 2017; Moorehead-Carter, 2015; Reifinger, 2018; Ritblatt, Longstreth, Hokoda, Cannon & Weston, 2013; Zhou & Li, 2017). There were differences existed between the song-based intervention applications. Some researchers involved singing activities (Good, Russo & Sullivan, 2015; Moorehead-Carter, 2015; Ritblatt, Longstreth, Hokoda, Cannon & Weston, 2013; Reifinger, 2018) or listening activities (Maneshi, 2017). Researchers also used a combination of song-based with other designed activities. Cochran (2008) infused singing, discussion, question-answer session, and word chanting game to encourage participants to practice vocabulary and word structure. Zhou and Li (2017) taught the participants through a song-based storybook and encouraged participants to sing along. This intervention showed a positive effect for the song-based intervention on linguistics skills among young children. The positive effect had enhanced the statement from previous researchers, Jensen (2005) and Governor, who agreed that singing could be an effective teaching tool for transferring know-

ledge and information. Yet, the one-based interventions limit the possibilities of including other music activities. Children should not be taught to sit still, sing along, or play instruments in the music classroom. Kihoro (2017) claimed various music activities create an environment where students are engaged. Undoubtedly, they would be more engaged with the class and more energetic and enthusiastic in class. Therefore, there were more studies that had applied the music and movement intervention in their studies.

The music and movement intervention involved a combination of singing and movement activities. Music games played an essential role in engaging participants and provide an enjoyable learning environment. Thirteen studies infused a variety of music and movement interventions with specific approaches/curriculum such as Education Through Music (ETM) (Loell, 2001), Heidi's Songs (Loell, 2001; Martin, 2017), Orff (Coban & Dubaz, 2011), Dalcroze (Long, 2014), and Kodály method (Schellenberg, Corrigall, Drys and Malti, 2015). The flexibility of using music and movement allowed teachers and researchers to plan and design curriculum according to the participants' ages, classroom settings, and linguistic skill levels.

Therefore, self-designed music and movement approaches have been implemented as interventions. Yazejian and Peisner-Feinberg (2009) designed a simple music game titled "start-stop," which required participants to incorporate singing with movement. Runfola, Etopio, Hamlen, and Rozendal (2012) involved "circle time, " including vocal exploration, singing, and creative movements. Lee and Lin (2015) encouraged participants to use facial expressions and gestures to respond to music activities. The researchers composed a Hello Song, Letter Song, and Goodbye Song to teach participants social skills and required the children to move to the songs. Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi (2018) involved singing, game playing, rhyming, and instrument playing. Data showed that music and movement interventions yielded benefits to young children's linguistic skills. However, some study descriptions did not provide details regarding the self-designed curriculum or specific music games and songs used in the intervention.

Some researchers compared song-based intervention and music and movement intervention to investigate and compare their effectiveness (Davis & Fan, 2016; Maroti et al., 2018). This provided efficient and clear results. Davis and Fan (2016) noted the combination of music and movement intervention and song-based intervention was equally effective in improving linguistic skills. Maroti et al. (2018) also claimed that both experimental groups exposed to music and movement intervention significantly improved working memory and verbal skills more than the singing-based intervention. Song-based and music and movement intervention improved young children's linguistic skills; however, the music and movement intervention was more effective by providing an energetic and enjoyable learning environment through musical play.

The effectiveness of music and movement intervention implemented in the existing studies has enhanced previous researchers' statements in highlighting the importance of music and movement intervention (Lewis, 1998; Stamou, 2002).

Design (D)

Table 4 shows the different designs of the 20 articles. The selected studies mainly utilized a pre-post-test experimental design. There were five studies which involved kindergarten participants had, included an experimental group and a control group, to investigate the effectiveness of music-based intervention (Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi, 2018; Lorenzo, Herrera, Candelas & Badea, 2014; Ritblatt, Longstreth, Hokoda, Cannon & Weston, 2013; Runfola, Etopio, Hamlen & Rozendal, 2012; Yazejian & Peisner-Feinberg, 2009). However, the results did not allow for comparisons between the music interventions on the participants'

Table 4. Summaries of Selected Studies

Author(s), Date	Sampling (S)	Phenomenon of Interest (PI)	Design (D)	Evaluation (E)	Research Tyoe (R)
1. Coban and Dubaz, 2011	52 elementary-age children and 52 parent	Music and movement intervention	Two experimental groups pre-posttest experimental design	Assessment, personal information form, and observation form	Quantitative Method
2. Cochran, 2008	23 kindergarten children	Song-based intervention	Two experimental groups pre-posttest experimental design	Assessment, daily observation, and interactions	Mixed-mode Method
3. Davis and Fan, 2016	64 kindergarten children	Music and movement intervention	Two experimental groups and a control group pre-posttest experimental design	Self-designed assessment	Quantitative Method
4. Good, Russo and Sullivan, 2015	38 elementary-age children	Song-based intervention	Two experimental groups pre-posttest experimental design	Self-designed assessment	Quantitative Method
5. Lee and Lin, 2015	23 kindergarten age children	Music and movement intervention	Single group pre-posttest experimental design	Standardized assessment and interview	Mixed-mode method
6. Linnavalli, Putkinen, Lipsanen, Huotilainen and Tervaniemi, 2018	66 kindergarten children	Music and movement intervention	Single experimental group and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
7. Loell, 2001	25 kindergarten children	Music and movement intervention	Single group pre-posttest experimental design	Daily observation, interactions, and formal and informal assessment	Qualitative method
8. Long, 2014	15 elementary-age children	Music and movement intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
9. Lorenzo, Herrera, Candelas and Badea, 2014	213 kindergarten children	Music and movement intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
10. Maneshi, 2017	300 elementary-age children	Song-based intervention	Three experimental groups and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
11. Maroti et al., 2018	63 kindergarten-age and elementary-age children	Music and movement intervention	Two experimental groups pre-posttest experimental design	Standardized assessment	Quantitative method
12. Martin, 2017	18 kindergarten children	Music and movement intervention	Single group pre-posttest experimental design	Standardized assessment and teacher research journal	Mixed-mode method
13. Moorehead-Carter, 2015	29 elementary-age children	Song-based intervention	Single group pre-posttest experimental design	Survey and assessment	Quantitative Method
14. Reifinger, 2018	170 elementary-age children	Song-based intervention	Single group pre-posttest experimental design	Standardized assessment	Quantitative method
15. Ritblatt, Longstreth, Hokoda, Cannon and Weston 2013	102 kindergarten children	Song-based intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment, teacher and parent report	Quantitative method
16. Runfola, Etopio, Hamlen, and Rozendal, 2012	165 kindergarten children	Music and movement intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
17. Schellenberg, Corrigall, Dys and Malti 2015	83 elementary-age children	Music and movement intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment	Quantitative method
18. Walton, 2014	93 kindergarten children	Music and movement intervention	Two experimental groups pre-posttest experimental design	Standardized assessment and self-designed assessment	Quantitative method
19. Yazejian and Feinberg 2009	207 kindergarten children	Music and movement intervention	An experimental group and a control group pre-posttest experimental design	Standardized assessment, teacher survey and parent survey	Quantitative method
20. Zhou and Li, 2017	106 kindergarten children	Song-based intervention	Two experimental groups pre-posttest experimental design	Self-designed assessment	Quantitative method

linguistic skills. For example, Linnavalli, Putkinen, Lipsanen, Huotilainen, and Tervaniemi (2018) compared the effectiveness of music games and simple instrument playing intervention to the control group participants' linguistic skills. The results revealed that the music games and instrument-playing intervention group significantly improved linguistic skills. It could not conclude that either intervention's effectiveness enhanced the participants' linguistic skills. Three studies included two experimental groups with different interventions: song-based music and movement with regular language programs (Walton, 2014) and a song-based storybook with listening and reading (Zhou & Li, 2017). In addition, Davis and Fan (2016) compared two experimental groups which included song-based intervention and choral repetition intervention, to the control group. Three studies investigated the pre- and post-test results with an experimental group (Lee & Lin, 2015; Loell, 2001; Martin, 2017). The studies involving more experimental groups presented detailed and specific effects of different interventions. For example, Davis and Fan (2016) identified that the experimental groups using the music and movement intervention or the song-based intervention improved equally on linguistic skills when compared to the control group. The implementation of music played an essential role in improving participants' linguistic skills.

There were two studies that investigated elementary-age participants in an experimental research design utilizing a control group (Long, 2014; Schellenberg, Corrigall, Drys & Malti, 2015). There were also two studies that involved two or more experimental groups utilizing different interventions. Cochran (2008) designed singing and chanting-based intervention with traditional reading instruction. Coban and Dubaz (2011) involved active learning-based education with music infusion, and the other experimental group was conducted with normal education lessons. Good, Russo, and Sullivan (2015) designed song-based intervention with spoken form intervention. Maneshi (2017) included three experimental groups and one control group. Each experimental group was assigned to listen to the song at different frequencies. These studies presented detailed results of the differences of various interventions. For example, Maneshi (2017) concluded that participants who were listened more times to the songs showed an increase in linguistic skills among the two experimental groups and one control group. On the other hand, there were two studies that had infused single group pretest- post-test design by comparing the result of pretest and post-test to seek the effectiveness of the intervention (Moorehead-Carter, 2015; Reifinger, 2018). These studies did not present an accurate result as participants may have improved through other external influences other than the music-based intervention. Comparisons among multiple experimental groups or control groups presented a more specific result regarding each intervention.

The duration of the treatment plays a crucial role when investigating the effectiveness of music-based approaches on children's linguistic skills. Zhou and Li (2017) suggested that longer intervention durations present more convincing results. Researchers can explore the long-term effectiveness of the treatment and can avoid interactions with other conditions. The duration of the existing studies ranged from two weeks to two years. Two studies involved one to two weeks, limiting the treatment's long-term applicability (Good, Russo & Sullivan, 2015; Zhou & Li, 2017). Seven studies ranged in duration from four to ten weeks (Coban & Dubaz, 2011; Davis & Fan, 2016; Loell, 2001; Long, 2014; Maneshi, 2017; Martin, 2017; Moorehead-Carter, 2015).

In comparision, eleven studies lasted longer than four months (Cochran, 2008; Lee & Lin, 2015; Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi, 2018; Lorenzo, Herrera, Candelas & Badea, 2014; Maroti et.al,2018; Reifinger, 2018; Ritblatt, Longstreth, Hokoda, Cannon & Weston 2013; Runfola, Etopio, Hamlen & Rozen-

Table 5. Design of the Selected Studies

Author(s), Date	Experimental Group 1	Experimental Group 2	Control Group	Curation of the Treatment
1. Coban and Dubaz, 2011	Active learning model and Orff's method	Conventional education	No treatment	8 weeks
2. Cochran, 2008	Singing and chanting	Traditional reading instructions	N/A	1 year
3. Davis and Fan 2016	Song- based with games and activities	Choral repetition	No treatment	7 weeks
4. Good, Russo and Sullivan, 2015	Singing based	Spoken form with the rhythm of the poem	N/A	2 weeks
5. Lee and Lin, 2015	Musical storytelling, musical movement and instrument playing	N/A	N/A	18 weeks
6. Linnavalli, Putkinen, Lipsanen, Huotilainen and Tervaniemi, 2018	Musical games, Simple instrument playing	N/A	No treatment	2 years
7. Loell, 2001	Waldorf Summer Institute and Education through Music (ETM) and Heidi Songs approach	N/A	N/A	10 weeks
8. Long, 2014	Dalcroze's rhythmic based	N/A	No treatment	6 weeks
9. Lorenzo, Herrera, Candelas and Badea, 2014	Singing, movement and instruments playing	N/A	No treatment	2 years
10. Maneshi, 2017	Song Listening	N/A	No treatment	5 weeks
11. Maroti et.al, 2018	Creative playing with music and movement	Creative playing appreciation with movement	Singing-based	8 months
12. Martin, 2017	Singing, movement and Heidi Song's approach	N/A	N/A	4 weeks
13. Moorehead-Carter, 2015	Singing- integrated reading instructions	N/A	N/A	8 weeks
14. Reifinger, 2018	Pitch sight singing skills	N/A	N/A	24 weeks
15. Ritblatt, Longstreth, Hokoda, Cannon and Weston, 2013	Song Singing	N/A	No treatment	1 year
16. Runfola, Etopio, Hamlen and Rozendal, 2012	Vocal exploration, creative movement and singing	N/A	No treatment	2 years
17. Schellenberg, Corrigall, Dys and Malti, 2015	Group Music Training	N/A	No treatment	10 months
18. Walton, 2014	Music and movement	Regular language and literacy programs	N/A	12 weeks
19. Yazejian and Peisner-Feinberg, 2009	Music, movement and musical games	N/A	No treatment	6 months
20. Zhou and Li, 2017	Shared of singing pictured book instruction	Story listening and reading	N/A	1 week

dal, 2012; Schellenberg, Corrigall, Dys and Malti, 2015; Walton, 2014; Yazejian & Peisner-Feinberg, 2009). However, the effects of maturity threat might cause participants to lose interest and patience with the intervention. Besides, the improvement or failure of the participants' linguistic skills might be affected by other conditions such as the availability of English classes at their school.

Evaluation (E)

Table 5 shows the evaluation of the selected studies. The evaluation category refers to the measurement instruments and measurement criteria for linguistic skills. Linguistic skills were defined differently by researchers. For example, Gardner (1999) noted that linguistic skills involved communication skills, including communication awareness and the potential to utilize language to achieve goals. Erlina et al. (2019) claimed that linguistic skills helped learners understand information easier and clearer. In addition to different definitions, linguistic skills also included verbal skills, vocabulary acquisition, reading comprehension, pronunciation, reading fluency, and more. From the selected studies, linguistic skills were measured and evaluated from different dimensions (see Table 5).

Vocabulary acquisition was widely evaluated (Davis & Fan, 2016; Good, Russo & Sullivan, 2015; Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi, 2018; Maneshi, 2017; Martin, 2017; Runfola, Etopio, Hamlen & Rozendal, 2012; Schellenberg, Corrigall, Drys & Malti, 2015; Zhou & Li, 2017). The vocabulary acquisition evaluated participants' vocabulary understanding skills and used standardized assessments such as Peabody Picture Vocabulary Test-III (Yazejian & Peisner-Feinberg, 2009) and Word Recognition in Isolation and Word Recognition in Context (Moorehead-Carter, 2015). The standardized assessments were reliable and suitable for children, with most of the assessments using pictured-based material and oral questioning. Young children weremore developmentally appropriate with the oral-based assessement than the written test. Researchers also utilized self-designed vocabulary assessments to address participant backgrounds (Davis & Fan, 2016; Maneshi, 2017; Zhou & Li, 2017). Davis and Fan (2016), and Zhou and Li (2017) involved participants who were not native English speakers and viewed a standardized vocabulary acquisition assessment as overly challenging for the participants. The phonological awareness dimenaison was wdiely evaluaed in the selected studies (Good, Russo & Sullivan, 2015; Linnavalli, Putkinen, Lipsanen, Huotilainen & Tervaniemi, 2018; Maroti et.al, 2018; Walton, 2014; Yazejian & Feinberg, 2009). Phonological awareness focused on participants' pronunciation while speaking or reading. Participants were required to read with structured passages or sentences and were rated by the examiner. Reading skills were also defined as a component of linguistic skills and involved reading attitudes (Carter, 2015; Cochran, 2008; Lee & Lin, 2015; Long, 2014) and reading comprehension (Cochran, 2008; Lee & Lin, 2015; Long, 2014; Reifinger, 2018). According to Hagan (2013), reading attitudes evaluate participants' feelings about reading and aim to develop positive reading habits. Reading comprehension evaluates the understanding of the content within text. Both dimensions' measurements were designed with statements or story passages followed by questions or opinions asked afterward. The researchers mainly utilized standardized assessments to test participants' reading abilities; Cochran (2008) and Carter (2015) infused Elementary Reading Attitude Survey (ERAS) and Long (2014) utilized Neale's analysis of reading ability (NARA).

There were also various dimensions of linguistic skills evaluated within the studies: grammatical understanding (Long, 2014; Runfola, Etopio, Hamlen & Rozendal, 2012), sentence recalling (Good, Russon & Sullivan, 2015; Maroti et al., 2018 Runfola, Etopio, Hamlen & Rozendal, 2012, Zhou & Li, 2017), and commu-

Table 6. Evaluation of the Selected Studies

Author(s), Date	Measurement Criteria	Measurement Instrument
1. Coban and Dubaz, 2011	Multiple Intelligence which included linguistic skills	Multiple Intelligence Development Assessment Scale, Personal Information Form, and Observation Form
2. Cochran, 2008	Reading attitudes and reading achievement	Elementary Reading Attitude Survey (ERAS), STAR Reading Test
3. Davis and Fan, 2016	Vocabulary acquisition	Self-designed English Vocabulary assessment
4. Good, Russo and Sullivan, 2015	Sentence recall, pronunciation, and vocabulary translation	Self-designed assessment
5. Lee and Lin, 2015	English understanding and expression	Semi-structured observation form
6. Linnavalli, Putkinen, Lipsanen, Huotilainen and Tervaniemi, 2018	Phoneme processing, vocabulary subtests, perceptual reasoning skills, and inhibitory control	Neurocognitive assessments
7. Loell, 2001	Student engagement and language development	Daily observation, interactions, formal and informal assessment
8. Long, 2014	Reading comprehension, reading accuracy, reading rate, reading fluency, reading behavior, grammatical structures, and phrase contours	Neale Analysis of Reading Ability (NARA)
9. Lorenzo, Herrera, Candelas and Badea, 2014	The initiative, social relations, creative representation, music and logical thinking	HighScope Spanish Version of the Child Observation Record (COR)
10. Maneshi, 2017	Vocabulary acquisition	Multiple-choice vocabulary assessment
11. Maroti et al., 2018	Working memory, phonological processing, verbal skills	3DM-H Test of Phonological Awareness, Wechsler Intelligence Scale for Children IV and Empathy Index of Bryant
12. Martin, 2017	Sight word acquisition	Qualitative journal and self-designed assessment
13. Moorehead-Carter, 2015	Academic, composite reading attitudes, fluency and reading rate	Elementary Reading Attitude Survey (ERAS), Qualitative Reading Inventory-5, Words per Minute (WPM)
14. Reifinger, 2018	Linguistic reading fluency and comprehension	Dynamic Indicators of Basic Early Literacy Skills
15. Ritblatt, Longstreth, Hokoda, Cannon and Weston, 2013	Language and reading skills	Kindergarten Readines Survey
16. Runfola, Etopio, Hamlen and Rozendal, 2012	Vocabulary acquisition, grammatical understanding, sentence recalling, and oral language skills	Test of Language Development: Primary (3rd edition)
17. Schellenberg, Corrigall, Dys and Malti, 2015	Vocabulary acquisition	Peabody Picture Vocabulary Test — Fourth Edition
18. Walton, 2014	Phonological skills, pronunciation and word reading	Self- designed rhyming test, Sound Isolation Test, Letter Sound Knowledge, and self-designed reading test.
19. Yazejian and Peisner-Feinberg, 2009	Language skills and phonological awareness skills	Peabody Picture Vocabulary Test- III and Early Phonological Awareness Profile
20. Zhou and Li, 2017	Sentence recalling and vocabulary acquisition	Self-designed assessment

nication skills (Lorenzo, Herrera, Candelas and Badea, 2014; Runfola, Etopio, Hamlen & Rozendal, 2012; Yazejian & Feinberg, 2009). However, there were studies that did not state a specified dimension of linguistic skills but presented general data of language development (Coban & Dubaz,

2011; Loell, 2001).

Most studies included several dimensions to investigate a broad scope of linguistic skills among participants. For example, Cochran (2008) explored reading achievement, fluency, prosody, phrasing, and choral reading. Yazejian and Feinberg (2009) investigated participants' communication skills, language understanding skills, and phonological awareness. On the other hand, some studies focused on one dimension of linguistic skills. Coban and Dubaz (2011) infused Multiple Intelligence Development Assessment Scales to evaluate elementary-age participants' multiple intelligence skills and linguistic skills. Martin (2017) studied participants' sight word acquisition.

Research Type (R)

Sixteen studies applied utilized the quantitative methods of standardized or self-designed assessments, surveys, questionnaires, and observation forms. From the existing studies, researchers involved numerous standardized assessments and surveys according to the participants' age group, sample size, and classroom setting. Self-designed assessments were also incorporated. The quantitative data allowed researchers to present numerical data to generalize the effectiveness of the intervention on a specific age group of participants. It avoids biases and subjective interpretation by examiners and researchers.

The mixed-mode case study involved a combination of assessment, questionnaire, parent report, and interview. The qualitative data presented a deeper understanding to support the numerical data. Due to the participants' young ages, interviews, surveys, and questionnaires may not be developmentally appropriate; therefore, the interviews and surveys were completed by parents or teachers (Lee & Lin, 2015; Yazejian & Peisner,

Feinberg, 2009). Parents' and teachers' reports clarified the progression of the participants (Martin, 2017; Ritblatt, Longstreth, Hokoda, Cannon & Weston, 2013). A mixed-mode study helps researchers to investigate the data in-depth as participants' linguistic skills might improve or regress due to other variables. Parents and teachers are familiar with the children and able to identify the participants' daily progression.

Table 7. Research Type of the Selected Studies

Research Type	N	Percentage (%)
Quantitative method	16	80
Qualitative method	1	5
Mixed-mode method	3	15

From the selected studies, only one study used a qualitative method. Loell (2001) included daily observation investigation and formal and informal assessment. The lesson observation showed daily progression, whereas participants might be nervous completing formal assessments. The daily observation presented a clear, detailed progression throughout the duration of the intervention.

CONCLUSIONS

The authors reviewed and discussed 20 studies focused on the effectiveness of the music-based intervention on linguistic skills. Overall, the music and movement intervention was the most frequently implemented intervention. Due to the flexibility of the music-based intervention, few studies examined the effects of combining music-based intervention with other interventions. Future research is suggested in this area. However, the variety of interventions and duration lengths among the studies made generalizability difficult. Data showed that music-based intervention significantly improved linguistic skills among kindergarten-age and elementary-age children. By comparing the song-based intervention and music and movement intervention, music and movement intervention was more effective to enhance students' linguistic skills by engaging their muscle memory. Besides, musical play which had been highly infused in music and movement intervention had encou-

raged students to practice their language skills with their peers.

These studies supported previous researchers' statements claiming that music can enhance linguistic skills through song-based and music and movement interventions. However, music and movement intervention was more effective than the song-based intervention as it presented a comfortable and relaxed learning environment of musical play. Students engaged in memorization with the learned knowledge by experimenting and experiencing music activities. Yet, scarce studies investigated and compared the effectiveness between song-based interventions and music and movement interventions. It is strongly recommended that future studies would compare the different effectiveness between song-based interventions and music and movement interventions to explore a more reliable and appropriate music intervention.

The intervention, measurement, and assessment should be carefully considered when evaluating children. Intervention and assessment should not be too complicated and challenging for kindergarten-age children. Older elementary-age children can be exposed to more complex curriculum and advanced assessments. Future research that focuses on the effectiveness of specific interventions and measurements for children of different ages is warranted.

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