

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN THE HOME MUSIC
ENVIRONMENTS AND MUSIC APTITUDES OF KINDERGARTEN STUDENTS

By

Michael John Romanik

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ABSTRACT

AN INVESTIGATION OF THE RELATIONSHIP BETWEEN THE HOME MUSIC ENVIRONMENTS AND MUSIC APTITUDES OF KINDERGARTEN STUDENTS

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The purpose of this study was to investigate the relationship between the home music environments and the music aptitudes of kindergarten students. The specific research problems were: (1) to determine the nature of the home music environments of kindergarten students, and (2) to determine the relationships between the home music environments and the music aptitudes of kindergarten students. The subjects of this study were 289 children who had just started kindergarten. During the Fall of 2015, the Parent/Guardian Survey Regarding Kindergarten Music (PSRKM) was distributed to all of the parents of these children. Two hundred eight of these surveys were returned and analyzed to provide a measurement of these children's home music environments. PSRKM had a Cronbach's alpha of .91. Returned surveys indicated that parents engaged in a variety of different music activities with their children, and that parents strongly supported music and music education. Girls scored significantly higher than boys on PSRKM ($p=.003$). In addition, all of the children took Primary Measures of Music Audiation (PMMA) to measure their music aptitudes. Unfortunately, the Cronbach's alphas were unacceptably low for PMMA, with reliabilities of .67, .42, and .67, for the tonal, rhythm, and composite aptitudes, respectively. These low reliabilities invalidated the small, yet significant correlations that were found between individual items from PSRKM and tonal and composite aptitudes. Significant differences related to age were found for rhythm aptitude ($p=.001$) and composite aptitude ($p=.011$).

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KEY TO ABBREVIATIONS

CMBI – Children’s Music Behavior Inventory

CMRBQ – Children’s Music-Related Behavior Questionnaire

HOMES – Home Musical Environment Scale

IMMA – Intermediate Measures of Music Aptitude

MAAF – Music Achievement Assessment Form

MAP – Musical Aptitude Profile

MAT – Music Achievement Tests

MEQ – Musical Experiences Questionnaire

PIM – Parental Involvement Measure

PMMA – Primary Measures of Music Audiation

PSRKM – Parent/Guardian Survey Regarding Kindergarten Music

PSRPM – Parent/Caregiver Survey Regarding Preschool Music

WFPS – Watkins-Farnum Performance Scale

CHAPTER 1: INTRODUCTION

Music Aptitude

In music and music education, it has long been believed that certain people possess musical “gifts” or “talents,” and that others do not (Mcpherson & Williamon, 2006; Persson, 2009). Beginning in the early 20th century, a number of psychiatrists, music educators, and researchers attempted to measure this innate musical potential. Carl Seashore’s *The Measurement of Musical Talent* (1915) is the seminal example of such a measurement. Although Seashore’s test battery long has been considered to possess questionable validity when used to measure musical potential (Drake, 1933; Gordon, 1969), it did serve as a catalyst to inspire additional research into the nature of musical development and musical talent (Hallam, 2006). Of the research related to music potential and musical development that has emerged since that time, Edwin Gordon’s arguably is the most comprehensive. His contributions include the landmark theoretical text *Learning Sequences in Music* (2007) and a set of music aptitude measures that include *Music Aptitude Profile* (1965), *Primary Measures of Music Audiation* (1979), and *Intermediate Measures of Music Audiation* (1982). These aptitude tests have been used in schools by teachers and researchers across the world (W. C. Chuang, 1997; Stamou, Schmidt, & Humphreys, 2010). Gordon describes the differences between music aptitude and music achievement as follows:

Music aptitude is a measure of one’s potential or capacity to learn music. It points beyond itself. Music achievement is a measure of what has been learned in music. For example, a person is not born knowing how to compose music in a given style. This must be learned, and once learned, it is considered music achievement...On the other hand, a person is

born with more or less potential to learn how to compose music in a given style, and that potential is considered music aptitude. (Gordon, 2007, P. 46)

Gordon goes on to explain that, while music aptitude is indeed innate, that does not mean that it is hereditary: it can not be predicted by the music aptitude of one's parents, grandparents, or great grandparents (Gordon, 2007). Other researchers also have provided evidence that one's music aptitude can not be predicted by the music aptitude of their parents (Guerrini, 2005).

If music aptitude indeed is innate but is not a result of genetics, one might wonder what value there is to be had in knowing why certain people are able to more easily achieve in music. That would be short-sighted, however. Although music aptitude is innate, it also is developmental, at least prior to around the age of nine. In other words, it is influenced by the environment when children are young. Gordon provides insight:

Children are in the developmental music aptitude stage from birth to approximately age nine and in the stabilized music aptitude stage from approximately age nine onward. It is essential children receive the highest quality of informal music guidance and formal music instruction while they are in the developmental music aptitude stage, because not only will their immediate level of achievement increase, their overall level of music aptitude, their lifetime potential for music achievement, will be increased. (Gordon, 2007, p. 48)

This statement should affect the practice of music educators. If our goal is to prepare our students for a life-time of meaningful musical experiences, we should be doing everything we can to provide rich musical experiences and guidance early in life, when it is most likely to positively influence children's music aptitude – and thus – give them better tools for musical achievement throughout life. This means that music educators should be compelled to ensure

high-quality music instruction for our youngest students: those in kindergarten, preschool, and even earlier, when possible. While this certainly should be a primary goal of music educators – especially among those who work with young students – is there more that can be done to help prepare students for a lifetime of musicianship prior to their attending public schools? Since children's music aptitude has the most potential to fluctuate (positively or negatively) during the earliest years of their lives, it is easy to conclude that the environment in a child's home is one of great influence on his or her musical development, including the development of music aptitude (Berger & Cooper, 2003; Mcpherson, 2009).

Home Music Environment

Studies investigating home music environment have provided insight into the practices of parents and their children prior to entering formal schooling. Custodero, Britto, and Brooks-Gunn (2003) used data (N =2017) from a national survey to examine parents' self-reported singing/playing of music for their children, who were 3 years of age or younger. They found that 60% of participating parents sang or played recorded music for their children daily, and that an additional 32% did so weekly (p. 560-561). Additionally, they found that these activities were more likely to occur with: (1) mothers rather than fathers, (2) children less than 2 years old rather than children between the age of 2 and 3, (3) firstborn rather than latter-born children, (4) and parents who had more than a high-school education (p. 553). No association was found between singing and/or playing recorded music and race/ethnicity and/or income (p. 567).

In a study investigating the home music environment of children from three Australian preschools, deVries (2009) had parents fill out surveys to indicate how frequently they engaged in five musical behaviors with their children. Unlike Custodero et al. (2003), deVries separated singing for/with children from playing recorded music for children, which may have influenced

the substantial differences in the results: deVries reported that only 9% of parents sang for/with their children daily, and that only 18% played music for their children daily (2009, p. 398). This suggests that recorded music plays a paramount role in young children's home music environments. These differences also may have been affected by a smaller sample size (N =63) and cultural differences.

In addition to investigating home music environment alone, numerous studies have investigated the relationship between home music environment with other musical variables, such as music achievement and music aptitude. Shelton (1965) went into the homes of 30 first-grade children: 18 that he classified as "musical" and 12 that he labeled as "unmusical." In this study, Shelton conducted interviews to determine if the first-grade children: (1) had the opportunity to hear music at home; (2) had the opportunity to use musical instruments at home; (3) participated in shared music activities with parents; (4) had musical or unmusical siblings; (5) had parents with strong or weak musical backgrounds. Shelton also investigated the presence of older musical and unmusical siblings and the musical background of parents, as well any musical activities that may have occurred when the children were in kindergarten or in church services (Shelton, 1965, p. 3). In his findings, Shelton reported a significant difference between the home music environments of the "musical" and "unmusical" children. Specifically, Shelton reported that opportunities to hear music and singing contributed most to this difference (p. 85 – 88).

Later studies that examined the relationship between home music environment and music aptitude opted to collect data with questionnaires (as opposed to interviews), although many of the same factors were investigated. Almost all studies after Shelton's included the opportunity to listen to music (recorded or otherwise) at home as a factor of home music environment (Atterbury & Silcox, 1993; Brand, 1982, 1985, 1986; W. C. Chuang, 1997; Lyon, 2008; Mallett,

2000; Persellin, 2006; Rasmussen, 2004; Valerio, Reynolds, Grego, Yap, & McNair, 2011; Valerio, Reynolds, Morgan, & McNair, 2012; Zdzinski, 1992, 1996). Some studies went beyond this and differentiated between the specific genres of music that were being played in the home (Atterbury & Silcox, 1993; Lyon, 2008; Rasmussen, 2004; Zdzinski, 1992, 1996). Two of these studies that also included music aptitude as a variable found a small but significant relationship between music aptitude and music listening (W. C. Chuang, 1997; Mallet, 2000). No significant findings regarding specific music genres were reported by any of the researchers who included it as a variable (Atterbury & Silcox, 1993; Lyon, 2008; Rasmussen, 2004; Zdzinski, 1992, 1996).

Many studies also have investigated the relationships between parental musical background/skill and their children's music aptitude (Atterbury & Silcox, 1993; Brand, 1986; W. C. Chuang, 1997; Lyon, 2008; Mallett, 2000). Criterion measures for these students include questions regarding parental instrumental experience, current musical practice (playing instruments in the home, etc.), and parental concert attendance. Several of these studies (Brand, 1986; W. C. Chuang, 1997; Lyon, 2008) found no relationships between these factors and music aptitude, with Lyon stating:

Parents can rest assured that they do not need to have a strong background in music in order to provide their children with musical experiences. Likewise, it cannot be assumed that parents of strong musical backgrounds will provide an enriched musical environment for their children. (2008, p. 26)

Another element of the home music environment that has been investigated is parent attitudes towards music and music instruction (W. C. Chuang, 1997; Lyon, 2008; Mallett, 2000). These studies investigated parent valuing of music as a school subject and a life skill, parental encouragement of musical behaviors and participation, parental belief that all children can

achieve in music, and parental beliefs regarding what constitutes developmentally appropriate music instruction. Both Lyon (2008) and Mallet (2000) found a significant relationship between parent attitudes and other aspects of home music environment, but no relationship between parent attitudes and music aptitude. However, both Mallet (2000) and Chuang (1997) reported a significant relationship between music aptitude and home environment.

But to what extent is music aptitude affected by home environment? While there have been studies that investigate this question, the results are conflicting. Some studies suggest that there is no relationship between home music environment and music aptitude (Atterbury & Silcox, 1993; Brand, 1986; Lyon, 2008; Rasmussen, 2004). In contrast, there are other studies that suggest that there is a significant and positive relationship between home music environment and music aptitude (W. C. Chuang, 1997; Mallett, 2000; Zdzinski, 1992, 1996). In addition to these conflicting results, there is a lack of research that investigates this relationship among students when they first enter formal schooling specifically. This is an issue of concern, since any study that investigates the relationship between the home music environment and music aptitude of students in later grades runs the risk of unclear results, as students in schools already could have been heavily influenced by their school music environment, including any general music classes that they may have had at school (Flohr, 1981; Rutkowski, 1996). This study aimed to limit the influence of factors other than the home music environment and music aptitude by measuring the subjects' music aptitude shortly after they begin kindergarten.

Research Purpose

The purpose of this study is to investigate the relationships between home music environments and the developmental music aptitude of kindergarten students.

Research Problems

The specific research problems are as follows:

To determine the nature of the home music environments of kindergarten students.

To determine the relationships between the home music environments and the music aptitudes of kindergarten students.

This study aims to make meaningful contributions to the home music environment and music aptitude literature. The study's sample (N=289) of kindergarteners is larger than any found in previous work done with this age group that the researcher could locate. As kindergarteners' music aptitude is still prone to change at this age, but also is less influenced by factors outside of their home than it will be after years of schooling, the results of this study have the potential to provide a unique insight into how and why musical potential develops in young children. This could lead to additional research that would continue to refine our understanding of the complex relationship between "nature" and "nurture" as they relate to music aptitude. Any significant relationships that are found between specific variables of home music environment and music aptitude may lead researchers, music educators, and parents towards cultivating the types of home music environments that produces children more ready to succeed in music.

CHAPTER 2: REVIEW OF LITERATURE

Introduction

Researchers have conducted numerous studies to determine factors that influence music aptitude's development. This body of work includes a number of studies that include home music environment as a variable. This chapter will provide descriptions of the most prominent and relevant studies that have been conducted investigating the relationships between home music environment and music aptitude. Each review will highlight the measurement tools used to determine the nature of home music environment and music aptitude, as well as general strengths and weaknesses of each study. This chapter will conclude by summarizing what has been learned from these studies, including how these studies have influenced this study.

Review

Chuang's Study

Chuang's (1997) dissertation included a sample of 1723 fourth to twelfth grade students in Central Taiwan. In addition to exploring the relationship between the home music environment and music aptitude, Chuang also investigated the relationships between musical self-concept, attitudes towards music learning, parental support, family musical backgrounds/experiences, parent/teacher estimates of student musical abilities, and gender.

All subjects (N =1723) in Chuang's study took at least one of two divisions of Gordon's *Musical Aptitude Profile* (MAP), Tonal Imagery or Rhythmic Imagery. Only two classes of seventh and eighth grade students took both of these divisions. This accommodation was made in order to limit the amount of time that subjects would spend taking tests, as each division of MAP is 50 minutes long (p. 57). Of the larger sample, 1066 were selected to answer a questionnaire. Chuang asked the students who returned the questionnaire to take an additional questionnaire

home to their parents. This was used to investigate home musical environment, as well as parent concepts of their child's musical abilities.

In her results and discussions, Chuang reported high reliabilities and concurrent validities for the use of MAP with Taiwanese students, providing support for its use as a reliable measurement for Taiwanese population (p. 67). Chuang also compared results from the home music environment and musical background surveys to determine their reliability. "All of the values of Spearman correlation between parents' response and students' response to the same questions were larger than the critical value at the .001 level. The values of the correlations ranged from .43 to .90" (p. 76). Chuang also provided tables with specific correlations for each item from this portion of her survey, revealing that most items on the student surveys have moderately high (.50 - .69) correlations with the equivalent questions on the parent surveys (P. 77 - 78). Chuang used this evidence as a type of interjudge reliability and determined that the overall set of data regarding students' music environments was suitable for use in the rest of her study.

In regards to the relationship between the results of the questionnaires and MAP scores, Chuang reported significant but difficult to interpret correlations at different grade levels. To make the reported results more practically significant, Chuang decided to analyze all subjects as one group, regardless of grade level. Spearman correlations then were determined for each area of MAP: Melody and Harmony scores contributed to the overall Tonal Imagery scores, and Tempo and Meter contributed to the Rhythm Imagery scores. Among the results, there were a number of positive and significant correlations, the strongest of which follow. For the question "How many days do you sing at home per week?" correlations of .28 and .27 were found with Tonal and Rhythm music aptitude, respectively. Correlations of .26 and .24 were found for Tonal

and Rhythm aptitude in relationship to the number of private lessons students reported attending. Students' amount of attendance at music activities yielded correlations of .25 and .20 with Tonal and Rhythm Aptitude (p. 92 – 94).

Chuang's study had a number of strengths, including her complete presentation of data and thorough review and comparison to previous research. Although the students in her study were much older than those in this study – and thus, able to self-report on their musical background – the comprehensiveness of her questionnaire helped inform this study's design. Chuang's study also benefitted from a large sample size (N =1723), albeit spread over a wide range of grades (4th – 12th), whereas this study focused on a sample of 289 kindergarten students. The age of Chuang's sample may also have made a difference in her results, as music aptitude is most susceptible to fluctuating before the age of 9 (Gordon, 2007). Most of Chuang's sample was older than 9, unlike the proposed study, in which most of the children in this study were approximately 5 years old. Perhaps the relationship between home music environment and music aptitude is more easily detectable at ages when music aptitude is more sensitive to environmental influences.

The Development of the Home Musical Environment Scale

Brand (1985) made a number of contributions to the understanding of home music environment and its relationship to other factors, including music aptitude and music achievement. Brand observed that much of the previous research related to these areas had a number of flaws, one of the most significant of which was that the tools that were being used to measure home music environment lacked empirical support, such as established reliability and validity. In an effort to design a study that avoided these pitfalls, Brand set out to develop such a tool (1985).

The “Home Musical Environment Scale” (HOMES) was developed as a self-reporting measure to be completed by the parents of lower elementary school children (p. 42). Brand noted that making HOMES self-reporting was appropriate if the respondents were: “(1) able to understand the questions asked, (2) have sufficient self-awareness to provide the necessary information, and (3) are likely to answer honestly and not deliberately falsify their responses” (p. 42). This seems reasonable, given the nature of the questionnaire.

Brand began by formulating a pool of 33 possible items for HOMES. These items represented a variety of aspects of home music environment and were drawn from the literature and previous measures of home music environment. To establish content validity, these 33 items were sent to a panel of four music educators who had extensive experience in elementary and early childhood general music. The panel eliminated items that they determined to be redundant or too specific, and unanimously selected the 15 items that they believed to be most indicative of an outstanding home music environment. Brand describes HOMES as follows:

The final version contains five survey-type items, nine Likert-type scale items, and one semantic differential item. The survey items gather information on the availability of records, tapes, record/tape players, musical instruments, as well as the child’s involvement with music. The Likert-type scale items assess the extent to which the parent(s) has provided a musical environment (e.g., sung to/with the child, provided “toy” musical instruments, provided toys that make sounds or music, helped child learn songs, taken child to concerts, etc.). Lastly, the semantic differential item evaluates the parents’ general attitude toward music. All items have a response range from one to five. (p. 42)

HOMES then was distributed to 201 second-grade children from two elementary schools in the southwestern United States. One-hundred fifty-seven usable HOMES were returned and

analyzed. Brand reported a Cronbach's alpha of .86, which indicated a strong degree of internal consistency. Factor analysis then revealed four factors that accounted for 63% of the variance: "(1) parent's attitude toward music and musical involvement with child; (2) parental concert attendance; (3) parent/child ownership and use of record tape player, records, tapes; (4) parent plays a musical instrument" (p. 43). Brand also attempted to establish concurrent validity of HOMES by asking the students' music teachers to use a modified version of HOMES to estimate the quality of the students' home music environment. Only one of the music teachers felt capable of completing this task for her students ($N = 69$). The teacher's evaluations were compared with HOMES scores. Results showed a strong and statistically significant relationship ($r = .62$) between the teacher evaluations and parent attitudes and musical involvement (factor 1), and significant, but less strong (.30 and .26, respectively) relationships with parent concert attendance (factor 2) and ownership and use of recorded music (factor 3). No significant relationship was found between the teacher's evaluations and parents having played a musical instrument (factor 4) (p. 45).

Overall, Brand did an excellent job developing and providing empirical support for a tool to measure the home musical environment. Brand does note that HOMES' development had limitations, including that students were from a single grade level (second grade) and that most of the subjects were minorities from a lower or lower-middle socioeconomic status. That being said, Brand recommended the use of HOMES not only for music education researchers, but also for parents wishing to improve their home music environment and teachers wishing to encourage parents to do so (p. 46).

The Brand Study

Following the development of HOMES, Brand designed a study that investigated the relationships between home music environment, music aptitude, and music achievement (1986). For this study, Brand's sample consisted of 116 second-grade children and their parents. These students mostly were (N =98) Mexican-American and from lower socioeconomic environments. Music aptitude was evaluated using *Primary Measures of Music Audiation* (PMMA) (Gordon, 1979). Finally, Brand measured music achievement through a combination of observations by the subjects' general music teachers and the teachers' formal and informal evaluations of the subjects' musical achievement. The teachers' assessments then were recorded on the "Music Achievement Assessment Form" (MAAF) (Brand, 1986, p.115).

In his results and discussion, Brand reported that there were no significant correlations between HOMES' scores and the two separate components of music aptitude that PMMA measures: tonal and rhythm. There were, however, positive and statistically significant correlations between three dimensions of HOMES and music achievement scores as measured by the MAAF, the highest of which was .43 for "parental attitudes toward music and musical involvement with child" (Brand, 1986, p. 117). Brand noted that the components of this dimension included behaviors such as "singing to and with the child, providing toys that make sounds/music, providing toy musical instruments, and helping child learn songs" (p. 118). Although it is not surprising that these behaviors were associated with the subjects' MAAF scores, it is interesting that none of HOMES' dimensions had a significant relationship with aptitude scores. While one might hypothesize that these are the very behaviors that would provide the type of rich, musical environment that may cause an increase in music aptitude, Brand's findings did not support this. Further, MAAF scores had only a minimally significant

relationship with rhythmic aptitude and none at all with tonal aptitude (p.117). These findings suggest that the nature of music aptitude and music achievement is indeed complex and in need of more research.

The Zdzinski Study

Zdzinski (1992) investigated the relationships between parental involvement, music aptitudes, music achievements, and performance achievements of instrumental music students. For this study, Zdzinski's sample included 113 randomly selected brass and woodwind music students from four middle schools who were in grades 6 through 8. His sample included 77 females and 36 males.

To measure parental involvement, Zdzinski designed a self-report questionnaire called the "Parental Involvement Measure" (PIM) (p. 116). This tool was developed after reviewing the literature, consulting with middle school band directors, and adapting portions of Doan's "Measurement of Family Involvement in Music" (1973) and Brand's HOMES (1985). PIM had 15 five-point, Likert-type items that measured the degree to which parents engaged in certain activities, many of which were identical to those found on HOMES. In addition to this, some of these Likert-type items addressed things specific to middle school band parents, such as determining how often parents attended their child's band rehearsals (Zdzinski, 1992, p. 125). Fifteen questions that mirrored the Likert-type items also were created to determine which parent (or both) was involved with certain activities, rather than the frequency with which a family engaged in specific activities. For example, the equivalent of the Likert-type statement, "Your parents listen to music at home," was "Do either of your parents listen to music at home?" (p.125). PIM also had nine yes/no items primarily related to various musical purchases that parents may have made. A pilot version of PIM was administered to 43 summer music camp

students, and non-specified revisions were made based on those results (p.116). Unlike Brand's (1986) study – in which case HOMES was sent home to be filled out by parents and returned at a later date – Zdzinski's PIM was given to students and filled out at the school site.

To measure music aptitude, Zdzinski used the Tonal Imagery and Rhythmic Imagery subtests of Gordon's *Music Aptitude Profile* (MAP) (1965). This test choice was appropriate for Zdzinski's study but would not be for this study, as MAP is a measure of stabilized (not developmental) music aptitude for students in fourth through twelfth grades. Zdzinski also used selected subtests from Cowell's *Music Achievement Tests* (MAT) (1969) to measure music achievement. In addition, he administered a pilot of the MAT subtests to 41 middle school band students to “verify the item discrimination for each of the subtests in the sample” (Zdzinski, p. 117). Performance achievement was measured using the *Watkins-Farnum Performance Scale* (WFPS) (1954).

In his results, Zdzinski reported reliability coefficients of .85 or higher for all measurements. Interestingly, the performance achievement scores (WFPS) had moderately high correlations with all other variables except parent involvement, with which it had no meaningful relationship. Aptitude scores had a low (.196) but statistically significant relationship with parental involvement, although such a low correlation likely is of little practical significance (p. 117-118). This is in contrast to the results of Brand (1986), who reported no relationship between the home music environments and the music aptitudes of 2nd grade students. This may have been due to the age difference between the students, specifically that Brand's subjects were still in the developmental music aptitude stage.

Although Zdzinski used the term “parental involvement” consistently throughout his study, based on the items that make up Zdzinski's PIM, it is clear that what he is referring to is

similar to “home music environment,” which is a more commonly used term in the literature. However, since there were some topics addressed on PIM that were not included on tools such as HOMES, it may have been enlightening if Zdzinski’s analysis had included correlations between individual items on PIM and music aptitude in order to remove statistical weight from items less related to the home musical environment, such as “is your instrument school-owned, family-owned, or rented” (p. 125). Additionally, it would have been interesting to know if Zdzinski’s analysis of PIM yielded any significant factors, such as the four that were reported by Brand (1986).

The Lyon Study

Lyon’s (2008) “The Effect of Home Musical Environment on Child Attitude and Aptitude” has a number of similarities to the current study. Like this study, Lyon investigated the relationship between home music environment and music aptitude. In addition, she included child attitudes towards music, gender roles, and age as variables in her study.

At the outset of the study, Lyon administered two surveys. The first was administered to parents (N =95) and was designed to collect information about home music environments. The survey contained three sections: parent musical background, parent attitudes towards music, and home musical activities (Lyon, 2008, p. 14). The second survey was completed by 121 first or fourth grade students and measured their attitudes towards music. The researcher also administered *Intermediate Measures of Music Aptitude* (IMMA) to these children. IMMA is an aptitude test designed by Gordon that is similar to PMMA, the primary difference being that IMMA is more difficult and designed for older students or those who find PMMA too easy. The tonal subtest of IMMA was administered one week, and the rhythm subtest was administered the following week.

In the results portion of her study, Lyon provided specific descriptions of the ten questions or statements that were included on the home music environment survey that went home to parents. In addition to this, she provided the details of how these questions were scored. For example, regarding the question:

How many years did you take music in school?, the answer was converted into a scale so that the weight of the answers was balanced throughout the parent background survey section. If a parent responded with one year or less, that answer was assigned a one. If a parent responded either one, two, or three years, that answer was assigned a two. If a parent stated that they had between four and eight years of music in school, that answer was assigned a five. And finally if a parent responded that they took more than eight years of music in school, that answer was assigned a value of ten. (p. 17 – 18)

This level of detail was continued throughout Lyon's description of the home music environment survey and made these areas easy to comprehend. This continued into the results, in which she reported finding no significant relationships between any of the variables proposed in her research questions. This includes the relationship between home music environment and music aptitude, which had a correlation of .094 (p. 22).

In her discussion, Lyon expressed surprise over the lack of significant relationships found between home music environment, music aptitude, and the other measured variables, stating that the "results of this study seem to create more questions than provide answers" (p. 25). Regarding the lack of correlation between parent background and home music environment, Lyon provides positivity, proposing that "parents can rest assured that they do not need to have a strong background in music in order to provide their children with musical experiences" (p. 26). This

message is an empowering one that, if delivered to parents appropriately, could encourage them to provide more musical experiences for their children.

One possible concern with Lyon's study is the tool that was chosen to measure the music aptitude of the first and fourth grade students, the *Intermediate Measures of Music Audiation* (IMMA). While this test's published grade range is first – sixth, Gordon (1984), who developed the test, notes that IMMA “is designed to be used with a group in which half or more of the students score above the 80th percentile on the Tonal and/or Rhythm subtests of PMMA” (p. 1). While it is indeed possible that the first grade children in Lyon's study collectively had high enough music aptitudes to warrant taking IMMA (instead of PMMA), Lyon does not make this clear, nor does (s)he, provide rationale for choosing IMMA as her aptitude measurement for first grade students. This test may have been too difficult for first grade students, which may have led to skewed results. IMMA may have been used in order to allow for the comparison scores between the first grade and fourth grade students, as PMMA is not designed for use by fourth-grade students. However, when in a similar predicament in his factor analysis of the results of 110 fourth grader students who took PMMA, IMMA, and MAP, Gordon concluded:

A compromise had to be made if the three test batteries were to be administered to the same students. It was more appropriate to ask fourth grade students to take a test battery that might be too easy than to ask third grade students to take two test batteries which might be too difficult. (Gordon, 1986a, p. 20)

Regardless, the lack of rationale for choosing the measurement tool of a primary variable is a concern.

The Atterbury and Silcox Study

The study that includes the most similar sample to this study is Atterbury and Silcox's (1993) *A Comparison of Home Musical Environment and Musical Aptitude in Kindergarten*

Students. As a part of a larger 2-year study of children's singing, this study compared the home music environments of kindergarten students with their tonal music aptitudes. Additionally, singing achievement was included as a variable and was used to pre-select students to be included in the results. The researchers chose to evaluate the singing abilities of 205 kindergarten students at the beginning of the school year using a scale that placed students into one of four groups:

1 – presinger: does not sing but chants the song text; 2 – uncertain singer: sustains tones, uses both speaking and singing voice, and when singing uses a limited range of about a third; 3 – partial singer: sings some phrases correctly but not entire song; and 4 – singer: sings entire song correctly in one key” (p. 19).

From the sample, they had a total of 33 students who received a 4 – “singers” – and they then randomly chose 33 students who received a 1 – “presingers” – to create their sample of 66.

The researchers sent a home music environment survey at the beginning of the school year. The questionnaire – adapted from Brand's HOMES (1985) – was relatively short, with only 13 questions, presumably to encourage a high rate of return. In addition, they included a set of questions related to concert attendance. In order to obtain music aptitude results that were as uninfluenced as possible by general music instruction, the researchers intended to administer PMMA in the fall for their study, but this was changed to the following spring after they were unable to administer the test in the fall due to the limited length of the subjects' music classes. While Atterbury and Silcox had 30 minutes in each music class to administer PMMA, the current study had larger, 40 minute classes.

In their results and discussion, Atterbury and Silcox noted that there was a significant ($p = .02$) difference in the home music environment scores of the “singer” and “presinger” groups

but no significant correlation between the home music environment scores and PMMA results. They also were surprised to find no significant difference in PMMA scores of the “singer” and “presinger” groups. One possible reason they suggest for this finding is the large gap in time (over half a year) between administering the singing test and PMMA, and that the intervening instruction may have affected the lack of significance between the aptitude scores of these two groups (Atterbury & Silcox, 1993, p. 20). Previous research that suggests that music instruction affects the music aptitude of kindergarten students seems to support this conclusion (Flohr, 1981; Rutkowski, 1996). In addition to these findings, the researchers provided some interesting information about the singing development of their subjects over the course of the school year, comparing the singing pre-tests and post-tests:

Of the 33 presingers, 45.5% remained unable to sing, and 36.5% improved slightly to become uncertain singers. Thus, despite musical aptitude similar to the sample of singers, 82% of the presinging sample were still at a very low level of singing ability while the remaining 18% of the presingers improved to the level of partial singers. Not one of these children became a singer during the year of instruction. For the children in this sample, musical aptitude and singing ability were not complementary attributes (Atterbury & Silcox, 1993, p. 20).

This – particularly the final sentence – may seem surprising, as it suggests that music aptitude, music achievement, and music instruction do not always interact in a predictable way. However, more recent research suggested that tonal music aptitude does not always manifest itself in singing voice development: In her study of the effects of small-group instruction on kindergarten singing voice and music aptitude, Rutkowski (1996) reported a small relationship between developmental tonal aptitude and use of singing voice. Similarly, in Hornbach and Taggart’s

(2005) “The Relationship between Developmental Tonal Aptitude and Singing Achievement Among Kindergarten, First-, Second-, and Third-Grade Students,” no meaningful relationship was found between singing achievement and developmental tonal aptitude. For Atterbury and Silcox, these revelations leave a couple possibilities to consider: (1) The “presingers” – while possessing comparable aptitude – were still struggling with the physiological challenges of singing, (2) the home music environments positively impacted musical attributes through (unmeasured) means other than music aptitude (i.e. increased motivation or intrinsically valuing music), or (3) the data does not reflect reality.

It is unfortunate that the researchers were not able to administer PMMA near the beginning of the school year, when they also investigated home music environment using their musical background form. By having such a large gap between data collection for the two primary variables in the study (aptitude and home music environment), it is impossible to know if and how much their subjects’ music aptitudes were affected by nearly an entire year of music instruction. Additionally, their sample was relatively small ($N = 66$) and only focused on two kindergarten groups at opposite ends of the singing achievement spectrum.

The Rasmussen Study

Rasmussen investigated the relationship between home music environment and music aptitude among first-grade children (2004). Unlike the current study, however, Rasmussen investigated only early childhood music experiences, which he defined as those in the timeframe from birth to 18 months old. Rasmussen also investigated whether school type (public/private) or school setting (urban/suburban) were predictive of music aptitude. Rasmussen’s starting sample included 151 first-grade children whose parents completed a questionnaire designed to measure

early childhood music experiences (p. 36). These children were from public and private school populations from urban and suburban schools in southeastern Pennsylvania.

Prior to the commencement of the formal study, Rasmussen conducted a pilot study to determine the internal consistency of his *Musical Experiences Questionnaire* (MEQ) and the suitability of Gordon's (1986) *Intermediate Measures of Music Audiation* (IMMA) for first-grade children. The pilot revealed that both of the measures were relatively stable, with a reliability of .88 for MEQ and a reliability of .88 for the composite score of IMMA (Rasmussen, 2004, p. 38 -39).

Rasmussen then administered both subtests (Tonal and Rhythm) of IMMA to intact first-grade classes. These students then were asked to take MEQ home to their parents to be filled out. The researcher periodically reminded children and teachers about MEQ to raise the percentage of questionnaire returns. Additionally, Rasmussen offered entrance to a lottery to win 50 dollars as an incentive to parents who returned MEQ by the requested time (p. 40). Of the 151 children whose parents returned MEQ, 114 had completed both subtests of IMMA. To further confirm the validity of individual IMMA scores, Rasmussen reported that the answer sheets did not show evidence of obvious pattern marking (p. 36). Analysis of IMMA results revealed high reliability coefficients except for one group: the suburban public school children, whose split-halves reliability was a reported .56 (p. 46). While all other groups took the rhythm subtest one week after the tonal subtest, this group took the rhythm subtest 48 hours after the tonal subtest, on a Friday afternoon. Rasmussen suggested this limited reliability may have been due to either test fatigue or a lack of motivation. After retesting this group several days later, reliability improved to .78.

In his analysis and discussion, Rasmussen thoroughly described the analytic processes he chose to use and his interpretations of his results. To investigate possible sample bias, Rasmussen compared the mean IMMA scores of children whose parents completed MEQ (submitters) to those of the children whose parents did not (non-submitters). Rasmussen reported that submitters had only slightly higher means and slightly smaller standard deviations than non-submitters, and that thus, sample bias was not a significant factor (p. 44 – 46).

After confirming that his MEQ had means, standard deviations, and discrimination values indicative of a good measurement – except for one item, which was eliminated from further analysis – Rasmussen presented the six factors that emerged in MEQ: Factor 1 (music behaviors of parents), Factor 2 (music/movement classes), Factor 3 (prenatal music experiences), Factor 4, (live instrument experiences), Factor 5 (music from television), and Factor 6 (live music and radio) (p. 50). Regarding music aptitude, Rasmussen only found a statistically significant relationship ($r = .35$) between tonal music aptitude scores and home music environment when combined with school variables (urban, public, etc.). Rasmussen suggested that this represents a maximum of 12% of the variance of the tonal scores and possibly less, when removing positive bias (p. 53 – 54).

In his conclusion, Rasmussen briefly considers that the development of music aptitude is determined by innate factors only, regardless of one's music environment. He quickly dismisses this, instead suggesting that his results were a Type II error, and that his MEQ simply was not measuring what needed to be measured (p. 76). Rasmussen admits that asking parents to recall their child's experiences accurately that are 6 years in the past may have been a critical flaw in his study. Rasmussen also suggests that MEQ did not measure parent attitudes towards music adequately, which likely is an important factor of home music environment (W. C. Chuang,

1997; Lyon, 2008; Mallett, 2000). While these limitations likely affected Rasmussen's results, these lessons and his recommendations provided valuable guidance for this study.

The Children's Music-Related Behavior Questionnaire

The first study. Valerio, Reynolds, Grego, Yap, and McNair (2011) conducted research to develop a comprehensive measure to document the musical behaviors of young children. Their research questions were:

- (a) How reliably can parents/guardians (parents) document their children's music behaviors using the *Child Music-Related Behavior Questionnaire*, a researcher-developed instrument?
- (b) Are there differences in the frequencies of children's music related behaviors based on age and the music activities parents perform with them (2011, p. 163)?

In order to develop their questionnaire to collect data regarding the musical behaviors of children as reported by their parents, "the researchers consulted research, theory and practice to identify young children's music behaviors and descriptions of interactive music behaviors between parents or early childhood caregivers and children" (p. 163). Individual items were created and categorized, and 15 parents provided feedback prior to the development of the "Children's Music-Related Behavior Questionnaire" (CMRBQ). The questionnaire included demographics, a section related to types of children's music behaviors (Part One), and a section related to parent's music activities with children (Part Two). Part 1 included eight sections: (a) attention and emotion, (b) vocalizations, (c) moving, (d) daily routines, (e) requests, (f) taking turns, initiating, sharing, (g) creativity, and (h) other music behaviors (p. 163). Items in sections A – G used a four-point Likert-type scale with an "I don't know" option (p. 163). Section H was asked respondents for open-ended description of music-related behaviors. Part One of CMRBQ

included 29 four-point Likert-type items and one yes/no question. Like Brand's HOMES (1985), Part Two of CMRBQ included items pertaining to the playing of recorded music (Valerio et al., 2011). However, CMRBQ included many more items related to parent's musical interactions with children, including items related to the musical encouragement of children. Additionally, as opposed to only including yes/no items, CMRBQ provides the opportunity for finer discrimination by using a four-point Likert-type scale.

Seven-hundred sixty-three copies of CMRBQ were distributed to early childhood centers in the Southeastern United States. Parents of children enrolled in these early childhood centers were asked to fill out one test form for each child who was 5 years old or younger, with an eventual return of 249 questionnaires (p. 164 – 165).

Regarding their first research question, the researcher's reported Cronbach's alphas ranging from .64 (section A, attention and emotion) to .95 (section E, requests) for each subscale of Part One of the questionnaires. Reliability in Section A was improved to .77 after removing three items. Part Two had a reliability of .92 for the 29-items after removing the yes/no question (p. 166). In response to the second research question, the researcher's reported that "children's age categories and parent music activity levels both contributed to differences in documented frequencies of children's music-behaviors" (p. 167). The five age categories were: 0 – 12 months, 13 – 24 months, 25 – 36 months, 37 – 48 months, and 49 months or greater (p. 166).

The researcher's concluded that CMRBQ is a reliable tool for measuring the music-related behaviors of children and the music activities that parents perform with their children. However, due to age differences in the results found in the study, the researchers determined that Part One of CMRBQ may need to be modified to be used for children between the ages of three and five. Since the parents who reported performing the most music activities with their children

also observed the most music-related behaviors performed by their children, the researcher's used this as evidence to encourage parents to interact musically with their children. Finally, the researchers called for further investigation into the reliability of CMRBQ with a larger and more diverse sample prior to its mass distribution (p. 176).

The second study. In a follow-up study, Valerio, Reynolds, Morgan, and McNair (Valerio et al., 2012) investigated the construct validity of CMBRQ. This study's research problem was to examine the hypothesized single-factorial structure of CMRBQ.

Prior to distribution of CMRBQ, two items that were worded poorly were removed from the Attention and Emotion (section A) subscale of Part One. The open-ended section (section H) also was removed. The researchers offered childcare centers up to a \$200 incentive for the purchase of music-related products for soliciting to and returning completed questionnaires from parents and advertised this opportunity over approximately three months. Six-hundred sixteen completed surveys comprised the final sample (p. 188 – 191).

Like the first study performed using CMRBQ, subscale reliabilities were reported in a similarly moderately-high to high range (.77 – .97) (p. 193). Skewness and kurtosis also were reported to be within acceptable bounds. Factorial analysis revealed that all subscales (Sections A – G of Part 1, and all of Part 2) had statistically significant loadings on the hypothesized single factor, with individual loadings for each subscale ranging from .71 – .90 (p. 194).

The researchers concluded that evidence supports that CMRBQ is a valid tool for gaining information from parents related to their children's musical behaviors and the musical behaviors that parents perform with their children. The researchers recommended continued research with more diverse populations as well as continued research investigating the psychometrics properties of CMRBQ (p. 195).

Summarizing CMRBQ. CMRBQ is a thoughtfully-designed tool with substantial support from two reviewed studies showing that it can be used with confidence in future research (Valerio et al., 2011, 2012). In particular, the second part of CMRBQ measures parents' musical interactions with their children more thoroughly than any previously discussed home music environment measure, including Brand's HOMES (1985). In order to make the current study's survey a more comprehensive measure of home music environment, CMRBQ was included as a component of the final survey that was used.

The Mallet Study

Mallet's (2000) subjects were preschool children between the ages of 36 and 59 months (N =161) and their parents/caregivers. The children were enrolled in 22 different preschools that did not offer music enrichment beyond group singing or passive music listening (p. 83-84). In this dissertation, Mallet's research purpose was:

to examine the relationship between the attitudes of parents or caregivers of preschool children toward music instruction and the home musical environment and to determine if selected factors (parent/caregiver attitudes, home musical environment, socioeconomic status, age of child, or gender of child) were predictive of musical potential in young children. (p. 11)

A music attitudes survey was developed by Mallet through the use of two pilot studies. The final attitude survey contained 23 five-point Likert-type items that prompted parents/caregivers to indicate the degree to which they agreed or disagreed with certain statements. All 23 statements began with one of three phrases: (1) "I believe preschool music instruction ..." (2) "I believe preschool children ..." or simply (3) "I believe ..." (p. 154-155). Specific items addressed many topics, including whether certain students should receive music

instruction, whether music should be taught in school, and what about music instruction was valuable. Mallet combined his attitude survey with the entirety of Brand's (1985) HOMES and demographic questions (age, gender, and socioeconomic status) to form the total survey, the "Parent/Caregiver Survey Regarding Preschool Music" (PSRPM) (Mallett, 2000, p. 84 - 85).

PSRPM also included *Audie* (Gordon, 1989), a music aptitude game/measurement developed and validated for 3- and 4-year-old children. While *Audie* has lower reported reliabilities than PMMA ($r = .68$ for melody, $r = .69$ for rhythm), Mallet supports his use of *Audie* by citing the work of Ryan (1992) and Crump Taggart (1994), the latter of whom concluded: "Based upon the results of this research, teachers, parents, and researchers should feel confident that Audie can be used as one of the bases by which to predict tonal and rhythm achievement in 3- and 4-year-old children' " (Mallett, 2000, p. 97). PSRPM was completed and returned by 174 out of the 241 to whom it was distributed. Thirteen of the returned PSRPMs were not included in the study since the children were older than four, yielding a sample of 161 (p. 84).

In her results and analysis, Mallet reported that parents/caregivers had fairly positive attitudes regarding preschool music, with a mean score of 4.16 (of a possible 5), supported by an alpha coefficient of $r = .86$ for the attitude portion of PSRPM (p. 106). The mean scores for HOMES was 34.59 (out of a possible 47 points which would represent a very musical home environment) with an alpha of $r = .75$ (p. 107). A moderately positive relationship (.42) was found between PSRPM and HOMES scores (p. 108).

In order to determine if any of the other factors in the study were predictive of music aptitude, Mallet only used the combined tonal and rhythm music aptitude scores from *Audie*. Mallet provides support for this technique by citing the works of Reynolds (1990), Blesdell (1991), Ryan (1992), and Farr (1993), who also used combined aptitude scores from *Audie* in

their research (Mallett, 2000, p. 109). Out of the factors related to the composite aptitude scores – gender, socioeconomic status, age, parent attitudes, and home music environment – Mallet reported that only age and home music environment were predictive of music aptitude, with correlations of .27 and .24, respectively (p. 112).

Mallet's dissertation provides a blueprint to follow for other researchers interested in conducting similar types of studies. Her multiple surveys – supported by pilot studies and exhibiting strong internal reliabilities – are a particularly strong component of her work. Similar measurement tools were used in the current study, which is reasonable considering the large number of similarities between Mallet's research questions and those of this study. However, Mallet's study did have a number of limitations, many of which she addresses in her recommendations for future research. In response to her study finding a significant relationship between age and music aptitude scores, Mallet wrote: "Future uses of Audie as a measure of developing musical aptitude should examine subgroups of children based on number of months old" (p. 146). Although most children in this study fell into a 12-month age gap (as opposed to the 23-month gap in Mallet's), this study included age as variable to detect any patterns that emerged in relationship to age. This study also used PMMA instead of *Audie*, which is a much stronger music aptitude measurement. Mallet also chose only to include HOMES and her attitude measure as separate variables when examining their relationship with music aptitude. It is possible that combining these variables and correlating them with music aptitude may have produced significant results. Finally, although Mallet reported no significant relationship with socioeconomic status in her study, she also reports that similar studies needs to be conducted with more diverse economic populations. Indeed, 72.6% of Mallet's sample reported a gross

annual income of \$40,000 or more, with 36% reporting that they made over \$60,000 (p. 104). The proposed study included a larger and more economically diverse sample population.

Summary

This chapter served as a review of the most relevant and informative research related to this study. In it was a discussion of many different tools for measuring home music environment. One of these tools was Brand's (1985) "Home Musical Environment Survey" (HOMES), which has been used in numerous studies in its original or modified form (Atterbury & Silcox, 1993; Brand, 1986; Mallett, 2000). While Brand's HOMES was appropriate for those studies, a more recent tool designed specifically for younger children and reflective of the most current music research and music practice was desirable for this study. This tool is CMRBQ, which was developed specifically for the use with children in the proposed study's age range and is supported by two studies that investigated its psychometric properties (Valerio et al., 2011, 2012). For this study, a modified version of Part Two of CMRBQ served as a section of the questionnaire that was distributed to parents.

However, Part Two of CMRBQ only measures the musical behaviors that parents perform for and with their children. Other studies have recognized that parental attitude is an important component of home music environment, and that has been reflected in their research and the questionnaires that have been used (W. C. Chuang, 1997; Lyon, 2008; Mallett, 2000; Rasmussen, 2004). Because of this, the survey used in this study included an additional section that measures parental attitudes towards music and music education. This portion of the questionnaire was based on "Section C" of "Parent/Caregiver Survey Regarding Preschool Music (PSRPM)" (Mallett, 2000, p. 84 - 85). Mallett also recognized the need for measuring aspects of home music environment in addition to parent attitudes, which is why she included

HOMES with his parental attitudes measurement (CMRBQ was not yet developed). Like previous research (Brand, 1986; Rasmussen, 2004; Valerio et al., 2012), this study included factor analysis to determine if any items on the questionnaire are measuring the same construct as other items.

Primary Measures of Music Audiation (PMMA) (Gordon, 1986b), as was used in other studies with similarly aged children as this study (Atterbury & Silcox, 1993; Brand, 1986), was used to measure music aptitude in this study. Since all of the students in this study were kindergarten students, there was no conflict in deciding which music aptitude measure to use, as was likely the case in Lyon's study (2008). Music aptitude subtests were administered one week apart, as practiced by Lyon (2008) and Rasmussen (2004) and recommended in the test manual (Gordon, 1986b), to limit the effect of test-fatigue and increase reliability of PMMA.

A primary gap that has been observed in the literature review is the lack of research investigating music aptitude before it is significantly influenced by school music experiences, which have been shown to have an effect on music aptitude (Flohr, 1981; Rutkowski, 1996). For many of these studies, this was due to the age of the population being investigated (Brand, 1986; W. C. Chuang, 1997; Lyon, 2008; Zdzinski, 1992, 1996). Mallet's (2000) dissertation actually had a younger sample than this study and was limited by being forced to use the only available music aptitude measure – *Audie* (Gordon, 1989) – which is a less reliable measure than PMMA (Gordon, 1986b). Additionally, Mallet chose to use only combined aptitude scores from *Audie* for his analysis, due to a small number of items (10) on each subtest of *Audie*. Due to the much longer test length of PMMA, this study will include tonal, rhythm, and composite music aptitude scores as variables. Rasmussen (2004) examined the relationship between early-childhood music experiences and the music aptitude of first grade students. However, by his own admission,

asking parents to assess the nature of their child's home music environment accurately 6 years later likely led to invalid results. The study that came closest to measuring music aptitude and the home music environment before students had substantial experience in school music classes was that of Atterbury and Silcox (1993). However, due to time constraints, the administration of their music aptitude measure (PMMA) had to be delayed to the spring of kindergarten, at which point students had substantial music learning experiences separate from their home music environments.

For the analysis of these measures, there are two notable techniques that have emerged from the literature review. Rasmussen's (2004) tactic of comparing the mean music aptitude scores of children who do not receive home music environment scores (due to not returning surveys) with those who do was emulated in this study. This was done to determine if sample bias was a concern. Mallet (2000), however, chose not to combine the two sections (HOMES and the parental attitude measure) of his survey when examining the relationship between various variables and music aptitude. In this study, these two sections were compared separately as well as combined when determining the relationship to music aptitude.

The purpose of this study is to investigate the relationship between the home music environment and the developmental music aptitude of kindergarten students. The research that has been reviewed above provides a glimpse into how similar research has been conducted before, including its strengths, weaknesses, and the gaps in the research. This study builds on that research and helps fill in their gaps, providing useful insights for future researchers, music educators, and parents.

CHAPTER 3: METHODS

Introduction

The problems of this study were investigated by measuring the subjects' music aptitudes and determining the nature of their home music environments shortly after the subjects began kindergarten. Home music environment were measured using the "Parent/Guardian Survey Regarding Kindergarten Music" (PSRKM), which included components borrowed from the Parent/Caregiver Survey Regarding Preschool Music" (Mallet, 2000) and the "Children's Music-Related Behavior Questionnaire" (Valerio et al., 2011, 2012). PSRKM included items investigating multiple components of home music environment, including both the types of musical behaviors that parents perform with and for their children as well as parental attitudes towards music and music instruction. Music aptitude was measured using *Primary Measures of Music Audiation* (Gordon, 1986b). Since these variables were measured shortly after the school year began, there was a limited time for potential change in the music aptitude of the subjects due to the music instruction that they received at school.

Sample

This study had the largest sample-size to date on this topic with a kindergarten population, using a sample of 289 kindergarten students who attended a suburban public school in Southeast Michigan. These students were from 12 intact classes of kindergarten that were taught in an all-kindergarten elementary building. These students received regular music instruction during two 40-minute sessions a week, with classes taught by the researcher. Most of these students received limited or no previous formal or informal music instruction/guidance prior to the start of the academic year. The exception to this was 42 students who received music instruction from the researcher the previous year. These students were either in their second year

of kindergarten or received music instruction through a developmental kindergarten class offered at the research site.

One-hundred thirty-seven (47.4%) of the students were female and 152 (52.6%) were male. As of September 1st, 2015, all of the subjects were either 4-, 5-, or 6-years old. The sample was primarily white and 49.2% of the students at the research site were eligible for free or reduced lunch. Students are eligible for a reduced price school lunch by being from households with incomes between 130 and 185 percent of the federal poverty level. Any students from households with incomes up to 130% of the federal poverty level are eligible for free school lunch. Two-hundred fifty-three (87.5%) of the students were White, 15 (5.2%) students identified with two or more races, 12 (4.2%) students were Hispanic, 8 (2.5%) students were African-American, and 1 (.3%) student was Asian.

Design and Procedures

Home Music Environment

The “Parent/Guardian Survey Regarding Kindergarten Music” (PSRKM) was used to measure home music environment. This survey comprises components that were developed in previous studies and designed to be used with kindergarten-aged children. The first of these components was Part Two of the “Children’s Music Behavior Inventory” (CMBI) (Valerio & Reynolds, 2015), which is the renamed and most current version of the “Children’s Music-Related Behavior Questionnaire” (CMRBQ) (Valerio et al., 2011, 2012). The second component of PSRKM was Section C of Mallet’s “Parent/Guardian Survey Regarding Preschool Music” (PSRPM) (2000). The demographics section from Mallet’s PSRPM also was included in PSRKM.

PSRKM had three sections. Section A asked for demographic information regarding the sex and birthday of the child. Asking for the specific birthday, rather than simply asking for a numerical age in terms of years allowed for greater differentiation among the students. This is per Mallet's recommendation, as she discovered a significant relationship between age and music aptitude in her study of preschool children. Section A also gathered information about who filled out the survey and the approximate gross income of the household.

Section B of PSRKM was the second part of Valerio and Reynold's CMBI (2015). Section B contained 29 Likert-type items that measured the frequency with which parents performed certain music-related activities with their children. The four possible responses for each item were *never*, *rarely*, *sometimes*, and *frequently*. The only modification that was made to CMBI is that, instead of reading "Darken the square that best reflects how frequently you have performed each activity with your child within the last one-month period," Section B asked parents to recall activities that had occurred in the past year. The rationale for making this change was to increase the accuracy of parent responses, with the thought that a time-frame as limited as a month would leave parents unsure about how to respond to a number of items on CMBI. Additionally, since the purpose of this study was to examine home music environment in a broader sense, it was thought that a larger time-frame would make parent responses more representative of the child's home music environment on average. If the original language ("one-month") was not altered, the responses given by parents may have been less likely to be representative of the child's home music environment in totality. This change was done per conversations with and permission from CMBI's authors (Valerio & Reynolds, 2015).

Section C of PSRKM was a survey developed by Mallet (2000) that investigated parent/caregiver attitudes. Like a number of other researchers (W. C. Chuang, 1997; Lyon, 2008;

Mallett, 2000; Rasmussen, 2004), the researcher believed that parent attitude is an important component of a child's home music environment and also an area that Valerio and Reynold's CMBI (2015) did not address. Section C included 22 five-point Likert-type statements through which parents/guardians stated the degree to which they agreed. All of these statements began with one of three statements: "I believe preschool music instruction...", "I believe preschool children...", or "I believe..." (Mallet, 2000, p. 154 – 155). Section C of Mallet's document was developed through two pilot studies, which she outlined in detail in her dissertation (p. 86 – 95). Additionally, Mallet reported an alpha coefficient of .86 in her study, making the measure suitable for use in this study.

Section C is slightly modified from Mallet's version. Similar to the alteration made in Section B, all references to preschool/preschooler were changed appropriately. Additionally, the statement "I believe...Music instruction is more appropriate for school-age children" was eliminated. Since the children in this study were already school-aged children, it did not seem appropriate.

The researcher allowed PSRKM to be filled out and turned in on site at an "Open House" event that took place the week prior to the beginning of school year. Since this was the first opportunity for parents and incoming kindergarten students to explore their new school and meet the staff, the turnout for this event was high. Additionally, meeting the school's music teacher was an item on the "scavenger hunt" that kindergarteners and parents were encouraged to complete, which further encouraged families to visit the music room. This allowed for an ideal opportunity to distribute the survey and allow parents to complete it on-site. Parents who did not complete PSRKM on-site or return it by the end of the second week of the school year received a copy of PSRKM in their child's take-home folder. Surveys were returned at a rate of 71.97%.

Music Aptitude

Instead of immediately beginning the school year by measuring the music aptitude of the students, the researcher spent the first two music classes (and the fourth music class) of the school year following the normally taught music curriculum. This choice was made in order to establish basic routines with students, as well as to develop a comfortable and safe learning environment for the students. During these first two classes, the researcher did not teach students to discriminate and/or classify sounds as same/different.

To measure music aptitude, the research administered the *Primary Measures of Music Aptitude* (PMMA) (Gordon, 1986). PMMA is a valid music aptitude test and is designed to be used with kindergarten-aged children (Atterbury & Silcox, 1993; Brand, 1986; W. C. Chuang, 1997; Gordon, 1986b; Stamou et al., 2010). While the researcher intended to follow the written and standardized test directions provided in PMMA manual as closely as possible, the researcher did fill out the “name” line for all of the students in advance, and additional pauses were given during administration in order to make sure that all students could keep up.

There are two subtests of PMMA, Tonal and Rhythm. Gordon describes PMMA subtests as such:

The Tonal subtest includes short tonal patterns void of rhythm and the Rhythm subtest includes short rhythm patterns void of melody. The test items are presented in a musical context, and are performed on a Moog Sonic Six Synthesizer and a specially produced Moog Rhythm Programmer. (Gordon, 1986, p. 19)

One of the subtests was administered during the third music class of the school year, with the other subtest being administered during the fifth music class of the school year: one week later.

The one week break between each subtest was included to avoid test fatigue among students and unreliable results, as reported by Rasmussen (2004).

Half of the classes took the Rhythm subtest first, with the other half taking the Tonal subtest first. This was done to limit the effect of subjects who improve due to taking one of the subtests first. While each of the subtests are completely different in content, both involved discriminating between musical sounds, and both tests asked students to mark their answers in the same fashion. In addition to this, in an acknowledgement to the fact that young children are more fatigued in the afternoon – particularly at the beginning of the school year – the researcher will made an effort to distribute the classes that take each subtest as evenly as possible across the morning and afternoon. However, due to scheduling restrictions, this was not entirely possible. It was my hope that by administering PMMA so close to the beginning of primary schooling for these children, that their aptitude results were as un-influenced as possible by the school music environment and in particular by the students' biweekly music classes.

Analysis

Parent/Guardian Survey Regarding Kindergarten Music

Completed PSRKMs (Appendix A) were returnable by parents up until September 25th, 2015, which also coincided with when the last classes finished PMMA. Upon collection of PSRKMs, each section was analyzed as described below.

Section B of PSRKM contained a modified portion of Valerio and Reynold's CMBI (2015), which was designed to self-reported music activities that parents perform with their children. All 29 items were recoded from *never*, *rarely*, *sometimes*, and *frequently* to 1, 2, 3, and 4, respectively. These conversions are identical to those used by CMBI's original developers (Valerio et al., 2011, p. 165). Using these conversions, possible raw scores from this section

ranged from 29 to 116. Means, standard deviations, and Cronbach's alpha were calculated for the Section B scores to determine if the instrument was performing correctly. In addition to this, analysis occurred to determine if any factors exist within Section B, as reported by previous researchers (Brand, 1985, 1986; Rasmussen, 2004; Valerio et al., 2012).

Section C of PSRKM contained 22 Likert-type statements to which parents/guardians responded. To convert these responses into numerical data, the following practices were employed, as per Mallet's research:

For statements that represent positive beliefs (e.g., "I believe kindergarten music instruction should be available to all children"), values ranging from one to five will be assigned (1 = strongly disagree, 2 = disagree, 3 = undecided, 4 = agree, 5 = strongly agree). For statements that represent negative beliefs (e.g., "I believe kindergarten music instruction benefits only those children who participate in music later in life"), values will be assigned in reverse order (1 = strongly agree, 2 = strongly disagree, 3 = undecided, 4 = disagree, 5 = strongly disagree). Based on these conversions, possible raw parental attitude scores range from 22 to 110 for complete questionnaires. Means, standard deviations, and Cronbach's alpha will be calculated for the Section C attitude scores. (Mallet, 2000, p. 99)

For the purpose of providing as comprehensive of results as possible, Sections B and C also were analyzed as a combined variable, in addition to being included in analysis separately. Based on the previously listed score conversions listed for Sections B and C, the possible total scores ranged from 51 to 226. Means and standard deviations for this combined variable were calculated.

Primary Measures of Music Audiation

After administration of PMMA, each student's answer sheet was scored by hand according to the directions provided in PMMA manual (Gordon, 1986b). Raw scores were calculated for tonal, rhythm, and composite music aptitude. In addition to this, scores, means and standard deviations were calculated. Cronbach's Alpha coefficients were calculated to assure that PMMA was demonstrating internal reliability. As per Rasmussen (2004), any score sheets that showed obvious evidence of pattern marking were not used in the final analysis.

The Relationship Between Home Music Environment and Music Aptitude

After all data from PSRKM and PMMA was analyzed and confirmed, analysis to determine the relationships between music aptitude and home music environment commenced. This was achieved by calculating the Pearson Product-Moment correlations between PSRKM and PMMA scores. This was in contrast to how Mallet (2000) analyzed her results, where she only examined the relationships between the sections of her questionnaire separately. This study analyzed both sections separately and as a combined variable. Additionally, analysis was performed to determine if there were any significant relationships between music aptitude and individual items of PSRKM. Means and standard deviations also were calculated for those students whose parents did not return PSRKM and labeled as the "non-submitters" group. These means and standard deviations were compared to the means and standard deviations of the students whose parents returned PSRKM ("submitters"). This was done to determine if sample bias was a concern, as practiced by Rasmussen (2004).

CHAPTER 4: RESULTS AND INTERPRETATION

Introduction

The purpose of this study was to investigate the relationships between the home music environments and the developmental music aptitudes of kindergarten students. The primary research problems are as follows:

To determine the nature of the home music environments of kindergarten students.

To determine the relationships between the home music environments and the music aptitudes of kindergarten students.

This study took place during the Fall of 2015 at a public elementary school in a Midwestern suburb. This school contained 12 intact kindergarten classes, from which this study's subjects (N=289) were drawn. One hundred thirty seven (47.4%) of the students were female and 152 (52.6%) were male. As of September 1st, 2015, all of the subjects were either 4-, 5-, or 6-years old. To better quantify the range of ages in this study, the subjects were grouped into three-month age ranges. As of September 1st, 2015, 24 (8.3%) of the subjects were less than 60-months old, 56 (19.4%) of the subjects were between 60- and 63-months old, 74 (25.6%) of the subjects were between 63- and 66-months old, 58 (20.1%) of the subjects were between 66- and 69-months old, 50 (17.3%) of the subjects were between 69- and 72-months old, 23 (8.0%) were between 72- and 75-months old, and 4 (1.4%) were 75-months or older. Forty two (14.5%) of the students had had a year of previous music instruction from the researcher, either because they were a student in a "Young Fives" class the previous year, or because they were entering their second year of kindergarten. All of the analysis was conducted using IBM's Statistical Package for the Social Sciences (SPSS), version 23.

The Parent/Guardian Survey Regarding Kindergarten Music

The Parent/Guardian Survey Regarding Kindergarten Music (PSRKM) was distributed to all kindergarten parents who visited the music room during the “open house” event at a suburban public school in the Midwestern United States. Approximately two weeks later, any parents who did not return a completed survey (including those that did not receive an initial survey) were sent a copy of the survey with a brief message attached to it encouraging that they complete and return the survey (Appendix B). In addition to this, a reminder to return copies of PSRKM was included in the weekly newsletter that went home to parents. Eventually, 208 surveys were completed, returned, and included in analysis.

Section A – Demographics

In Section A of PSRKM, student sex and age was recorded. Additionally, the responders had the opportunity to note their relationship to the child, as well as the gross annual income of the household. Of the 208 surveys that were returned, 117 (56.3%) were for male children, and 91 (43.8%) were for female children. In regards to responder identity, 163 (78.4%) indicated that they were the mother/female guardian, 7 (3.4%) indicated that they were the father/male guardian, 33 (15.9%) indicated that both the mother/father were filling out the survey, 4 (1.9%) identified themselves as having an unlisted relationship to the child (grandparent, sister, etc.), and 1 (.5%) responder chose not to indicate the type of relationship to the child. No responders indicated chose the “male/female guardian” option on the survey, suggesting this option was either unnecessary, confusing, or not-applicable to the subjects of this study.

In regards to income, 53 (25.5%) of respondents indicated a combined annual income greater than \$70,000, 14 (6.7%) indicated an income between \$60,000 and \$69,999, 8 (3.8%) indicated an income between \$50,000 and \$59,999, 16 (7.7%) indicated an income between

\$40,000 and \$49,999, 15 (7.2%) indicated an income between \$30,000 and \$39,999, 8.6% indicated an income between \$20,000 and \$29,999, 18 (8.6%) indicated an income between \$10,000 and \$19,999, and 5 (2.4%) indicated an income less than \$9,999. Sixty one (29.3%) of respondents either chose the option “I prefer not to answer this question” or did not make a selection regarding income.

Section B – Parent Music Activities

Section B of PSRKM was a modified version of the second part of Valerio and Reynold’s CMBI (2015). Section B contained 29 Likert-type items that measured the frequency which parents recalled performing certain music-related activities with their children in the previous year. The four possible responses for each item are *never*, *rarely*, *sometimes*, and *frequently*. While 208 copies of PSRKM were returned, a number of respondents did not report answers for every item. Because of this, only the 191 surveys without missing Section B data were used for the analysis of Section B as a whole. Scoring and analysis of this section of PSRKM revealed a Cronbach’s alpha of .90, indicating that the instrument was performing consistently.

With 29 items worth 1 – 4 points each, the possible score range in Section B was between 29 and 116. The mean score for Section B was 80.79, with a standard deviation of 12.06. An independent-samples t-test was conducted to determine if there was a significant difference between the Section B total scores of female and male subjects. The results from this test showed there was a significant difference between the means of female subjects ($M=83.47$, $SD=12.23$) and male subjects ($M=78.72$, $SD=11.58$); $t(189)=2.74$, $p=0.007$. Female children had richer home environments musically than the male children. The highest mean for an individual item was 3.81 for item 13, which stated “I sing along with recorded music while my child is listening,” while the lowest mean was 1.22 for item 24, which read “I attend early childhood

music classes with my child.” Individual means, standard deviations, number of respondents for each item, and summaries of the content of each item is reported in Table 1.

Table 1 – Means and Standard Deviations of PSRKM: Section B

	Mean	N	Std. Deviation
SecB1 – Sing songs for child.	3.51	208	.614
SecB2 – Make up songs/rhymes using words for child.	3.04	208	.836
SecB3 – Make up songs/rhymes using words with child.	3.11	208	.773
SecB4 – Make up songs/rhymes not using words for child.	2.48	207	.939
SecB5 – Make up songs/rhymes not using words with child.	2.55	205	.910
SecB6 – Sing songs/rhymes for child during daily routines.	3.01	207	.889
SecB7 – Sing songs/rhymes with child during daily routines.	3.04	208	.810
SecB8 – Sing songs/rhymes and leaving out notes/phrases.	2.50	208	1.068
SecB9 – Sing songs/rhymes by child request.	2.79	206	.959
SecB10 – Encourage child to make up songs/rhymes.	3.18	207	.839
SecB11 – Compliment child’s made-up songs/rhymes.	3.71	207	.531
SecB12 – Play recorded music for child while awake.	3.76	207	.572
SecB13 – Sing with recorded music while child listens.	3.81	206	.454
SecB14 – Encourage child to sing with recorded music.	3.79	207	.486
SecB15 – Dance with child while playing recorded music.	3.63	207	.601
SecB16 – Dance with child while adult performs songs/rhythms.	3.32	208	.772
SecB17 – Dance with child while child performs songs/rhythms.	3.33	208	.754
SecB18 – Dance with child while adult and child performs songs/rhythms.	3.39	208	.728
SecB19 – Notice that child is using a chanting, not a singing voice.	2.54	203	.908
SecB20 – Notice that child is using a singing voice.	3.30	207	.775
SecB21 – Play toy instruments for child to listen/observe.	2.37	208	.933
SecB22 – Play toy instruments with child.	2.47	208	.911
SecB23 – Read books with a musical theme with child.	2.71	207	.741
SecB24 – Attend early childhood music classes with child.	1.22	206	.624
SecB25 – Attend concerts, ballets, or musicals with child.	1.97	208	.980
SecB26 – Play a musical instrument by itself while child listens.	1.66	208	1.018
SecB27 – Play instrument and sing for child.	1.37	207	.751
SecB28 – Play songs on an instrument while child sings.	1.48	208	.857
SecB29 – Invite child to play a musical instrument.	1.98	208	1.146

In order to determine if there was an underlying factorial structure within Section B of PSRKM, a factor analysis was calculated. First, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy was calculated. Results ($KMO=.817$) indicated that Section B was suitable for further analysis to determine what factors may have existed within Section B. An Eigenvalue Monte Carlo parallel analysis simulation then was run to determine how many factors should be extracted from Section B. A maximum-likelihood factor analysis with a direct-oblimin rotation was calculated. The four factors that were extracted from Section B accounted for 48.35% of the total variance. These four factors had individual loadings of 12.57%, 16.44%, 10.49%, 8.86%, respectively). Table 2 shows the loadings (only those $>.10$ reported) for each of the four factors. Table 3 contains the correlations between the four factors.

Individual items were considered a meaningful contributor to each factor if it had loadings above a .3 level (Table 2). Factor 1 (“Purposeful Music Making”) included items 6, 7, and 8, and related to using music to elicit some sort of response, whether practical (cleaning, bathing, etc.) or musical (leaving out part of a song or chant). Factor 2 (“Playing Instruments”) included items 21, 22, and 26 through 29, and related to playing toy or “real” instruments. Factor 3 (“Creating Music”) included items 2 through 5 and related to parents making up new songs or chants with or without words for or with their child. Factor 4 (“Recorded Music and Dancing”) included items 12 through 18 and item 23 and included items related to listening and interacting with recorded music, dancing to music, and reading books with a musical theme. This is a different approach than that of Valerio and Reynolds (2012), who used confirmatory factor analysis to determine that the entirety of CMBI (not just the portion used in the current study) fit a one-factor model.

Table 2 – Factor Analysis Pattern Matrix of PSRKM: Section B

	Factor			
	"Purposeful Music Making"	"Playing Instruments"	"Creating Music"	"Recorded Music and Dancing"
SecB1 – Sing songs for child.	.275		.244	.250
SecB2 – Make up songs/rhymes using words for child.	.166		.556	
SecB3 – Make up songs/rhymes using words with child.			.556	.238
SecB4 – Make up songs/rhymes not using words for child.			.956	-.269
SecB5 – Make up songs/rhymes not using words with child.			.898	-.188
SecB6 – Sing songs/rhymes for child during daily routines.	1.070			
SecB7 – Sing songs/rhymes with child during daily routines.	.860			
SecB8 – Sing songs/rhymes and leaving out notes/phrases.	.389		.150	
SecB9 – Sing songs/rhymes by child request.	.196		.266	.231
SecB10 – Encourage child to make up songs/rhymes.	.140	.234	.294	.178
SecB11 – Compliment child's made-up songs/rhymes.		.168	.153	.255
SecB12 – Play recorded music for child while awake.			-.107	.464
SecB13 – Sing with recorded music while child listens.				.489
SecB14 – Encourage child to sing with recorded music.				.561
SecB15 – Dance with child while playing recorded music.				.771
SecB16 – Dance with child while adult sings songs/rhythms.	.131		.132	.702
SecB17 – Dance with child while child sings songs/rhythms.				.797
SecB18 – Dance with child while both sings songs/rhythms.				.848
SecB19 – Notice that child is using a chanting, not a singing voice.			.275	
SecB20 – Notice that child is using a singing voice.		.220	.101	.246
SecB21 – Play toy instruments for child to listen/observe.		.542		.257
SecB22 – Play toy instruments with child.		.560		.220
SecB23 – Read books with a musical theme with child.	.179			.316
SecB24 – Attend early childhood music classes with child.		.289	.125	
SecB25 – Attend concerts, ballets, or musicals with child.	.128	.126		.220
SecB26 – Play a musical instrument by itself while child listens.		.920		-.107
SecB27 – Play instrument and sing for child.		.899		-.177
SecB28 – Play songs on an instrument while child sings.		.978		
SecB29 – Invite child to play a musical instrument.		.762		

Table 3 – Factor Correlation Matrix of PSRKM: Section B

	1	2	3	4
Factor	Purposeful Music Making	Playing Instruments	Creating Music	Recorded Music
1 – Purposeful Music Making	1.000	.284	.372	.412
2 – Playing Instruments	.284	1.000	.211	.291
3 – Creating Music	.372	.211	1.000	.327
4 – Recorded Music and Dancing	.412	.291	.327	1.000

Section C – Parent Attitudes Towards Music and Music Education

Section C of PSRKM was a survey developed by Mallet (2000) that investigated parent/guardian attitudes. Section C included 22 five-point Likert-type statements through which parents/guardians stated the degree to which they agreed with each statement. All of these statements began with one of the following: “I believe kindergarten music instruction...,” “I believe kindergarten children...,” or “I believe...” As with Section B of PSRKM, only the 195 surveys without missing items for Section C were used for the analysis of Section C as a whole. Scoring and analysis of this section of PSRKM revealed a Cronbach’s alpha of .87, indicating that the instrument was performing consistently.

Each of the statements in Section C were given a value of 1 to 5, with appropriate items being reverse coded. This yielded a total score range of 22 to 110 for Section C. The mean total score for Section C was 96.11 with a standard deviation of 8.33. Like in Section B of PSRKM, an independent-samples t-test was conducted to determine if there was a significant difference between the Section C total scores of female and male subjects. The results from this test showed there was a significant difference between the means of female subjects ($M=97.66$, $SD=7.49$) and male subjects ($M=94.96$, $SD=8.76$); $t(193)=2.26$, $p=0.025$. Parents’ attitudes about the importance of music for children were more positive if they had a girl rather than a boy child. The highest mean for an individual item was 4.85 for item 4, which stated, “I believe

kindergarten music instruction should be available to all children.” The lowest mean for an individual item was 3.39 for item 16, which read “I believe kindergarten children come to value music in their lives because of their level of natural music talent, rather than through school instruction.” Individual means, standard deviations, the number of respondents, and the complete text for each item are reported in Table 4. Items which were reverse-coded are marked.

In order to determine if there was an underlying factorial structure within Section C of PSRKM, a factor analysis was calculated. First, a Kaiser-Meyer-Olkin Measure of Sampling Adequacy was calculated. Results ($KMO=.884$) indicated that Section C was suitable for further analysis to determine what factors may have existed within Section C. An Eigenvalue Monte Carlo parallel analysis simulation was then run to determine how many factors should be extracted from Section C. This analysis determined that three factors should be extracted from Section C. A maximum-likelihood factor analysis with a direct-oblimin rotation was calculated. The three factors that were extracted from Section C accounted for 41.53% of the total variance. These three factors had individual loadings of 30.67%, 7.05%, and 3.82 %, respectively. Table 5 shows the loadings (only those $>.10$ reported) for each of the three factors. Table 6 contains the correlations between the three factors.

Similar to the factor analysis performed on Section B, the individual items of Section C were considered a meaningful contributor to each factor if it had a loading above .3 (Table 5) without a loading of .3 or higher on any other factor. Factor 1 (“Positive Music Statements”) included items 1, 3, 4, 6, 7, 8, 10, 12, 13, 14, 19, 20, and 21. All of these were positive statements, the content of which included items related to the non-musical benefits of music instruction, items related to what music instruction should look like, and items related to the

Table 4 – Means and Standard Deviations of PSRKM: Section C

	N	Mean	Std. Deviation
I believe kindergarten music instruction...			
SecC1 – Teaches children poise and confidence.	207	4.3913	.58002
SecC2 – Does not develop critical thinking skills.	206	4.1845	.86951
SecC3 – Develops individual creativity in young children.	206	4.6650	.54050
SecC4 – Should be available to all children.	207	4.8454	.38826
SecC5 – Does not help with other types of learning (e.g., math, reading).	205	4.3854	.84179
SecC6 – Provides a spontaneous, healthy outlet for emotions and feelings.	207	4.6957	.50158
SecC7 – Can help social development.	206	4.6796	.47808
SecC8 – Can influence the degree to which children values music in their lives.	207	4.5459	.60465
SecC9 – Benefits only children who will participate in music later in life.	206	4.2573	.86494
SecC10 – Provides an outlet for self-expression.	207	4.6812	.47744
SecC11 – Is not necessary for the overall development of young children.	206	4.2767	.91393
SecC12 – Is a necessary part of early childhood music instruction.	207	4.5556	.59574
I believe kindergarten children...			
SecC13 – Should have musical experiences that focus on exploring sound.	208	4.5096	.57307
SecC14 – Should learn to play simple songs.	205	4.4780	.60695
SecC15 – Should not waste time learning to play simple instruments.	207	4.5121	.68166
SecC16 – Come to value music in their lives because of their level of natural music talent, rather than through school music instruction.	205	3.3902	1.24613
SecC17 – Should receive musical instruction only if they exhibit musical talent.	206	4.3544	.73628
SecC18 – Should express an interest in music before they enrolled in music instruction.	207	4.0821	.88021
SecC19 – Should continue in music instruction even if they are not achieving musically at the same level as their peers.	206	3.8544	.92032
SecC20 – Should experience exemplary musical sounds, activities, and materials.	208	4.1875	.84467
I believe...			
SecC21 – All children have musical potential.	207	4.3575	.74242
SecC22 – Music instruction for preschool children should occur in the home with parent(s) and/or caregiver(s) rather than in school.	207	4.0870	.99131

*Item was reverse coded

Table 5 – Factor Analysis Pattern Matrix of PSRKM: Section C

	Factor		
	1 Positive Music Statements	2 Music Values	3 Negative Music Statements
I believe kindergarten music instruction...			
SecC1 – Teaches children poise and confidence.	.521		
SecC2 – Does not develop critical thinking skills.			.617
SecC3 – Develops individual creativity in young children.	.516		.101
SecC4 – Should be available to all children.	.576		
SecC5 – Does not help with other types of learning (e.g., math, reading).			.655
SecC6 – Provides a spontaneous, healthy outlet for emotions and feelings.	.826		-.136
SecC7 – Can help social development.	.793		
SecC8 – Can influence the degree to which children values music in their lives.	.668		
SecC9 – Benefits only children who will participate in music later in life.		.443	.329
SecC10 – Provides an outlet for self-expression.	.713	.221	
SecC11 – Is not necessary for the overall development of young children.	.126	.305	.384
SecC12 – Is a necessary part of early childhood music instruction.	.542	.111	.161
I believe kindergarten children...			
SecC13 – Should have musical experiences that focus on exploring sound.	.708		
SecC14 – Should learn to play simple songs.	.681		-.112
SecC15 – Should not waste time learning to play simple instruments.	.204	.246	.480
SecC16 – Come to value music in their lives because of their level of natural music talent, rather than through school music instruction.	-.124	.639	
SecC17 – Should receive musical instruction only if they exhibit musical talent.		.604	.295
SecC18 – Should express an interest in music before they enrolled in music instruction.	.151	.640	
SecC19 – Should continue in music instruction even if they are not achieving musically at the same level as their peers.	.373		
SecC20 – Should experience exemplary musical sounds, activities, and materials.	.321		.193
I believe...			
SecC21 – All children have musical potential.	.374		.148
SecC22 – Music instruction for preschool children should occur in the home with parent(s) and/or caregiver(s) rather than in school.		.561	

Table 6 – Factor Correlation Matrix of PSRKM: Section C

Factor	1 Positive Music Statements	2 Music Values	3 Negative Music Statements
1 – Positive Music Statements	1.000	.326	.511
2 – Music Values	.326	1.000	.277
3 – Negative Music Statements	.511	.277	1.000

accessibility of music instruction. Examples include item 7: “I believe kindergarten music instruction can help social development;” item 13: “I believe kindergarten children should have musical experiences that focus on exploring sounds;” and item 12: “I believe kindergarten music instruction is a necessary part of early childhood education programs.” Factor 2 (“Music Values”), included items 16, 17, 18, and 22. All of these were statements related to why students should value music, as well as which students should receive music instruction, who should deliver music instruction, and where music instruction should occur. Item 17 reads, “I believe kindergarten children should receive musical instruction only if they exhibit musical talent.” Factor 3 (“Negative Music Statements”) included 3 negative statements (items 2, 5, and 15) about music or music education. Item 15 reads, “I believe kindergarten children should not waste time learning to play simple instruments.”

Combined Scores of Sections B and C

To determine a “total” home music environment score, in subject’s Section B and Section C totals were combined. Cronbach’s alpha for the 180 surveys that had all of Sections B and C completed (no missing items) was .91. Possible scores for this combined variable range between 51 and 226. The mean score for these combined sections was 176.51 with a standard deviation of 16.83. An independent t-test revealed that female students had significantly higher scores ($M=180.82$, $SD=15.62$) than male students ($M=173.36$, $SD=17.05$); $t(178)=3.01$, $p=0.003$.

Primary Measures of Music Audiation

Initial Administration and 2nd Administration

On the 3rd and 5th music classes of the school year, subjects took the two subtests (tonal and rhythm) of Primary Measures of Music Audiation (PMMA). Although the two subtests measure different aspects of music aptitude, both subtests ask students to determine if pairs of musical patterns sound the same or sound different. To control for any sort of significant skill gain students may achieve from taking one of these subtests before the other, six classes took the tonal subtest first, and six took the rhythm subtest first.

During administration of PMMA, subjects were given additional pauses between individual items on PMMA to circle their answer and make sure they were in the correct place. These pauses became less frequent as the test continued, except for an additional pause to assist students during the page turn that occurs slightly before the half-way point of PMMA. Despite these efforts to make sure that all students understood how to complete the subtests of PMMA and were motivated to do so, it was clear while hand-scoring the tests that this test was not appropriate for many of the kindergarten students. Some students pattern marked or did not complete their answer sheet. There are several reasons why this may have been the case: For many of the subjects, this was the first (or one of the first) assessments that they had ever taken. While the researcher was present to help administer PMMA, the lack of one-to-one assistance may have made it difficult for many students to complete the task of circling an answer for each item of PMMA. Additionally, it is likely that the approximate 30 minutes that it took to administer each subtest (including paper/pencil distribution, teaching directions, pausing, redirecting of students, etc.) exceeded the attention spans of many of the subjects. Many of the subjects did not attend preschool and had not yet built up substantial endurance for this type of task. Finally, the initial group of students that took PMMA included many students who were

identified as needing various special education services. Any students that the researcher determined were unable to produce meaningful results on PMMA had their aptitude scores removed from the analysis.

To assist in including only valid PMMA results in the study, many of the children were asked to retake PMMA at least 2 weeks after their first attempt. This gap was included to make sure that students did not recall the answers to any specific items on a subtest and thus invalidate their scores. Some of the children who retook PMMA still were unable to produce meaningful results. These students' PMMA scores were not included in the analysis. There were 42 subjects who were able to successfully retake the tonal portion of PMMA, and 44 subjects who were able to successfully retake the rhythm subtest. These scores were included in analysis.

The researcher was concerned that the students who retook PMMA may have received an advantage over students who successfully completed PMMA in only one attempt. The students who retook PMMA not only got to hear the patterns included in PMMA an additional time, but attended their music classes in the time that led up to PMMA retakes. To make sure that this was not the case, the researcher ran a set of independent t-tests to show if there were significant differences in the scores of students who only took a subtest of PMMA once (tonal, rhythm, or both) and those who retook one or both of the subtests. The analysis showed that there was no significant difference between the tonal scores of students who took the tonal subtest once ($M=25.31$, $SD=4.85$) and the second set of scores for those who took the tonal subtest a second time ($M=24.81$, $SD=4.407$). Similarly, there was no significant difference between the scores of those who took the rhythm subtest once ($M=23.75$, $SD=4.59$) and the second set of scores for those who retook the rhythm subtest ($M=24.31$, $SD=3.42$). These results suggest that the subjects did not receive an advantage by taking a subtest twice.

PMMA Analysis

After all tests had been hand-scored, double-checked, and removed due to obvious pattern-marking or grossly incomplete tests, the final sample included 224 tonal subtest scores, 220 rhythm subtests, and 195 composite scores, the latter of which required scores for both subtests of PMMA. The Cronbach's alpha for these subtests were .67 for the tonal subtest, .42 for the rhythm subtest, and .67 for the composite. Unfortunately, these low reliabilities make it difficult to draw confident conclusions from any of the problems of this study that include PMMA scores as a variable, particularly for the rhythm subtest. The large difference between the reliabilities of the tonal and rhythm subtests is similar to what occurred in Rasmussen's investigation into the relationship between home music environment and music aptitude with first graders (2004). Means and standard deviations for PMMA score totals are reported in Table 7. These metrics are similar to those reported by Gordon for the tonal ($M = 24.7$, $SD = 5.28$) and rhythm ($M = 22.3$, $SD = 3.74$) subtests of PMMA (1979).

Table 7 - PMMA Means and Standard Deviations

	Tonal	Rhythm	Composite
N	224	220	195
Mean	25.64	23.82	50.17
Std. Deviation	4.641	3.824	6.720

Three independent t-tests also were run to determine if there was a significant difference between the mean PMMA scores of female and male subjects. No significant differences were found between the tonal, rhythm, and composite scores of female and male students.

To determine if age had a significant relationship with music aptitude scores, a One-Way-ANOVA was conducted. Significant differences related to age were found for rhythm scores

($p=.001$) and composite scores ($p=.011$), but not for the tonal scores. Plot points representing the relationships between age and mean music aptitude scores are provided in Figures 1, 2, and 3.

Figure 1 – Scree Plot for Tonal Music Aptitude by Age

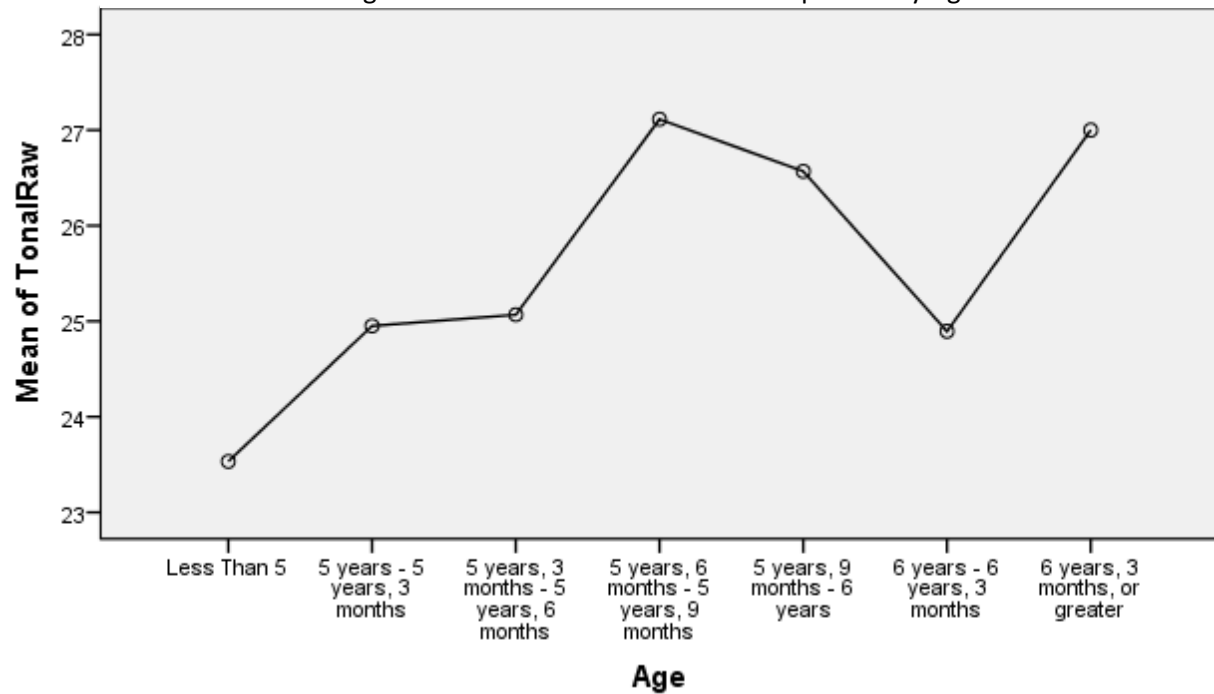


Figure 2 – Scree Plot for Rhythm Music Aptitude by Age

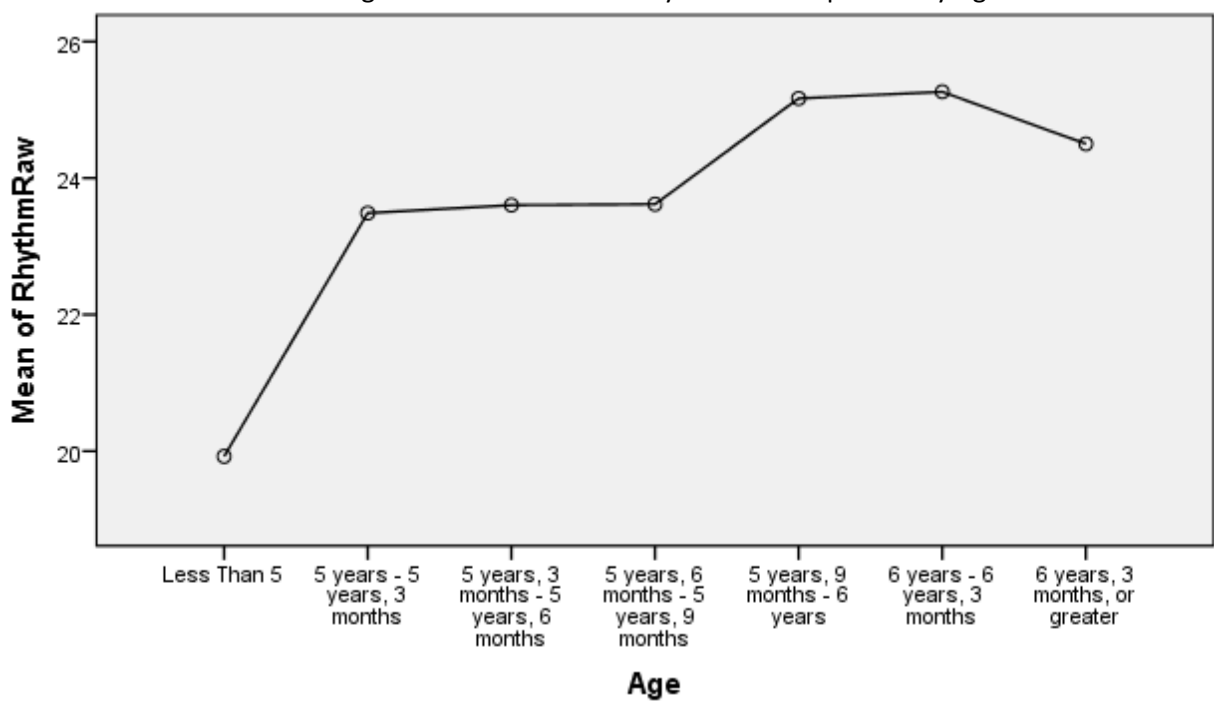
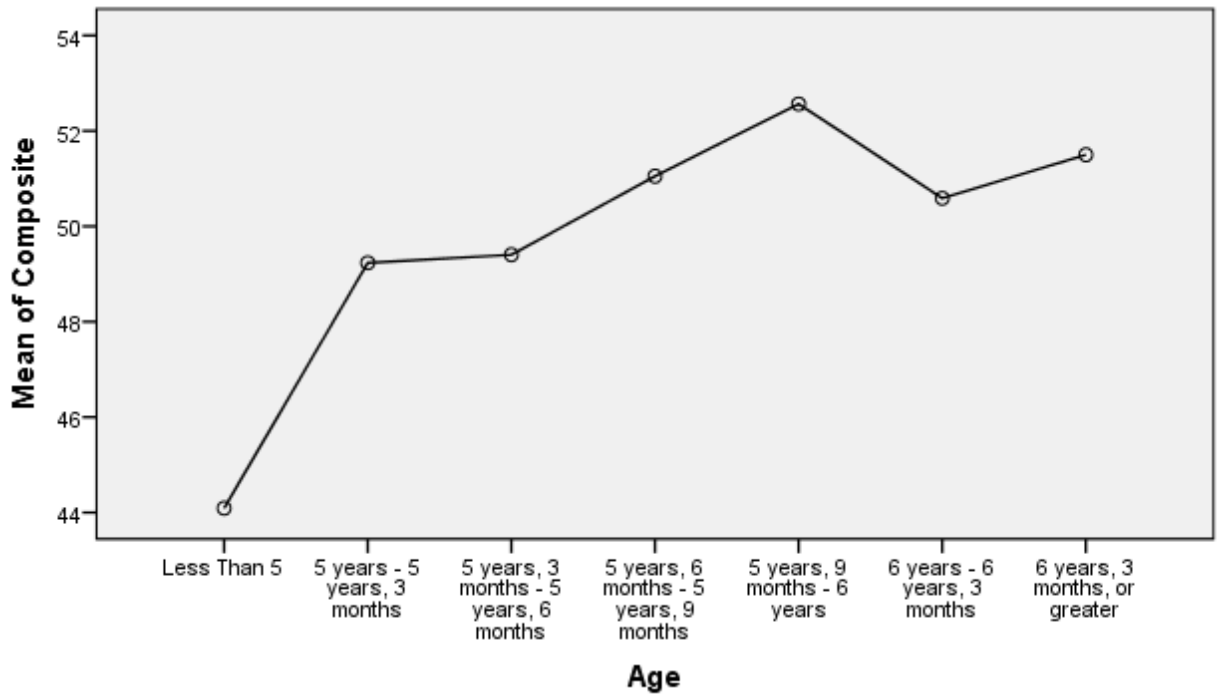


Figure 3 – Scree Plot for Composite Music Aptitude by Age



Analysis was also conducted to investigate if there was a significant difference between the music aptitudes of students by income. A One-Way-ANOVA revealed no significant differences when accounting for income for tonal aptitude [$F(8, 147) = 1.463, p = .176$], rhythmic aptitude [$F(8, 144) = 1.146, p = .336$], or composite aptitude [$F(8, 130) = 1.134, p = .345$].

Although all of the subjects of the study were kindergarten students, 42 of the subjects had received music instruction from the researcher the year prior to this study. These students were either in their second-year of kindergarten, were receiving special education services, or were enrolled in a “developmental kindergarten” class the previous year. To determine if there was any significant difference between the means of these students and the students who were in their first year of instruction with the researcher, an independent-samples t-test was performed. The analysis showed that students with a previous year of music instruction had significantly higher means for rhythm ($t(218)=3.686, p<.001$) and composite aptitudes ($t(193)=2.608, p=.01$).

This is likely due to the content of the subjects' previous year of music instruction (which included identifying same and different musical patterns, as well as substantial musical enrichment opportunities), their readiness to take a pencil/paper assessment, or some combination of both. Means and standard deviations for previous music students and new music students are shown in Table 8.

Table 8 – Aptitudes of Previous Students/New Students

	Previous Student?	N	Mean	Std. Deviation
Tonal Aptitude	Yes	36	26.42	4.129
	No	188	25.49	4.728
Rhythm Aptitude	Yes	35	25.94	3.842
	No	185	23.42	3.696
Composite Aptitude	Yes	33	52.91	6.312
	No	162	49.61	6.682

The Relationship Between Home Music Environment and Music Aptitude

The primary problem of this study was to determine the relationship between the home music environments and music aptitudes of subjects in kindergarten. The Parent/Guardian Survey Regarding Kindergarten Music (PSRKM) was used to measure the home music environment and had two main sections (B and C), one of which measured the types of musical activities that parents engaged in with their parents, and one which measured parental attitudes regarding music and music education. Music aptitude was measured using Primary Measures of Music Audiation (PMMA).

Section B – Parent Music Activities

Section B of PSRKM contained 29 four-point likert-type items that measured the frequency with which certain musical activities occurred in the home. In order to determine if any significant relationship existed between these activities and the music aptitudes of the

subjects, a series of Pearson's Product-Moment Correlations were calculated. Because not all subjects in this study had data for all of the variables necessary for this analysis (tonal/rhythm aptitude, completed survey), the samples for each of these analyses varied as follows for Section B: The number of subjects' scores included in each tonal, rhythm, and composite aptitude analysis were 144, 139, and 128, respectively. The first of these was an analysis of the correlation between the Section B total scores and tonal, rhythm, and composite aptitudes. The correlation between Section B total scores and tonal, rhythm, and composite aptitudes were .14, -.05, .06, respectively. There was not a significant relationship between music aptitude and home music environment as measured by the Section B total scores.

This was followed by analysis correlating each individual item of Section B to tonal, rhythm, and composite aptitudes. There were 4 items in Section B that had small – but significant – correlations with tonal aptitude, the strongest of which was a correlation of .25 for item 29, which reads: “I invite my child to play my musical instrument.” Item 22, which also had a significant correlation of .17 with tonal aptitude, investigated a similar behavior: “I play toy instruments with my child.” While these correlations are small, the similarity between these two items indicates that there may be a meaningful relationship between exposure to instruments and tonal music aptitude. The other two items with significant correlations to music aptitude were items 8 ($r = .17$) and 25 ($r = .19$). Item 8 reads “I sing songs or perform rhythms/rhymes and leave out a note or phrase to see what my child does.” Item 25 reads “I attend concerts, ballets, or musicals with my child.” Composite aptitude also had a correlation of .24 with item 29. Item 29 reads “I invite my child to play my musical instrument.”

For rhythmic aptitude, two small, significant, and negative correlations were found in relationship to items in Section B of PSRKM. The correlations were both $-.16$ and for items 12 and 13, both of which related to children listening to recorded music while awake. These results are suspicious, and likely the result of the very low reliability of the rhythm subtest of PMMA or a measurement error. Music aptitude correlations for each item of Section B of PSRKM are listed in Table 9.

Finally, an analysis was done to identify any relationship that might exist between music aptitude and any of the four factors that were identified in Section B. This analysis revealed a significant correlation of $.18$ between tonal aptitude and Factor 2 (“Playing Instruments”), which contained six items. This result was consistent with earlier analysis showing a relationship between tonal aptitude and two items related to children playing musical instruments. Correlations between music aptitude and the four factors of Section B are presented in Table 10.

Section C – Parent Attitudes Towards Music and Music Education

Section C of PSRKM contained 22 five-point likert-type items that asked for parents’ level of agreement with a variety of statements related to music and music education. A series of Pearson’s Product-Moment Correlations were calculated to determine the relationships between Section C total scores and music aptitude. The number of cases included in each of these analyses is 145 for tonal aptitude, 142 for rhythm aptitude, and 128 for composite aptitude. Correlations of $.07$, $.02$, and $.06$ were found between Section C total scores and tonal, rhythm, and composite aptitude, respectively. These correlations were not statistically significant. Additional analysis revealed no significant correlations between music aptitude and any of the individual items in Section C. These correlations are presented in Table 11.

Table 9 – Correlations Between Individual Items From Section B of PSRKM and Music Aptitude Scores

	Tonal Aptitude	Rhythm Aptitude	Composite Aptitude
SecB1 – Sing songs <u>for</u> child.	.094	.014	.073
SecB2 – Make up songs/rhymes using words <u>for</u> child.	.105	.146	.160
SecB3 – Make up songs/rhymes using words <u>with</u> child.	.061	.055	.083
SecB4 – Make up songs/rhymes not using words <u>for</u> child.	-.061	.121	.045
SecB5 – Make up songs/rhymes not using words <u>with</u> child.	-.048	.135	.044
SecB6 – Sing songs/rhymes <u>for</u> child during daily routines.	.113	-.003	.064
SecB7 – Sing songs/rhymes <u>with</u> child during daily routines.	.040	-.056	-.036
SecB8 – Sing songs/rhymes and leaving out notes/phrases.	.168*	-.050	.101
SecB9 – Sing songs/rhymes by child request.	.012	-.142	-.116
SecB10 – Encourage child to make up songs/rhymes.	.003	.075	.035
SecB11 – Compliment child's made-up songs/rhymes.	-.015	-.052	-.061
SecB12 – Play recorded music for child while awake.	.015	-.162*	-.094
SecB13 – Sing with recorded music while child listens.	-.005	-.163*	-.108
SecB14 – Encourage child to sing with recorded music.	.003	-.157	-.103
SecB15 – Dance with child while playing recorded music.	.104	.051	.117
SecB16 – Dance with child while adult performs songs/rhythms.	.092	.057	.109
SecB17 – Dance with child while child performs songs/rhythms.	.026	.040	.040
SecB18 – Dance with child while adult and child performs songs/rhythms.	.029	.025	.054
SecB19 – Notice that child is using a chanting, not a singing voice.	-.059	-.029	-.085
SecB20 – Notice that child is using a singing voice.	.093	-.045	.036
SecB21 – Play toy instruments <u>for</u> child to listen/observe.	.125	-.066	.053
SecB22 – Play toy instruments <u>with</u> child.	.172*	-.036	.102
SecB23 – Read books with a musical theme with child.	.049	-.055	-.013
SecB24 – Attend early childhood music classes with child.	.152	-.048	.085
SecB25 – Attend concerts, ballets, or musicals with child.	.187*	-.119	.033
SecB26 – Play a musical instrument by itself while child listens.	.132	-.047	.066
SecB27 – Play instrument and sing for child.	.057	-.058	.029
SecB28 – Play songs on an instrument while child sings.	.104	-.037	.094
SecB29 – Invite child to play a musical instrument.	.252**	.070	.235**

** . Correlation is significant at the 0.01 level.

* . Correlation is significant at the 0.05 level.

Table 10 – Correlations Between Music Aptitude and Factors of PSRKM: Section B

	Tonal Aptitude	Rhythm Aptitude	Composite Aptitude
Factor 1 - Purposeful Music Making	.135	-.045	.059
Factor 2 - Playing Instruments	.177	-.029	.125
Factor 3 - Creating Music	.016	.139	.101
Factor 4 - Recorded Music and Dancing	.056	-.061	.004

As with Section B of PSRKM, an analysis was performed to identify any relationship that might exist between music aptitude and the three factors that were identified within Section C of PSRKM. There were no significant correlations between music aptitude and any of the three factors of Section C. These correlations are presented in Table 12.

Parent/Guardian Survey Regarding Kindergarten Music

In addition to performing analysis on each of the individual sections of PSRKM and the individual items of the survey, a total score was calculated that combined the scores for both sections of PSRKM. A Pearson's Product-Moment Correlation was calculated to detect any relationship that may exist between the combined sections and music aptitude. No significant correlations were found between the total PSRKM scores and tonal ($r = .16$), rhythm ($r = -.02$), or composite ($r = .10$) aptitude.

To detect any sample bias that may be present in the study, an independent-samples t-test was conducted to compare the means and standard deviations of the subjects whose parents completed and returned a copy of PSRKM and the subjects whose parents did not return the survey. There were no significant difference between the means and standard deviations between the "submitters" and "non-submitters." Results of this analysis are presented in Table 13.

Table 11 – Correlations Between Individual Items from Section C of PSRKM and Music Aptitude Scores

	Tonal Aptitude	Rhythm Aptitude	Composite Aptitude
I believe kindergarten music instruction...			
SecC1 – Teaches children poise and confidence.	.011	.010	.013
SecC2 – Does not develop critical thinking skills.	-.089	.085	.001
SecC3 – Develops individual creativity in young children.	.092	-.026	.027
SecC4 – Should be available to all children.	.024	.022	-.009
SecC5 – Does not help with other types of learning (e.g., math, reading).	.014	.065	.072
SecC6 – Provides a spontaneous, healthy outlet for emotions and feelings.	-.002	-.077	-.060
SecC7 – Can help social development.	-.020	-.011	-.008
SecC8 – Can influence the degree to which children values music in their lives.	.066	-.094	-.002
SecC9 – Benefits only children who will participate in music later in life.	.067	.045	.087
SecC10 – Provides an outlet for self-expression.	.097	-.040	.066
SecC11 – Is not necessary for the overall development of young children.	.145	.055	.137
SecC12 – Is a necessary part of early childhood music instruction.	.130	.090	.151
I believe kindergarten children...			
SecC13 – Should have musical experiences that focus on exploring sound.	.071	-.070	.025
SecC14 – Should learn to play simple songs.	.046	-.104	-.023
SecC15 – Should not waste time learning to play simple instruments.	.016	-.055	-.007
SecC16 – Come to value music in their lives because of their level of natural music talent, rather than through school music instruction.	.004	.093	.059
SecC17 – Should receive musical instruction only if they exhibit musical talent.	.029	.046	.050
SecC18 – Should express an interest in music before they enrolled in music instruction.	.063	.075	.060
SecC19 – Should continue in music instruction even if they are not achieving musically at the same level as their peers.	-.079	-.033	-.083
SecC20 – Should experience exemplary musical sounds, activities, and materials.	.157	.023	.126
I believe...			
SecC21 – All children have musical potential.	.071	.000	.024
SecC22 – Music instruction for preschool children should occur in the home with parent(s) and/or caregiver(s) rather than in school.	.012	.000	.018

** . Correlation is significant at the 0.01 level.

* . Correlation is significant at the 0.05 level.

Table 12 – Correlations Between Music Aptitude and Factors of PSRKM: Section C

	Tonal Aptitude	Rhythm Aptitude	Composite Aptitude
Factor 1 - Positive Music Statements	.090	-.038	.037
Factor 2 - Musical Values	.038	.059	.053
Factor 3 - Negative Music Statements	-.044	.087	.042

Table 13 – Aptitude Means/SD for PSRKM Submitters/Non-Submitters

		N	Mean	Std. Deviation
Tonal Aptitude	Submitter	156	25.44	4.483
	Non-Submitter	68	26.10	4.990
Rhythm Aptitude	Submitter	152	24.13	3.934
	Non-Submitter	68	23.12	3.492
Composite Aptitude	Submitter	139	50.09	6.709
	Non-Submitter	56	50.36	6.805

Summary

The results of PSRKM revealed that parents engaged in many different musical activities with their children in the year prior to entering kindergarten. A number of small correlations were found between individual items from Section B of PSRKM and tonal music aptitude, as well as one item from Section B that had a significant correlation with composite aptitude scores. Unfortunately, because the reliability scores of PMMA were below the minimum acceptable threshold, these results are questionable. Additionally, it is possible that there were meaningful relationships that existed between the home music environment items that were measured in this study and music aptitude that were not detected due to the poor performance of PMMA.

CHAPTER 5: DISCUSSION AND CONCLUSION

Purpose and Problems

The purpose of this study was to investigate the relationships between the home music environments and the developmental music aptitudes of kindergarten students. The primary research problems were as follows:

To determine the nature of the home music environments of kindergarten students.

To determine the relationships between the home music environments and the music aptitudes of kindergarten students.

This study was designed to provide insight into the types of musical activities that occur outside of the school setting for kindergarten-aged children. Further, this study investigated the relationship between the types of musical experiences children have before entering kindergarten and their music potential.

Home Music Environment: Results, Conclusions, and Implications

One of the primary problems of this study was to determine the nature of the home music environments of kindergarten students. The Parent/Guardian Survey Regarding Kindergarten Music (PSRKM) were distributed to the parents of all the kindergarten students at the research site, with 208 being completed and returned. Both sections of PSRKM performed with very high internal consistency in this study, as was the case in previous research (Mallett, 2000; Valerio et al., 2011, 2012). This is in spite of the modification that was made to Section B from its original design, asking parents to document behaviors that occurred in the previous year, as opposed to just the previous month.

Section B – Parent Music Activities

The results of Section B of PSRKM indicated that parents were engaging in certain music activities with their children fairly frequently, while others were occurring rarely, or never. The means for individual items in Section B indicated that parents are singing or chanting at a high rate with their children. Additionally, parents indicated that they listened to recorded music frequently and danced with their children at a high rate. The lowest mean for an individual item was for item 24, “I attend early childhood music classes with my child.” One hundred seventy seven out of 206 parents indicated that they “never” participated in early childhood music classes with their child. I believe that this is a result of a lack of opportunity or knowledge, rather than a lack of interest in early childhood music classes. Based on the results of this survey, particularly the Parent Attitude portion, it is apparent that parents are enthusiastic about music learning and the many benefits of music instruction for their children. Music educators should frequently encourage parents to attend any music enrichment courses available in the surrounding community, including early childhood music classes. Additionally, qualified early childhood music educators should continue to seek new opportunities to make early childhood music classes available to as many parents and their young children as possible.

Section C – Parent Music Attitudes

The results of Section C of PSRKM were encouraging, with only two out of 22 items having mean values less than 4 (“agree”). Parents in this study strongly showed their belief that all children should have access to music education, that it is a necessary part of early childhood education programs, and that it benefits children in a multitude of ways. Using almost the same Parent Attitude questionnaire as this study, Mallet (2000) found similar results in her study with 3- and 4-year old children. This is important for music educators to remember in the current

political climate of public education in the United States, where focus continues to shift towards STEM subjects and the language arts, and away from music and the fine arts. Music educators should encourage parents to voice this support to school administrators and education policy makers.

There were a few items in Section C for which parents had more differing opinions. Item 16 (which had the lowest mean score and by far the largest standard deviation for an individual item) read: “I believe kindergarten children should come to value music in their lives because of their level of natural music talent, rather than through school music instruction.” Some parents may have interpreted this item as advocating that musical achievement may be something for which only musically “gifted” children should strive for. Other parents may have wanted to express their support for school music instruction, and thus selected a negative indicator (“strongly disagree” or “disagree”) solely for that reason. In contrast to this, some parents may have selected a positive indicator for this item solely because they would like their children to “value” music. Clearly, this item has multiple possible interpretations, and thus, future researchers should consider revising or removing the item. Item 19 also had a low mean: “I believe kindergarten children should continue in music instruction even if they are not achieving musically at the same level as their peers.” This item had the second-highest number of parents indicate that they were “unsure” about their attitude towards this statement (the other was item 16). Perhaps these parents simply did not feel they had the expertise to have an opinion on whether students should continue in music instruction when they are not succeeding. The results for this item also may reflect the competitive environments that many middle school, high school, and possibly even elementary music ensembles create. If the goal for these ensembles/soloists is to achieve a “1” in a competition, perhaps parents believe that those who do

not achieve at a high enough level should discontinue participating in music. This also may be reflective of many of the reality-TV shows that are popular in the United States, where musicians are pit against each other and eliminated through competition. Music educators – especially those who teach ensembles have students that participate in musical competitions – should consider this: If all of our students (and their parents) felt that only the best musicians should continue music instruction, what would that mean for the future of music education, and more importantly, children?

Combined Scores of Sections B and C

In Sections B and C of PSRKM, female students had significantly higher mean score totals than male students. This is also true for the combined total scores of PSRKM, where the girl's mean was 7.46 higher than the boy's mean ($p=.003$). This indicates that not only the parents of girls have more positive attitudes towards music and music education than boys, but that girls also participate in more music activities in the home. This gap is certainly worthy of additional investigation in the future.

The students in this study only represented the musical environments of 289 children, from largely similar backgrounds. The vast majority (87.5%) of the students were white, and while the economic backgrounds of the students were somewhat diverse (49.2% received free/reduced lunch), this study only represents one group of children. It is possible the musical activates and attitudes that were prevalent in this study are only representative of this study's sample, and not larger and more diverse populations. Future researchers should continue to investigate the home music environment with children from diverse ethnic, economic, and geographic backgrounds.

The Relationship Between Home Music Environment and Music Aptitude: Results, Conclusions, and Implications

Unfortunately, it is difficult to draw meaningful conclusions from the music aptitude portions of this study due to the low reliabilities of PMMA. Although the tonal and composite reliabilities were higher than the rhythm reliability, they all fell short of what is considered to be the minimum standard of acceptable reliability for an individual subtest or a composite test. In addition to questioning the small but significant correlations that were found between individual items of PSRKM and aptitude scores, it is also possible that there may in actuality be meaningful relationships, but that PMMA did not perform well enough to uncover them. All of this should be kept in mind when reading the continuing discussion.

On item 29 – which had a correlation of .25 with tonal aptitude – many parents indicated that they did not invite their child to play their musical instrument very frequently (M=1.98 out of a possible 4, with 1 representing “never”). Since so many parents indicated how important they believed music learning to be, and because so many parents also indicated that they were engaging in a number of other music activities with their children, I believe that the primary reason for this is that most parents do not have access to a “real” instrument at home with which they are somewhat proficient. This is supported by a number of parents who expressed this in hand-wrote statements beneath item 29. Item 22 also revealed that toy instruments had a similar (but smaller) positive correlation with tonal aptitude. If this is the case, perhaps what matters is not whether a child has experiences with their parent playing an instrument with skill, but simply that a child benefits from a positive music experience with their parent and their instrument, regardless of the quality of sound produced. Considering this, perhaps parents who feel limited in their ability to play an instrument for their child (and consequently, do not do so) should be

encouraged to do so anyway, because what may matter is that they are building a love of music play through the use of instruments.

Recommendations for Future Research

One of the reasons the researcher chose to design this specific study was because of the uniquely large kindergarten population at his disposal. Children approximately age nine or younger are still in the developmental music aptitude stage, meaning their aptitude may fluctuate depending on the quality of their environments and experiences (Gordon, 2007). While kindergarten-aged children certainly are subject to this fluctuation, this elasticity is even more prominent in younger children, including all the way to birth (and younger). This study only investigated music activities that had occurred within the previous year, which means that for the youngest subjects of the study, parents potentially were documenting activities that occurred when their child was nearly four years old. Future researchers could consider extending the range that they are asking parents to recall beyond one year, although that approach comes with obvious pitfalls. In an ideal scenario, researchers would perform longitudinal studies measuring children's home music environments as early as possible and continuously over a period of years. Those same researchers then could measure music aptitude at an age when reliable results could be obtained and the relationship between home music environments and music aptitudes could be determined more accurately. Alternatively, researchers also may desire to replicate this study, with the change that parents would be asked to identify music activities that have occurred in the past month rather than the past year, as was the original intention of Valerio and Reynold's CMBI (2015). Perhaps children's music aptitudes are still so unstable at the age of five (like most of the subjects of this study) that the most recent music activities that are occurring are also the most relevant. Additionally, reducing the range of time that parents are asked to recall may

lead to more accurate survey results. Clearly, both of these options are possibilities for future researchers.

Future researchers also may want to consider using not only the “Parent Music Activities” portion of the Children’s Music Behavior Inventory (CMBI) (Valerio & Reynolds, 2015), but also the “Child Music Behaviors” section. This section asks parents to document the frequency with which their child exhibits certain behaviors, broken down into 7 sub-categories: (A) Attention and Emotion, (B) Vocalizations, (C) Moving, (D) Daily Routines, (E) Requests, (F) Taking Turns, Initiating, Sharing, and (G) Creativity. The items in these sections include many different behaviors and variables that have not yet been investigated in the home music environment literature. Additionally, Valerio and Reynold’s expertise in early childhood music and the thoroughness with which CMBI was developed makes it a unique tool that researchers should use (Valerio et al., 2011, 2012).

If future researchers do choose to only include the “Parent Music Activities” section of CMBI, as this study did, they should considering the following: Some of the language within CMBI may be unfamiliar to or uncomfortable for parents. Specifically, parents are asked to differentiate between songs and rhymes. Valerio and Reynolds acknowledge this by providing the following instructions at the beginning of the “Child Music Behaviors” section of CMBI:

Songs are melodies like *Twinkle, Twinkle, Little Star* and *Happy Birthday* that are performed to a beat with a singing voice. They may be performed with words or with nonsense syllables. Rhythms/Rhymes are rhythmic chants like *Pease Porridge Hot* and *Humpty Dumpty* that are performed to a beat with a speaking voice. They may be performed with words or with nonsense syllables. (2015, p. 2).

Parents in this study may have benefited by having this language added to the beginning of Section B of PSRKM, which refers to “singing” and “rhymes” frequently. Finally, the “Child Music Behaviors” section of CMBI also includes the following language: “Do not worry if your child has not displayed all of these behaviors within the last month. That is to be expected” (Valerio & Reynolds, 2015, p. 2). That language could be adapted to be appropriate at the beginning of the “Parent Music Activities” portion of CMBI, where parents may similarly feel pressured to dishonestly report exhibiting music activities at a higher rate than they actually do.

Researchers interested in not only measuring the various musical activities that occur in children’s homes, but also measure parental attitudes towards music and music education – as the current study did – should consider including the music attitudes questionnaire (developed by Mallet) that was included in PSRKM. Both sections of PSRKM demonstrated high internal reliabilities separately and as part of the complete survey.

The most difficult challenge faced during the implementation of this study was administering Primary Measures of Music Audiation (PMMA) to the kindergarten subjects. While this study intentionally was designed to measure the subjects’ music aptitudes at the beginning of the school year in order to avoid any potential aptitude gains that would occur through receiving music instruction, this proved to come with its own challenges. For most of the subjects of the study, this was the first time that they were asked to complete an assessment of this sort on their own. Because of this, many of the students lacked the motivation, endurance, and test-taking skills necessary to produce a meaningful aptitude score. This is almost certainly what contributed to the low reliabilities on PMMA, particularly for the rhythm subtest. Future research that attempts to administer PMMA to kindergarten children at the beginning of the school year should attempt to include adults during administration to help guide individual

students and keep them on-task. Additionally, while the music room at the research site was set up in order to allow for movement and music making, it was likely not the ideal place for students to work on a pencil and paper test. Many students took the assessment on the floor of the music room, where they may have been uncomfortable, had difficulty focusing, or been distracted by neighboring students. Future researchers should attempt to provide a more appropriate work-space for students to take PMMA. The other alternative to this is, of course, to administer PMMA later in the school year. This would not necessarily have to occur in the Spring, as was practiced by Atterbury and Silcox (1993). Instead, I believe that the students would make significant enough gains in their motor skills, attention, and test-taking skills even a month or two later in the school year. While this latter option may lead to some amount of interference with music aptitude due to the music instruction that will occur prior to administration of PMMA, I believe this is worth the likely sizable increase in the reliability of PMMA results.

This study also found that there was a significant difference between the music aptitudes of students who received previous music instruction with the researcher and those who did not (with previous students having higher scores). It is possible that this increase of music aptitude may have only been due to the music instruction they had received in the previous year, and not related to the home music environment. This makes having previous music instruction a confounding variable for any analysis that attempts determine the relationship between the home music environment and music aptitude. Because of this, future researchers looking to investigate the relationship between the home music environments and music aptitudes of kindergarten students should consider analyzing previous music students separately from students that have not received previous music instruction.

Conclusions

This study investigated the relationship between the home music environments of kindergarten children, and the relationship between those environments and each child's music aptitude. This study found that parents are engaging in many different musical activities with their children in the home, and that parents are generally very supportive of music and music education. Due to an inability to accurately measure the music aptitude of kindergarten children, it was impossible to determine the relationship between home music environment and music aptitude. Researchers should continue to investigate music aptitude and the various environmental factors that may affect the musical abilities of young children to further understand how musical potential develops.

APPENDICES

APPENDIX A: PARENT/GUARDIAN SURVEY REGARDING KINDERGARTEN MUSIC

Parent/Guardian Survey Regarding Kindergarten Music

Section A - Demographics

1. Indicate the following information **for your kindergartener**.

Your Child's Name: _____

Sex (circle one): female male Birthday: _____
month/day/year

2. Who is completing this survey? (circle appropriate response)

Mother/Female Guardian

Father/Male Guardian

Mother and Father

Male and Female Guardians

Other (please specify) _____

3. What is the approximate combined gross (pre-tax) income earned by all household members?

Less than \$9,999

\$40,000 – \$49,999

\$10,000 – \$19,999

\$50,000 – \$59,999

\$20,000 – \$29,999

\$60,000 – \$69,999

\$30,000 – \$39,999

\$70,000 +

I prefer to not answer this question

Section B – Parent Music Activities

DIRECTIONS: Please read each statement. Mark the square that best reflects how frequently you have performed each activity with your child within the last year. You may choose from the responses Never, Rarely, Sometimes, or Frequently.

I . . .	Never	Rarely	Sometimes	Frequently
1. Sing songs or perform rhythms/rhymes for my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2. Make up songs or rhythms/rhymes using words for my child to listen to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3. Make up songs or rhythms/rhymes using words with my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4. Make up songs or rhythms/rhymes using nonsense syllables for my child to listen to	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5. Make up songs or rhythms/rhymes using nonsense syllables with my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6. Sing songs or chant rhythms/rhymes for my child to listen to during daily routines such as bathing, dressing, cleaning up toys, getting ready to go somewhere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7. Sing songs or chant rhythms/rhymes with my child during daily routines such as bathing, dressing, cleaning up toys, getting ready to go somewhere	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8. Sing songs or perform rhythms/rhymes and leave out a note or phrase to see what my child does	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9. Sing songs or perform rhythms/rhymes when my child asks me by using verbal or non-verbal communication	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10. Encourage my child to make up his/her own songs or rhythms/rhymes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
11. Compliment my child's made-up songs or rhythms/rhymes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
12. Play recorded music for my child in the house or car when he/she is awake	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
13. Sing along with recorded music while my child is listening	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
14. Encourage my child to sing along with recorded music	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I . . .		Never	Rarely	Sometimes	Frequently
15.	Dance around with my child while playing music cds or music dvds	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
16.	Dance around with my child while I sing songs or perform rhythms/rhymes for my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
17.	Dance around with my child while he/she sings songs or performs rhythms/rhymes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
18.	Dance around with my child while we sing songs/perform rhythms/rhymes together	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
19.	Notice that my child's musical vocalizing sounds rhythmic, but not like singing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20.	Notice that my child's musical vocalizing sounds like singing	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
21.	Play toy instruments for my child to listen to/observe	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
22.	Play toy instruments with my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
23.	Read books that have a music theme to my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
24.	Attend early childhood music classes with my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
25.	Attend music concerts, ballets, or musicals with my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
26.	Play a musical instrument by itself while my child listens	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
27.	Accompany myself on a musical instrument while I sing for my child	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
28.	Play songs on a musical instrument while my child sings along	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
29.	Invite my child to play my musical instrument	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Section C – Parent Music Attitudes

For **each** statement in the left column below, **CIRCLE ONE** descriptor in the right column that reflects your immediate reaction to the statement.

	Strongly Agree	Agree	Undecided	Disagree	Strongly Disagree
I believe kindergarten music instruction...					
1. Teaches young children poise and confidence.	SA	A	U	D	SD
2. Does not develop critical thinking skills.	SA	A	U	D	SD
3. Develops individual creativity in young children.	SA	A	U	D	SD
4. Should be available to all children.	SA	A	U	D	SD
5. Does not help with other types of learning (e.g., math, reading).	SA	A	U	D	SD
6. Provides a spontaneous, healthy outlet for emotions and feelings.	SA	A	U	D	SD
7. Can help social development.	SA	A	U	D	SD
8. Can influence to what degree young children will come to value music in their lives.	SA	A	U	D	SD
9. Benefits only those children who will participate in music later in life.	SA	A	U	D	SD
10. Provides an outlet for self-expression.	SA	A	U	D	SD
11. Is not necessary for the overall development of young children.	SA	A	U	D	SD
12. Is a necessary part of early childhood education programs.	SA	A	U	D	SD

I believe kindergarten children...

13. Should have musical experiences that focus on exploring sounds.	SA	A	U	D	SD
14. Should learn to sing simple songs.	SA	A	U	D	SD
15. Should not waste time learning to play simple instruments.	SA	A	U	D	SD
16. Come to value music in their lives because of their level of natural music talent, rather than through school music instruction.	SA	A	U	D	SD
17. Should receive musical instruction only if they exhibit musical talent.	SA	A	U	D	SD
18. Should express an interest in music before they enrolled in music instruction.	SA	A	U	D	SD
19. Should continue in music instruction even if they are not achieving musically at the same level as their peers.	SA	A	U	D	SD
20. Should experience exemplary musical sounds, activities, and materials.	SA	A	U	D	SD

I believe...

21. All children have musical potential.	SA	A	U	D	SD
22. Music instruction for preschool children should occur in the home with parent(s) and/or caregiver(s) rather than in school	SA	A	U	D	SD

APPENDIX B: SURVEY REMINDER NOTICE

Thomson Parent/Guardian,

If you are receiving this notice, it is because I have not yet received a completed copy of the attached survey. This survey was distributed at Open House to those parents who visited the music room. Due to the significant line that formed during Open House, I understand if you were not able to come meet me and receive the survey. The survey is an important part of your child's music education and is in regards to different music activities that may occur in the home, as well as attitudes towards music and music education. Please complete the survey and return it in your child's red folder as soon as possible. If you have any questions or believe you are receiving an additional copy of this survey in error, feel free to contact me at mromanik@davisonschools.org or 810-591-0911.

Thank you so much for taking your time to complete this important survey!

Michael Romanik (Thomson Music Teacher)

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