EFFECTS OF BACKGROUND MUSIC ON PRESCHOOLERS’ ATTENTION

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Background music is often used in preschool classrooms with the belief that music makes children smarter and increases attention. The purpose of this study was to determine if background music increased children’s focused attention during play activities. Focused attention occurs when children maintain attention to a task regardless of distractions.

This quasiexperimental study investigated background music and play in a laboratory setting. I videotaped individual children during play with math manipulatives in a pretest-posttest research design with background music used as the treatment. Forty-three 3-, 4-, and 5-year-olds played for 15 minutes. The first 5 minutes of play had no music (pretest), the second 5-minute play episode had background music (treatment), and the final 5-minute play episode had no background music (posttest). Data were analyzed using one-way repeated measures analysis of variance. Findings revealed that the subjects paid less attention to the play task with background music than they did during the pretest, with no music.

Another key finding was that children with more musical experiences at home, as reported by the Child’s Home Musical Experience Survey (CHIMES), exhibited longer periods of focused attention with background music. This study confirmed previous research that 3-year-old children have shorter focused attention than 4- and 5-year-old children with and without background music. These findings have implications for teachers and parents that background music, instead of increasing attention in children, might indeed decrease children’s focused attention during play activities.
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CHAPTER I

INTRODUCTION

Preschool teachers introduce 3- to 5-year-old children to the world of school through games and activities to help develop language and vocabulary, improve social skills, and to learn basic academic concepts (Weikart, 2003). The children come from many backgrounds with different family, community, and living conditions. Each child enters the preschool classroom with a unique set of experiences that affects reactions and responses to music, play, and learning situations (Bronfenbrenner, 1986). The learning situation in the preschool classroom includes experiences with literacy, math, science, music, art, social studies, and physical education (Dodge, Colker, & Heroman, 2002). Early childhood education since Froebel, Montessori, and Dewey emphasizes the child and activities that build competency to enter school (Dewey, 1899; Froebel, 1887/1974; Montessori, 1912; Short, 2007).

Two of the activity areas of emphasis in preschool are play and music. Both activity areas encourage cognitive development and the social/emotional development of attention (Duncan et al., 2007; Singer, Golinkoff, & Hirsch-Pasek, in press; Trevarthen & Malloch, 2002; Vygotsky, 1978; Weikart, Bond, & McNeil, 1978). Cognitive academic skills, especially math and reading, attention, and social/emotional skills are key elements of school readiness that help prepare preschoolers for kindergarten and later school achievement (Duncan et al., 2007; Peisner-Feinberg et al., 2001).

School Readiness

Preschool teachers strive to enhance and foster each child’s academic development and attention, and to improve social-behavioral competence in preparation for kindergarten (Barnett, 2008; Barnett, Hustedt, Robin, & Schulman, 2004, Clifford et al., 2005; Duncan et al., 2007;
Weikart et al., 1978). Programs in preschool classrooms attempt to provide opportunities in all areas of child development: cognitive, physical, linguistic, and social-emotional (Barnett, Lamy, & Jung, 2005). Researchers studied a variety of components in preschool programs in 11 states with nearly 3,000 children and indicated an increase in reading and math scores in kindergarten when the children attended preschool (Barnett et al., 2004; Barnett et al., 2005; Hamre & Pianta, 2005; Howes et al., 2008). The research also investigated a variety of preschools: private, public, Head Start, faith-based, and cooperative preschools. The preschools researched represented a wide variety of teachers, directors, and facilities with an assortment of preschool classroom procedures and structural features that affected student academic success. The results of these studies reported that even when the classrooms had degreed teachers, full-day programs, and small class sizes, the classroom processes quality still remained low (Barnett et al., 2004; Hamre & Pianta, 2005; Howes et al., 2008). Low-level classroom processes included limited emotional support by teachers, limited concern for age appropriate activities, and limited care to meet the individual needs for specific children’s development offered the preschoolers experiences that did not prepare children for kindergarten (Barnett et al., 2004; Howes et al., 2008; Pianta, Hamre, & Stuhlman, 2003).

Bredekamp and Copple (1997) presented guidelines to use in early childhood education to improve the quality of education for the young child. Developmentally appropriate practice guidelines (DAP) formulated by the National Association for the Education of Young Children (NAEYC) (Bredekamp & Copple, 2008), designed to foster high quality early childhood education programs, also has limited power in the classroom. DAP guidelines, alone, lacked the ability to ensure the use of appropriate materials, to assure children received effective teaching, and to sustain teacher-child relationships that enhanced development (Bredekamp & Copple,
Howes et al. (2008) investigated the extent that variations in preschool classroom processes and teaching methods affected academic outcomes (Howes et al., 2008; Peisner-Feinberg et al., 2001). Effective teaching and learning occurred in classrooms where lessons, classrooms routines, play interactions, and discipline and management strategies supported learning and social development (Meyer, Wardrop, Hastings, & Linn, 1993; Pianta, in press). Duncan et al. (2007) concluded that the key elements of school readiness are reading, math, and attention combined to create the strongest predictors of school academic performance.

Emotional Regulation and School Readiness

Pianta, Cox, and Snow (2007) compiled recent research to assist educators regarding the issue of school readiness and transition to kindergarten and concluded that the area of emotional regulation was imperative for school readiness (Blair, 2002). Emotional regulation incorporates give-and-take between cognition and emotion that influences the ability to regulate one’s behavior (Blair, Granger, & Razza, 2005). Cognitive and emotional responses worked together to organize patterns of behavior such as following classroom rules, staying focused on an assigned task, or delaying an activity, like waiting for lunch when a child is hungry earlier (Davidson et al., 2002; Van Eden & Buijs, 2000). The factors of family, school, and social levels often affected the ability of a child to inhibit actions needed for school readiness (Gottlieb, 1998).

Another term used for emotional regulation is self-regulation (Baumeister & Vohs, 2004). Pianta et al. (2007) noted that self-regulation, as a school readiness factor, appeared to be effective in child-centered preschools and aided student academic success; however, traditional methods of rote teaching and teacher-initiated activities offered less assistance in preparation for kindergarten. Self-regulation includes the elements of temperament such as effortful control and cognitive processing, often called executive function (Blair, 2002; Cole, Martin, & Dennis, 2004;
Kochanska, Murray, & Harlan, 2000; Rueda, Posner, & Rothbart, 2005; Zelazo & Mueller, 2002). Components of executive function such as the “processes required for the conscious control of thought and action” (Happaney, Zelazo, & Stuss, 2004, p. 1) distinguished between “hot” aspects that involve affect and motivation and “cool” aspects that included working memory, inhibitory control, and attention (Blair, 2002; Posner & Rothbart, 2000). Attention-related skills such as task persistence and self-regulation increased the time children were occupied in academic endeavors that resulted in an increase of learning (Duncan et al., 2007). Vygotsky (1933/2002) expounded the theory that a child learns self-regulation through pretend play. As the child played, patterns of adult rules and ability to stay focused on a task became a part of the child’s life (Bodrova & Leong, 1996). This research study concentrates on attention that allows students to complete tasks and stay focused on a play activity, an example of a factor necessary for school readiness (Barkley, 1997; Chang & Burns, 2005; TEA, 2008).

Play

For young children, play is work and means of learning (Montessori, 1912; Singer et al., in press; Vygotsky, 1978). During play, children improve motor skills, develop initiative, establish self-regulation, and gain social skills (Larson & Verma, 1999). Physical activity and play is important in a child’s development (Bredekamp & Copple, 1997, 2008). Young children play and interact in preschool classrooms during free play time (Lindsey & Colwell, 2003). Play offered the opportunity for the learning experiences and expressions for each child (Leong & Bodrova, 2001). Bodrova and Leong (1996) explained how to encourage and manage a child’s play to regulate their behavior and emotions. A child’s play with older and younger children playing princesses or superheroes built a critical cognitive skill, executive function (Barkley, 1997). Executive function included the self-regulation element that aids children with their
ability to control their emotions and behavior, to resist impulses, to exert self-control and
discipline, and maintain attention as a predictor of school success (Singer et al., in press; Spiegel,
2008).

Child development theories of Piaget (1945/1962) and Vygotsky (1978) reflect that pretend play assisted in developing a child’s self-regulation skills. Researchers indicated that play allowed a child the opportunity to experience and grow in their emotional regulation and the chance to engage in the give-and-take of social interaction with peers and older children (Bretherton, 1989; Howes & Matheson, 1991).

Vygotsky (1933/2002) offered the clearest description of how this play and self-regulation development occurs by stating that play is the leading source of development during the preschool years. Play, as a task in a child’s development, tended to be based on the child’s motive or need to act and express special needs that were imperative for the development of the whole child through play. Children under the age of 3 preferred, and often demanded, instant gratification of their needs. During their preschool years, ages 3 to 5, children begin to develop the skill to delay immediate rewards during play (Bodrova & Leong, 1996, 2001). A child’s unmet desires that caused tantrums and fits at ages 2 or 3 changed during preschool years and begin to motivate imaginary play and fulfillment of desires as a cognitive activity (Piaget, 1936/1962). Play needs to be viewed as a cognitive process; not the end of learning, but the means of learning for preschoolers (Rickard, Gallahue, Gruen, Tridle, & Steele, 1995).

Vygotsky (2002) explained that play was the beginning of rules that led to the preschooler’s formulated rules of behavior, character, and actions. The child followed the rules of the person or thing emulated in play and continued to follow the rules when play ended (Vygotsky, 1933/2002). Self-initiated rules in play begin to develop a child’s self-restraint, self-
determination, and self-regulation (Vygotsky, 1978). Play provided the means of learning to act against immediate impulse (Bodrova & Leong, 2001). Piaget (1962) explained that rule-based play develops from the child’s internal rule: self-restraint and self-determination, not physical laws. Play, the means of reaching the highest level of preschool development, assists a child to use rules to regulate activity in the future and school readiness (Rickard et al., 1995; Vygotsky, 1933/2002).

Music

Preschool years are also a critical time for musical growth when the brain and building of neural pathways develop. (Levinowitz, 1999; Miyamoto, 2007) Musical development begins in infancy with parents as they sing lullabies, play musical games, and dance and move with an infant (Trehub, 2002, 2003, 2004; Trevarthen, 2002). Ongoing musical experiences construct a web of interaction that increases the pathways, neural connections in the brain (Schiller, 1999). These neural connections provide continuing cognitive development that helps to prepare the child for preschool (Chang & Burns, 2005). Interest of music educators to identify and understand the musical knowledge and skills of preschool children started in 1967 at the Tanglewood Symposium. Teachers of music received encouragement to prepare to work with and research young children, as young as 3 years of age (Brink-Fox, 1991).

Music, as a preschool activity, helps to promote cognitive activities and increase attention necessary for school readiness (Blacking, 1998; Flohr, Miller & de Beus, 2000). However, preschool teachers use background music in the classroom with the belief that the music increased the child’s intelligence (Gruhn & Rauscher, 2002). The belief that background music increases intelligence is a result of media reports of Rauscher et al.’s (1993a) research when college students increased scores on spatial math problems after listening to Mozart. The results
from this research came to be called the Mozart effect (Anonymous, 1999). Teachers and parents began to play background music for children, all the time, even during play, with the expectation that the child’s intelligence would increase (Campbell, 1997). However, many replications of Rauscher’s et al. (1993) research indicated that the results of the original study did not extend to all ages and conditions (Bridgett & Cuevas, 2000; Chabris, 1999; McCutcheon, 2000; Newman, et al., 1995; Steele, Ball, & Runk, 1997; Steele, Bass, & Crook, 1999; Steele, Brown, & Stoecker, 1999). This lack of research of the effect background music on a preschooler prompted interest in this present study.

Interest for Research

Interest for this study started in a doctoral class about qualitative methods of research. I observed 3-year-old preschoolers play during center time in a private preschool and recorded the comments of the children. Center time is a solitary play time, when children rotate through six individual centers for 5 minutes. The center activities included puzzles, LEGO® bricks (LEGO System, Inc., Enfield, CT, www.lego.com), books, kitchen center, blocks, and puppets. The children all worked in the same room, but were asked by the teacher to play individually during this time. The observations and transcriptions of the children for 30 minutes during center time occurred once a week for five weeks. The children played and talked each day, but on the fourth day of observation the preschool teacher turned on music during center time, for no apparent reason. The transcriptions and observations indicated that the patterns of play and talk of the preschoolers changed from the play and talk observed on days when there was no background music. Children displayed different responses with the background music. Examples of reactions included children became distracted from their play and looked around, children stopped playing with their toys, some children talked less than they had in previous observations, and others
continued to play without interruption. The background music appeared to alter the learning activity for some of the children.

Another doctoral class assignment recreated the background music and center time play session with a group of 4-year-olds in a private cooperative preschool. A classical piano piece played as background music during center time elicited a variety of responses. One child made noises, another child moved to the rhythm of the music, and a third child stopped playing while the music played. Observations from these class assignments did not clearly indicate whether the distraction responses resulted from the background music, age of the child, or gender of the child.

**Statement of the Problem**

In the last forty years, many educators recognized preschool as the foundation of school readiness in the United States (Campbell, Ramey, Pungello, Sparling, & Miller-Johnson, 2002; Reynolds, Ou, & Topitzes, 2004; Schweinhart, Barnes, & Weikart, 1993; Weikart, 2003). Research continues to support the benefits of preschool for the child’s later academic success (Barnett et al., 2004; Clifford et al., 2005; Duncan et al., 2007; Weikart et al., 1978). Activities that include play, music, math, science, literacy, and art assist each child to prepare for school and develop the skills identified as most important for school readiness: math, reading, and attention (Duncan et al., 2007). Faith-based, private, Head Start, and public preschools increase in number every year (NCES, 2008). All of these preschools require a huge number of teachers, aides, and directors with a variety of educational training and qualifications needed to teach in the facility. Teachers vary from untrained aides, child development aide(s) (CDAs), and bachelor-degreed teachers to directors with graduate degrees who teach and lead the daily activities for all of the
children. Thus the preschool room, activities, and procedures vary according to the children, teachers, and directors of each center (BLS, 2008).

A practice in some preschool classrooms is the use of background music during play time, as reported by current preschool teachers and directors (Gruhn & Rauscher, 2002). Background music is music played at a low level (60db or less) while other activities occur (Godeli, Santana, Souza, & Marquetti, 1996; Rauscher et al., 1993a). The increase in the use of background music with young children resulted from a media report that listening to music increases intelligence (Rauscher et al., 1993a, 1993b). Two studies in 1993 that both included Rauscher led to the report. Rauscher, Shaw, Levine, & Wright (1993) performed a pilot study with preschoolers that found that music training of 3-year-olds provided long-term enhancements of nonverbal cognitive abilities. Another Rauscher et al. study in 1993 studied college students listening to background music, while studying spatial tasks that resulted in an increase in spatial intelligence after the treatment (Rauscher et al., 1993a, 1993b).

The results from these two studies became combined in reports leading to the statement that children became more intelligent by listening to background music, which was not the finding of either of studies. Numerous replications of the Rauscher et al. (1993a) background music research did not confirm the results of increased intelligence (Bridgett & Cuevas, 2000; Chabris, 1999; McCutcheon, 2000; Newman et al., 1995; Steele, Ball, & Runk, 1997; Steele et al., 1999; Steele, Brown, & Stoecker, 1999). Media reported that background music increased the cognitive abilities of young children. Subsequent marketing of toys, music, and videos for young children claiming that music increases intelligence followed (Campbell, 1997). Even with the lack of confirming research, and a lack of research to verify how background music affects
young children, teachers and parents continue to operate on the media reports of the Rauscher et al. (1993a) research and not on results from subsequent research (Hetland, 2001).

Studies to replicate the original Rauscher et al. (1993a) research and to investigate children and background music during homework included children who were 11.95 years of age (McKelvie & Low, 2002). Research with preschoolers and background music examined the impact of background music on dramatic play and cooperative play in natural settings (Godeli, Santana, Souza, & Marquetti, 1996; Love & Burns, 2007). A problem arises when two activities of preschool, play and music, both known to increase cognitive development and to improve attention necessary for school readiness, combine with a possible disruption of cognitive development or improvement of attention. Therefore, with a lack of empirical data about the effect of background music on preschooler learning, this study attempts to determine if background music distracts the focused attention a child exhibits during play (Gruhn & Rauscher, 2007).

The Purpose of the Study

The purpose of this study is to determine if background music affects the ability of selected children aged 3 to 5 to maintain focused attention to play.

Research Questions

1. To what extent, if any, does a child respond to music played in the background during a solitary play session?

2. To what extent, if any, does a child’s gender, age, ethnicity, household income, or home musical experience (CHIMES) relate to the child’s responses to background music played during a solitary play session?
3. To what extent, if any, does a child’s preschool music experience relate to the child’s responses to background music played during a solitary play session?

Definitions of Terms

For the purposes of this study the following definitions were used:

**Attention**: An aspect of self-regulation that illustrates a child’s ability to stay focused on a given task despite the desire or distraction in the room (Akshoomoff, 2002; Barkley, 1997; Chang & Burns, 2005; TEA, 2008).

**Background music**: Music played at a low level (60db or less) while other activities occur (Godeli, Santana, Souza, & Marquetti, 1996; Rauscher et al., 1993a).

**Child’s home musical experience**: The musical experience of a child from birth to preschool. A child acquires musical knowledge *in utero* (Moore, Vareyar, Fulford, et al. 2001); in infancy by lullabies and “motherese,” the sing-song speech of a mother or caregiver to a baby (Trehub, 2004); and as a toddler with hand plays, songs, and dancing (Honig, 2004).

**Focused attention**: The condition of a child when there is no shift of attention to objects or people in the room that are not relevant to a task; includes steadiness of gaze, facial expression, position of toys, self-consciousness, amount of extraneous movement, speed of movement, and talking/vocalizing (Bono & Stifter, 2003; Ruff, 1986; Ruff & Lawson, 1990; Schmidt, Pempek, Kirkorian, Lund, & Anderson, 2008).

*Preschool*: A beginning group or class enrolling children younger than 5 years of age and organized to provide educational experiences under professionally qualified teachers in cooperation with parents during the year or years immediately preceding kindergarten or prior to entry into elementary school when there is no kindergarten (NCES, 2008).

*Preschool children*: Children age 3 to 5 who are not in kindergarten (Flohr, 2004).

*Preschool mathematical manipulatives*: Concrete objects used to enhance the learning of mathematical concepts such as: one-to-one correspondence, patterns, geometry, sequences, or fractions. Items used in this study include geometric blocks, alphabet blocks, LEGO®DUPLO® bricks (LEGO System, Inc., Enfield, CT, [www.lego.com](http://www.lego.com)), and beads (Dodge et al., 2002).

*Preschool teacher*: A person who teaches, guides, and encourages children ages 3 to 5 years in preparation for kindergarten (Barnett et al., 2004).

*Solitary play*: A form of play among a group of children within the same room or area in which each child engages in an independent activity using toys that are different from the toys of the others, concentrating solely on the particular activity, and showing no interest in joining in or interfering with the play of others (Mosby, 2009).

**Summary**

Preschool programs prepare young children to handle the challenges and learning that takes place in kindergarten and later school (Schmidt et al., 2007). Educators and parents share the responsibility to assist children in school success. In order to accomplish this goal it is important that lessons and activities work together to provide the child the optimum chance to succeed in school. This study strives to determine if music played in the background distracts the focused attention a child exhibits to play.
CHAPTER II
REVIEW OF LITERATURE

The investigation of the effects of background music on a child’s attention to play has not been researched in this manner before. Therefore, it is important to understand the components of this research. The sections include (a) background music, (b) attention and school readiness, (c) theoretical basis of cognition and learning, (d) preschools, (e) music in the curriculum and daily lives of children, and (f) the influence of play on a child’s cognitive and attentional development.

Background Music

Background music benefits businesses by keeping customers in the stores so that they buy more products (Inefuku, 2003; Milliman, 1982), calms patients in waiting rooms before seeing the doctor (Radocy & Boyle, 1979), and aids digestion while eating in restaurants (Inefuku, 2003; Milliman, 1986). Music’s effect on the brain continues to be investigated, but the use of music to focus attention and increase intelligence in young children lacks investigation.

Society and parents desire a quick, simple means to increase intelligence. In 1993, Rauscher et al. found that a group of 36 college undergraduates improved their spatial-temporal intelligence (the ability to mentally manipulate objects in three-dimensional space) after listening to 10 minutes of a Mozart sonata. Results showed that student intelligent quotient (IQ) scores improved by 8 to 9 points and lasted for 10 to 15 minutes. The results from this research came to be known as the phenomenon called the Mozart effect.

The original Mozart effect researchers based their rationale on the Trion model of the cerebral cortex, a part of the brain that helps with, motor control, speech, memory, auditory reception, and other things (Rauscher et al., 1993a). Rauscher et al. (1993a) developed the Trion
model by showing that similar neural firings patterns occur when listening to music and performing spatial tasks (Leng & Shaw, 1991). Rauscher et al. hypothesized that listening to certain types of complex music might “warm-up” neural transmitters inside the cerebral cortex and thereby improve spatial performance.

Other researchers have been wary of the findings presented by Rauscher et al. (1993a; 1993b). Mozart effect critics have claimed that the spatial intelligence increase after listening to classical music is nothing more than a shift in participants’ arousal, which then produced better spatial test scores (Steele, 2000; Thompson, Schellenberg, & Husain, 2001). In essence, their argument is that listening to Mozart’s music caused either an increase or decrease in someone’s arousal and mood to a level that was more optimal for testing. Personal preference for the music heard in Mozart effect testing might also be a possible influence on increasing spatial test scores (Nantais & Schellenberg, 1999).

The bulk of the Mozart effect research has been conducted on undergraduate college students, although some media reports claimed that Mozart’s music improves a baby’s intelligence. Presently, no test involving the possible influence of this music on infants’ spatial intelligence has been conducted. The youngest group of participants that have been tested for the Mozart effect had a mean age of 11.95 years (McKelvie & Low, 2002). No testing has been done on older adults, adolescents, or preschool children. Results of studies on the Mozart effect vary from successful replication of the study and results (Rideout, Dougherty, & Wernert, 1998) and failure to confirm the 1993 findings of Rauscher et al. (1993a) (Bridgett & Cuevas, 2000; Chabris, 1999; McCutcheon, 2000; Newman et al., 1995; Steele, Ball, & Runk, 1997; Steele, Bass, & Crook., 1999; Steele, Brown, & Stoecker, 1999). No testing has been done on older adults, adolescents, or preschool children.
Despite the overwhelming evidence that the Mozart effect lacked research support, Governor Miller of Georgia started distributing free compact discs (CDs) containing classical music to the parents of newborn babies in that state (Anonymous, 1999; Sack, 1998). The governor desired to begin the life of each child born in Georgia in a positive and cognitively stimulating manner. The increase of background music with young children resulted from a media report that listening to music increases intelligence (Rauscher et al., 1993a, 1993b). Two studies in 1993 that both included Rauscher led to the report. Rauscher, Shaw, Levine & Wright (1993) performed a pilot study with preschoolers that found that music training of 3-year-olds provided long-term enhancements of nonverbal cognitive abilities. Another Rauscher et al. study (1993) of college students listening to background music while studying spatial tasks found an increase in spatial intelligence after the treatment (Rauscher et al., 1993a, 1993b). The results from these two studies became combined in reports leading to the statement that children became more intelligent by listening to background music, which was not the finding of either study.

No research indicated increased intelligence in children as an effect of listening to Mozart or classical music. Increased production of digital video discs (DVDs) with classical music such as Baby Einstein and toys with music for all developmental stages promoted the idea that music increased intelligence. Toys with music, CDs, and videos using classical music and music classes for infants and toddlers became more numerous. Baby Einstein DVDs purport that having a child watch a music video increased the child’s cognitive development (Baby Einstein, 2007). The desire by parents and teachers to find an easy and affordable way to improve cognitive development in young children resulted in the continued use of music in the background when planning activities with young children. However, Christakis (2004, 2007) wrote that watching these baby videos or other television shows actually leads to the expansion in the number of
children with attention deficit hyperactivity disorder (ADHD). The television watching and background noise interfered with a child’s ability to concentrate on a problem and decide on a reasonable behavior or train of thought (Christakis, 2007). Schmidt et al. (2008) observed that an adult television show playing in background distracted young children ages 1 to 3 years during play. The distraction resulted in 50% less focused attention on play. Researchers expressed concern for the cumulative impact background television may exert on cognitive development of children (Christakis, 2004, 2007; Schmidt et al., 2008). Background music, used to change behavior in preschool classrooms, might actually hinder learning and attention to stay on task (Scott-Kassner, 1999).

A few researchers investigated the impact of background music in the classroom. Scott-Kassner (1991) found that the introduction of background music calmed the classroom students and increased production during study time. Wakshlag, Reitz, and Zillmann (1982) studied the effect of different types of background music on Dutch children’s educational television program viewing. Programs with fast, appealing background music were viewed considerably longer than programs with slow, unappealing music or those with no music at all, but the information acquisition from these shows was minimal (Wakshlag et al., 1982). Davidson and Powell (1986) investigated how American fifth grade science students responded to background music in the classroom while they studied. Results reflected the observations of on-task-performance (OTP) of children in the classroom with sessions alternating between easy-listening background music and no music. The males in the classroom and the class as a whole had a significant increase in OTP. Savan (1996) played background music to help calm and increase cooperation in a group of 10 special educational needs children who normally exhibited angry, disruptive behavior.
Speculation by Savan (1996) included that the musical frequencies might stimulate parts of the brain that produce biochemical changes that were calming on these students.

Giles (1991) continued investigating the type of music that students found to be beneficial to behavior and performance in the classroom. Beentjes, Koolstra, and van der Voort (1996) took an entirely different approach to the use of television and other media in educational settings. Beentjes et al. (1996) studied the presence and perceived effects of both auditory (music via radio, cassette, or CD) and audio-visual (television) interference on homework, as reported by students. Background music seemed to have a positive influence on paper and pencil work, but specifically television drama interfered with learning assignments, as reported by the students (Beentjes et al., 1996). Hallam and Price (1998) extended the Giles research by playing calming background music to emotionally and behaviorally disturbed children as they worked on math tasks. The results indicated that the hyperactive children responded the most to the calming music. Hallam, Price, and Katsarou (2002) also found that the type of background music had distinctive effects on behaviors and performances. Calming music had positive effects on children’s mathematics tasks, memory tasks, and pro-social behaviors. Unpleasant or aggressive music had negative effects on memory tasks and pro-social behaviors; the effects of music on task performances are mediated through arousal and mood rather than affecting cognition directly (Hallman et al., 2002).

Recent research concluded that background adult television distracted young children at play (Kirkorian, Pempek, Murphy, Schmidt, & Anderson, 2009; Schmidt et al, 2008). The ability of the children to stay focused and demonstrate attention to play diminished during the time that the television show played. Although this research dealt with television programming, the
parallel with background music and young children applies. Studies on preschool children and background music during dramatic play elicited a variety of results.

Godeli et al. (1996) researched the influence of background music on preschoolers’ behavior. This study focused on posture (sitting or standing), spatial localization (at or near the desk or away from the desk) and social interaction (child-to-child, child-to-teacher, or none). Brazilian children between 4 and 6 years of age listened to folk music and heavy metal rock songs that were unfamiliar to the children in the background during a free-play time with children working at desk work. Child-to-child interaction increased during and after the playing of the music. Other responses showed no increase or change from play activity without music. Background music and the feelings of children in a classroom have been researched in Montessori Children’s Houses with the preschool and kindergarten children who developed a more positive attitude for the music during the study (Jaskolski, McKinstry & Spisak, 2008).

Another preschool research study investigated how background music influenced dramatic play. Love and Burns (2007) played fast, slow, and no music while children played in the block area where the researchers added props and literacy items. The tempo of the music tended to match the type of dramatic play. Slow music caused enactment of mother, baby, and sister at bedtime. Fast music tended to elicit dramatic play of a disaster nature as the children played fire and hurricane games. Love and Burns (2007) concluded that there was an indication that background music aids young children by increasing their attention to task and control of impulses or self-regulation.

Emotional Regulation and School Readiness

Hundreds of thousands of American children each year make the transition from preschool to kindergarten. This new transition experience can be particularly difficult for those
who have not mastered basic skills involved in regulating behavior, including paying attention, following instructions, and inhibiting inappropriate actions. Baumeister and Vohs (2004) refer to these skills as behavioral regulation, which falls under the broader heading of self-regulation, and which is important for functioning in all contexts of life. The body responds to the brain’s promptings for monitoring internal and external stimuli. When stress occurs the brain sounds an alarm to provide the body with whatever is needed: food, drink, warmth, or attention. Infants and young children gain assistance from a parent or caregiver to regulate their needs as the brain acts on the response of the child to control anxiety and increases self-regulation (Eisenberg et al., 2001; Elias & Berk, 2002; Perry, 2008). Researchers revealed that children enter school with differing levels of behavioral regulation and skills that are essential for early school success (Foulks & Morrow, 1989; Lin, Lawrence, & Gorrell, 2003). Researchers stressed that children who are not able to sit still, follow directions, or work independently without being distracted do not perform well in kindergarten classes or in academic achievement (McClelland, Morrison, & Holmes, 2000; Rimm-Kaufman, Pianta, & Cox, 2000).

Definition and components of self-regulation in early childhood continued to be debated (Cole & Dennis, 2004; Kochanska et al., 2000; Rueda, Posner, & Rothbart, 2005; Zelazo & Mueller, 2002) and revealed that self-regulation was not a single construct, but consisted of several aspects of controlling, directing, and planning, including emotion regulation, and behavioral regulation (Kochanska, Coy, & Murray, 2001). Self-regulation included elements of temperament, effortful control, cognitive processing, and executive function (Kochanska et al., 2000; Murray & Kochanska, 2002; Rothbart & Posner, 2005). Zelazo and colleagues (Kerr & Zelazo, 2004; Zelazo & Mueller, 2002) differentiated between “hot” aspects of executive function that included regulating affect and motivation, and the more cognitive “cool” aspects of
executive function, such as those involved in problem solving such as attention, working memory, and inhibitory control (Blair, 2002).

Self-regulation, the ability to control impulses in favor of the planned or expected actions, is a crucial component of school readiness (Bodrova & Leong, 1996, 2001; Masten & Coatsworth, 1998; McClelland, Cannon, Connor, et al., 2007; Vygotsky, 1966, 1978). Vygotsky (1934/1962, 1966, 1978) stated that social interaction is necessary for the development of self-regulation skills. Executive attention or attention-switching are considered imperative in completing tasks and problem solving (Rothbart & Posner, 2005; Rueda, Rothbart, McCandliss, Saccomanno, & Posner, 2005; Zelazo & Mueller, 2002). Attention allowed children to focus on a task or problem, access working memory, and complete behavioral tasks (Barkley, 1997).

Attention, a positive behavior in a kindergarten classroom, predicted reading and math achievement at 54 months, according to the National Institute of Child Health and Human Development (NICHD) Early Child Care Research Network (ECCRN) (2003). Preschoolers demonstrated that those who had difficulty paying attention and using working memory and inhibitory control to complete goals had difficulty in school settings (NICHD, 2003). When attention becomes an imperative factor to academic and cognitive progress in early child development is not known. McClelland and Morrison (2003) differentiated the self-regulation during learning activities as learning-related social skills. Preschoolers with learning-related social skills exhibited behaviors that included listening and following directions, participating appropriately in groups, staying on task, and organizing work materials (McClelland & Morrison, 2003). Children deserve preschool experiences that enhance and increase their attention and cognitive development. The learning-related social skill of focused attention developed as children from ages 2.5 to 3.5 years were playing (Ruff, Capozzoli, & Weissberg,
However, Akshoomoff (2002) found that children’s attention to stay on task emerged between ages 3.5 and 4.5, the preschool ages.

**Theoretical Background**

Vygotsky’s (1978) theory of social-cultural development indicated that a child constructed knowledge and skills from interaction with a social environment. Children built their own knowledge and skills through the activities they engaged in at home, school, and on the playground (Leong & Bodrova, 2001). Development occurred spontaneously and education lacked the ability to alter the development, while language to communicate with others aided in the ability to regulate their own behavior. The behaviors included physical, social, emotional and cognitive areas as the child becomes in control of their behavior instead of reacting to their environment (Vygotsky, 1978). Formal schooling demanded that the child learns how to make the teacher’s expectations align with his/her actions in class (Bodrova & Leong, 1996). *Self-regulation* was the term used to describe the ability of a child to internally monitor actions.

Just as the body responded to the brain’s promptings for monitoring internal and external stimuli, when stress occurred the brain sounded an alarm to provide the body with whatever was needed (Perry, 2008). Infants and young children regulated automatically with the help of a parent or caregiver, but maturity was required for the children to participate in their own regulation. The children sought water when thirsty or fled from scary situations when frightened. The brain acted on the responses of the children to sensations or feelings, resulting in self-regulation (Perry, 2008). Development of self-regulation allowed the children to deal with increasingly complex and challenging situations (Duncan et al., 2007). The stress or needs-response system developed as the children were exposed to controllable challenges that activated a low-level alarm system. Each time a child experienced a challenge and responded the repetition
increased the brain’s ability to respond in an appropriate manner to regulate the anxiety for the child (Perry, 2008). Preschool children began to have the ability to wait for snacks until after free play, or to take turns with a toy or game (Vygotsky, 1978). The need to have needs met instantaneously became controlled by children as they delayed gratification or need until the appointed time (Perry, 2008). The children’s ability to read the cues of discomfort, distress, or need caused less impulsive actions and allowed the children to be more comfortable in dealing with the situations. Some children had genetic or medical reasons that caused slow development of self-regulation, which resulted in children who were difficult or disruptive to an entire classroom (Perry, 2008).

The structures of school schedules provided an environment to encourage self-regulation. Teachers in school modeled self-regulation and self-control by words and actions, provided structure and predictability with transitions and schedules, rewarded good self-regulation with free play, and identified factors leading to fear or misunderstanding to avoid difficult situations for the child (Perry, 2008). Preschool settings offered the first opportunity that some children experienced the transitions and schedules that aided self-regulation.

Preschool

Recent evidence from longitudinal intervention studies demonstrates that there is a long-lasting, positive influence of quality prekindergarten education on performance in kindergarten (Campbell et al., 2002; Reynolds et al., 2004; Schweinhart et al., 1993). Prekindergarten statistics in 1980 showed that 96,000 children participated in public and private schools. By 2005, preschool enrollment increased to 1,036,000 students. This enrollment added up to a 585% increase in 20 years, from 1985 to 2005, while the other elementary grades increased by only 25% (NCES, 2008). Preschool programs were offered in public, private, faith-based, and community settings with teachers with training that varied from licensed teachers in public schools to aides and
volunteers with little or no formal training. Private and faith-based preschools used degreed teachers, but they did not always require that the teachers were licensed (BLS, 2008).

The variety of teacher preparation and lack of training resulted in preschool teachers with deficient information concerning all aspects of child development and the impact on the preschool experience (De’Etoile, 2001). Consequently, the preschool classroom practices varied from facility to facility and teacher to teacher. Bogard, Traylor, and Takanishi (2008) found a connection between high-quality early childhood workers and high-quality care of children. The student’s school readiness depended on the teacher’s education and training programs, school organization and climate, and the teacher and student relationships. The disparity in the emphasis of the training for early childhood educators extended to inadequate training in appropriate music instruction (Scott-Kassner, 1999).

Music, a mainstay of early childhood education, remained an understudied domain for preschool teachers who had limited musical knowledge, skills, and resources to provide musical activities that were appropriate for young children and that enhanced child development (Hildebrandt, 1998). Training of preschool teachers offered a solution to the problem, when it was convenient and a reasonable cost (Gharavi, 1993). Research indicated that music training actually benefited the classroom situation; when the teacher used music more the children responded by increased interest in the activity (Nichols & Honig, 1995).

Music has been included in preschool curricula since the beginning of early childhood education (Froebel, 1887/1974). Several preschool curricula utilized by teachers incorporated music as an essential part of their daily activities (Chauncey, 2006; Rankin, 2004; Weikart et al., 1978). Waldorf schools incorporate music into every year of schooling as each child increases in levels of musical ability and proficiency in musical performance (Chauncey, 2006; Easton,
This emphasis on music followed the understanding that music was the young child’s first language (Trevarthen, 2002). High/Scope preschool curriculum utilized music experiences with a focus to move to music, to explore and identify sounds, to discover the singing voice, to develop a melody, to sing songs, and to play simple instruments (Chauncey, 2006). Opportunities to integrate movement and music with literacy, math, and other content domains were included throughout the daily routine (Weikart, 2003). As part of the public media’s emphasis on the importance of early childhood experiences, Begley (1996) reported that children’s early exposure to music, mathematics, and language affected the development of the physiology of the brain and musicality in children begins at birth (Flohr, 2004; Flohr & Hodges, 2006; Trehub, 2003; Trevarthen, 2002).

Music and the Young Child

Gardner (1983) believed that the first talent exhibited by a child was musical talent. This musical talent came from genetic makeup in some children, but could be nurtured in all children if desired. Preschool years appeared to be a critical time for musical growth, when the brain and building of neural pathways developed (Levinowitz, 1999; Miyamoto, 2007). A child’s ability to match pitches and rhythms of the songs heard from mother began in infancy when parents encouraged music and language skills (Trehub, 2002). Too often the parents focused on language, not realizing how music and language interrelated. Music not only offered an expression of emotion through singing and playing, but aided in a child learning about culture and environment (Fox, 2000; Trevarthen, 2004a).

Trevarthen (2002) spent the last 30 years studying infants and children with emphasis on infant communication, musicality, regulation of brain development, and human knowledge. Discussion included using music as a component for beginning communication, using music to
establish a feeling of being part of a culture, and using music to improve parenting (Trevarthen, 2004a). Mothers and infants used the bodily motion of swaying or rocking to share a feeling of peacefulness and security that soothed the child (Brand, 1985b). This rhythm along with the “motherese,” a song-like speech that mothers used when talking to their babies, and lullabies built the basis for the musical life of a child (Trehub, 2002). This musicality aided the child with interactions that corresponded to the expressions and motives of other human beings (Trevarthen & Malloch, 2002). Communicative musicality, the give-and-take rhythm of communication between a parent and child, provided a way for infants to interact with their parents before talking (Malloch, 1999). Thus, music and its expression became the first language of the child. Infants responded at a young age to the music in their lives. The children turned their heads toward a song or melody that they liked, or moved their arms and legs to a tune that was stimulating to them (Trehub, 2003). The parents reacted with a smile and even a “Good girl (or boy)!” This process repeated itself as the children learned the patterns of communication, whether musical or verbal, with the parent. The process built a strong base for the children’s cognitive learning that led to speaking.

Learning about the world began months before birth, in utero, when the child had the ability already in place to learn a language (Trevarthen, 2004). Music was almost a “pre-language,” according to Papousek (1996), that helped the infant to prepare for being a part of a human culture (Gratier & Trevarthen, 2007). The human brain prepared for this awareness of other people and sharing in their actions and consciousness before the child was born (Trevarthen, 2004). Using this predisposed condition aided in parenting a child. Like a computer that already had all of the programs needed to perform any task required, the infant entered the world fully loaded to learn and experience the world the parents provided.
Although Malloch & Trevarthen (2008) did not enumerate how to be a better parent, the information provided and contributions from his colleagues provided valuable input. Mothers and fathers have used music to lull babies to sleep or to entertain children when they play together (Trehub, 2002, 2004). Ongoing musical experience constructed a web of interaction that increased the pathways (neural connections) in the brain (Schiller, 1999). These neural connections provided continuing cognitive development that helped to prepare children for preschool (Chang & Burns, 2005).

The emphasis in the last 50 years remained on child development. There was a need to assess the effect that home experience and preschool classrooms had on a child’s ability (Dika & Singh, 2002). Interest in identifying and understanding the musical knowledge and skills of preschool children by music educators began in 1967 at the Tanglewood Symposium. Teachers of music received encouragement to prepare to work with young children, as young as 3 years of age (Brink-Fox, 1991). Research emanating from music educators after this time studied musical behaviors of preschoolers and their musical aptitude, development, and growth. This research included examining the effect that children’s home musical environment has on their preschool experience and attention during play.

Young Children and Play

how to encourage and manage a child’s play to regulate their behavior and emotions. A child’s play with older and younger children playing princesses or superheroes built a critical cognitive skill, executive function (Barkley, 1997). Executive function included the self-regulation element that aids children with their ability to control their emotions and behavior, to resist impulses, to exert self-control and discipline, and maintain attention as a predictor of school success (Spiegel, 2008).

Child development theories of Piaget (1945/1962) and Vygotsky (1978) reflect that pretend play assisted in developing a child’s self-regulation skills. Researchers indicated that play allowed a child the opportunity to experience and grow in their emotional regulation and the chance to engage in the give-and-take of social interaction with peers and older children (Bretherton, 1989; Howes & Matheson, 1992).

Vygotsky (1933/2002) offered the clearest description of how this play and self-regulation development occurs by stating that play is the leading source of development during the preschool years. Play, as a task in a child’s development, tended to be based on the child’s motive or need to act and express special needs that were imperative for the development of the whole child through play. Children under the age of 3 preferred, and often demanded, instant gratification of their needs. During their preschool years, ages 3 to 5 years, children began to develop the skills necessary to delay immediate rewards during play (Bodrova & Leong, 1996, 2001). A child’s unmet desires that caused tantrums and fits at ages 2 or 3 changed during preschool years, and began to motivate imaginary play and fulfillment of desires as a cognitive activity (Piaget, 1936/1962). Play needs to be viewed as a cognitive process; not the end of learning, but the means of learning for preschoolers (Rickard et al., 1995).
Vygotsky (2002) explained that play was the beginning of rules that led to the preschooler’s formulated rules of behavior, character, and actions. The child followed the rules of the person or thing emulated in play and continued to follow the rules when play ended (Vygotsky, 1933/2002). Self-initiated rules in play begin to develop a child’s self-restraint, self-determination, and self-regulation (Vygotsky, 1978). Play provided the means of learning to act against immediate impulse (Bodrova & Leong, 2001). Piaget (1945/1962) explained that rule-based play develops from the child’s internal rule: self-restraint and self-determination, not physical laws. Play, the means of reaching the highest level of preschool development, assisted a child to use rules to regulate activity in the future and school readiness (Vygotsky, 1933/2002).

Summary

Preschool classrooms used music in transitions from activity to activity, music centers, and often as background music. Music provided an easy and recognizable way to move children from place to place, redirect their attention, and provide ways to occupy children when they are waiting in line (Kelly, 1998). Children learned rhyming and rhythm, and improved cognitive development, by moving to music and experimenting with instruments (Foley, 2006). Music existed as an essential part of preschool classrooms. Consequently, background music was often played in preschools with a desire to increase a child’s intelligence following the suggestion of the Mozart effect that background music increases intelligence (Rauscher et al., 1993a). There is a need for preschool teachers and their assistants to understand how the background music actually affects each child and learning in the classroom.

Some educators in these programs had been trained in the proper method of using music in the classroom as children learned to play instruments, practiced moving to music, improvised musical pieces, and discussed musical elements. The singing of folk songs and children’s finger
plays and games increased children’s literacy with rhymes, alliteration, and encouraged sequencing of events and stories (Edelman, 1997). In early childhood education many activities consisted of the arts activities, such as play, art, music, movement, and drama (Lim, 2004). The writings of Vygotsky (1966) and the use of play to increase a child’s learning indicated the importance of play as a child’s work and means of learning especially during the preschool years (Bodrova & Leong, 1996). The teacher scaffolded the child’s learning by teaching songs to be learned by memory and to aid in the increase of vocabulary. Vygotsky (1978) stated that each child constructs his or her own learning. This concept encouraged the exploration and manipulation of music, rather than listening to music in the background with no purpose or reason.

The ability of children to stay focused on a given task was imperative for children’s readiness for school. The current study supports the importance of understanding attention as a multifaceted concept that relates to cognitive, social emotional, and motivational systems (Chang & Burns, 2005; Posner & Petersen, 1990). Attention to a task allowed children to learn more easily, especially in a preschool setting. Robb (2003) studied the effects of music on a group of visually impaired children, and found that the children improved their attention during music-based activities such as singing, playing instruments, and movement, but less attention to activity during non-music games and stories. This music-based instruction and music activities increased children’s attention while listening to music appeared to affect cognitive performance that required attention (Husain, Thompson, & Schellenberg, 2002). Although the interaction between music and attention remained unclear, some studies recorded participants’ physiological responses (Collins & Kuck, 1991), such as heart rate, while listening to music. Because there is
little evidence of the effects of background music in preschool classrooms, this study used background music during a solitary play session to observe the focused attention responses.
CHAPTER III
METHODOLOGY

Rauscher et al. (1993a) reported that when Mozart’s *Sonata for Two Pianos in D Major* (K.448) played in the background during the study of mathematical spatial problems, college students increased intelligence. The study (Rauscher et al., 1993a) changed the mind set of educators and parents who sought an easy way to increase a child’s intelligence. Many studies replicated the original research, but there was a lack of research about how background music affected a preschooler’s focused attention. Previous research studied how background music affected dramatic play and cooperative play in preschoolers (Godeli et al., 1996; Love & Burns, 2007). This study investigated how background music affected a preschooler’s focused attention (FA) during play.

A quasiexperimental design allowed the comparison of groups without random assignment because each child received the same treatment. The laboratory setting controlled for the interfering factors of peer interaction, classroom distractions, and teacher interaction. A room in each preschool used by speech or play therapists for work with individual children, with a couple of small tables and chairs and space large enough to accommodate the use of a video camera, provided the laboratory setting. The children’s responses were gathered by videotaped individual play sessions with field notes. Young children are best assessed by videotaping because it “is a powerful medium that captures the dynamics of movement, bodily expression, and emotion” (Guidry, van den Pol, Keeley, & Neilsen, 1996, p. 52; Hundt, 2002). Head Teacher Survey gathered qualitative information about the use of music in the preschool classroom, which added a mixed methods aspect to this study. Mixed method studies use both quantitative and qualitative approaches when the researcher collects and analyzes data, integrates the findings, and
draws inferences using both qualitative and quantitative methods in a single study (Tashakkori & Creswell, 2007). In this study the Head Teacher Survey allowed the exploration of preschool classroom music as a variable in the life of children, while the field notes of each play session allowed the research to explore all aspects of the research questions (Pole, 2007).

Research Design

A quasiexperimental research design with children studied in a laboratory setting, a room separate from the main classroom, in the preschool provided data for this study. In order to control the research setting and treatment the researcher chose a paired-sample match strategy with a pretest-posttest control group design. This pretest-posttest study design showed the child’s focused attention at a baseline, prior to the treatment, during the treatment, and again following the treatment. Each child videotaped individually in a laboratory setting, in a room other than the child’s preschool classroom, avoided interfering variables of preschool background, classroom use of music, intervention effect, peer interaction, and classroom distractions.

The independent variables in the study were the child’s age, gender, race, income, and home musical experience. The dependent variables were the means of focused attention (FA), the length of FA, and the number of FA episodes. The Focused Attention Coding Manual (Ruff & Rothbart, 1996; Schmidt et al., 2008) provided criteria for coding the videotapes. Coding criteria included in the manual were steadiness of gaze, facial expressions, position of toys, self-consciousness, amount of extraneous movement, speed of movement, and talking and vocalizing. Videotapes of the children constituted the quantitative data each child’s FA during the play session. I coded the tapes with a reliability coder (RC) in order to avoid researcher bias. The RC was trained to follow institutional review board (IRB) standards and the coding instructions in the Focused Attention Coding Manual (Ruff & Rothbart, 1996). The RC guaranteed that
criterion-related observer reliability, intraobserver reliability, and interobserver reliability would be met (Schmidt et al., 2008).

Parents completed a survey of home musical experience (CHIMES) that offered information of children’s musical experiences since birth in order to have a clear view of the children’s preexisting variable of musical experience. The teachers completed the Head Teacher Survey, a questionnaire about the use of music in the classroom to help understanding the preschool musical experience.

Instrumentation

Two instruments provided information of two interfering variables that could not be controlled, the musical experiences of the child at home and preschool classroom music experiences. CHIMES, a quantitative survey of children’s musical experiences since birth at home, was used as an independent variable measure. The second survey, Head Teacher Survey, was completed by the head teacher of each participating classroom about the use of music in the child’s preschool classroom and the head teacher’s educational training. Teachers also spoke with me when the survey was returned and volunteered opinions and experiences with music and young children in the classroom. The teacher information allowed the investigation of how different music practices in the classroom affected the focused attention of the preschoolers in each class.

CHIMES

The CHIMES survey updated the Home Musical Environment Scale (HOMES) designed by Brand (1985a) for primary children in second grade. Research studies about the musical experiences of a child from conception to preschool included information about when a child began musical knowledge in utero (Moore, Vareyar, Fulford, et al., 2001), the use of lullabies
and “motherese,” the sing-song speech of a mother or caregiver to a baby (Trehub, 2004), and hand plays, songs, and dancing of toddlers (Honig, 2004). The survey provided a musical experience total score used to quantify the preexisting musical conditions each child brings into the preschool environment.

Procedure for Revising Survey and Pilot Study

The original CHIMES survey had 44 yes/no statements describing the child’s home musical experiences since birth. The questionnaire was divided into seven subheadings of musical involvement as listed under preschool music guidelines from MENC (2007): singing (11 statements), listening (10 statements), dance and movement (5 statements), playing instruments (5 statements), music classes (3 statements), discussing music (6 statements), and creating (5 statements).

Content validity for the 44-statement survey, the original CHIMES, started with a panel of three judges. The judges consisted of a college professor in family studies with a strong research background; a college professor in early childhood education, an experienced researcher and a former preschool teacher; and a doctoral student in early childhood education skilled in writing surveys and a former director of a private preschool. The experts all with strong research background, with an understanding of the development of young children, and with experience teaching and interacting with young children offered a strong panel of experts to review this survey. A dichotomous format attained for each child a total score to use as an independent variable in research.

Changes made on the recommendations of the expert panel were deleting Question 9, “My child sings in a choir at church or in the community,” and replacing it with, “My child sings together with our family,” because the choirs did not reflect home experiences of singing. The
use of “car/van” was changed to “car” in Question 4 and Question 14. “Non-toy” was replaced with “real” in Questions 29, 30, and 40. “My child makes musical sounds with everyday items (such as tapping or beating on pans)” was added to the playing instruments section. Question 44 added, “My child makes up songs to stories and/or poems.” The final version used in the pilot study included 44 questions. A field test of 3 mothers with children ages 3 to 5 years did not garner any more changes.

The pilot study included 40 parents of preschoolers who fit the criteria of children ages 3 to 5 years, not in kindergarten, and were not enrolled in preschools that would be used for the main study. The parents who volunteered to assist the researcher were from Texas, California, Wisconsin, and Iowa. Only 19 completed surveys were returned to the researcher. The subjects (N = 19) included 11 boys and 8 girls, ranging in the age from 3 years to 5 years, 2 months with 15 white, 2 African-American, and 2 Hispanic children. All the surveys were finished by the parent who had the most knowledge of the child’s musical activities in the home environment since birth. Homogeneity of normality assumptions was tenable. Reliability analysis yielded a Cronbach’s alpha of .91 for the 44 items in the questionnaire.

Survey Used for this Research

Revision of the pilot study started with deletion of all statements from the survey that were answered the same by all the parents. Then, the factor analysis using SPSS® 17 statistical and data management package (SPSS Inc., Chicago, www.spss.com) removed low factor loading components of the pilot study survey. Factor analysis studies the patterns of relationship among variables (Darlington, 2009). Factors answer the questions of how to explain the pattern of relationships among variables, what is the nature of the factors, how do the factors explain the
observed data, and how much random variance there is because of each variable (Darlington, 2009).

I sought to gain a factor loading level of .50 to strengthen the reliability of the survey (Hair, Black, Babin, Anderson, & Tatham, 2006). Factor loadings are the correlation of each variable and the factor. Loadings indicate the degree of correspondence between the variable and the factor, with higher loadings making the variable representative of the factor. The squared loading is the amount of the variable’s total variance accounted for by the factor. Thus, a .50 loading denotes that 25% of the variance is accounted for by the factor. The loading must exceed .70 for the factor to account for 50% of variance of a variable (Hair et al., 2006, p. 127-128). Thus, the larger the absolute size of the factor loading, the more important the loading is in interpreting the factor matrix. Using practical significance as the criteria, the loadings are as follows. Factor loadings in the range of ±.30 to ±.40 are considered to meet the minimal level for interpretation of structure. Loadings ±.50 or greater are considered practically significant (Hair et al., 2006). Items answered the same by all the parents or with factor loadings below .50 culled from the 44-question pilot study resulted in the survey used in this study. The remaining 22 questions had a Cronbach’s alpha of .92. The final CHIMES was given to the parents in this study to complete. All paperwork given to parents was offered in English and Spanish.

**Head Teacher Survey**

The Head Teacher Survey provided information to explain the interfering variable of preschool classroom music for each child and the classroom where they attended. This survey garnered information about the music the children experienced in the classroom and about the education of the teachers. A panel of experts reviewed the survey for content validity. The experts included a preschool teacher of 13 years, an elementary school special education
supervisor, and a preschool director with 15 years of work in early childhood education. The reviewers agreed that the survey offered appropriate and adequate information to aid and to assess the impact that preschool musical experience had on a child in the study. The survey included the following questions: (a) how many music lessons are taught each week in the classroom, (b) when and why the teacher played background music during class time, (c) educational training of the teacher, and (d) the level of early childhood music training of the teacher. Teachers offered any comments they wanted to share.

Participants

The participants in this study were 54 preschool children ages 3 to 5 years old. Preschools in the greater Dallas-Fort Worth area that participated in the study included public, private, faith-based, and Head Start centers. Because of long approval processing, there were only two preschools offering programs in the summer that participated in this study. All other children volunteered to participate after a parent letter with information about the study was sent to mothers who had children in preschool. Participants included 32% children from participating centers and 68% of the preschoolers at home for the summer and not attending a summer preschool program. Children ranged in age from 36 to 65 months old. Forty-three of the 54 subjects played for the entire 15-minute session, thus qualified for use in data analysis. Eleven children requested to be excused from the study before the entire videotaping was completed.

The data of the 43 participants included the following independent variables (Table 2):
Table 1

Demographic Summary of Study Participants

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>N</th>
<th>Adjusted %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male</td>
<td>18</td>
<td>42.0</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>25</td>
<td>58.0</td>
</tr>
<tr>
<td>Race</td>
<td>White</td>
<td>33</td>
<td>77.0</td>
</tr>
<tr>
<td></td>
<td>African American</td>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>Hispanic</td>
<td>5</td>
<td>12.0</td>
</tr>
<tr>
<td></td>
<td>Asian American</td>
<td>1</td>
<td>0.02</td>
</tr>
<tr>
<td>Age</td>
<td>3 (26-47 months)</td>
<td>12</td>
<td>28.0</td>
</tr>
<tr>
<td></td>
<td>4 (48-59 months)</td>
<td>23</td>
<td>53.0</td>
</tr>
<tr>
<td></td>
<td>5 (60+ months)</td>
<td>8</td>
<td>19.0</td>
</tr>
<tr>
<td>Income</td>
<td>Level 1 (less than $14,999)</td>
<td>7</td>
<td>16.0</td>
</tr>
<tr>
<td></td>
<td>Level 2 ($15,000-24,999)</td>
<td>6</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>Level 3 ($25,000-34,999)</td>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>Level 4 (35,000-44,999)</td>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>Level 5 ($45,000-54,999)</td>
<td>4</td>
<td>9.0</td>
</tr>
<tr>
<td></td>
<td>Level 6 ($55,000-64,999)</td>
<td>6</td>
<td>14.0</td>
</tr>
<tr>
<td></td>
<td>Level 7 (above $65,000)</td>
<td>12</td>
<td>28.0</td>
</tr>
</tbody>
</table>

Observation of Preschoolers

The means, length, and number of focused attention (FA) episodes of each child provided data used in data analysis. Coding of the videotapes followed the explanation and guidelines.
outlined by Schmidt et al. (2008) for the study with toddlers and background television shows (Akshoomoff, 2002; Anderson, 2008; Ruff & Rothbart, 1996). Focused attention entailed visual examination by the child performing a task, or play activity that included changes in facial expressions and active manipulation of items. The two aspects quantified were length of active engagement of focused attention and number of episodes of focused attention to play. The means of FA, gained by dividing the length of FA by the number of FA episodes, provided the third dependent variable. The data gathered from the videotaped sessions provided the information necessary to analyze the responses of each child during the pretest with no music, the treatment with music, and posttest without music.

*Video Coding*

The *Focused Attention Coding Manual* and *Play Episodes Manual* (Choi & Anderson, 1991; Ruff & Rothbart, 1996; Schmidt et al., 2008) guided the analysis of video data. Tapes were reviewed three times: (a) with no sound to identify number of FA episodes, (b) with sound to measure FA length, and (c) with sound to re-check number of FA episodes and length of FA periods. A videotape of a typical preschooler at play was used for training (Schmidt et al., 2008). Focused attention to play elicited active engagement with the toys, showed facial expressions of concentration or interest, and included direct manipulation of the toys (Ruff & Rothbart, 1996).

Onset of FA began when the child touched the item and offset when the child stopped the play or looked away. Unfocused play was an off-task behavior, a brief period when the child was distracted and non-focused, or the child ceased looking at the toys and stopped engaging in play (Akshoomoff, 2002; Ruff & Capuzzoli, 2003; Schmidt et al., 2008) was also noted in order to account for all the videotaped time.
The reliability assistant (RA) was naïve of the purpose of the research and the videotapes played with no audio during the training section of videotape coding. The RA trained for criterion-related observer reliability, the extent that that a trained observer’s scores agreed to the researcher’s codes (Gall, Gall, & Borg, 2007). A tape of a typical child between the ages of 3 and 5 years was used for training (Schmidt et al., 2008). The RA worked with the training tape until achieving an acceptable reliability of a phi correlation that was .70 or greater (Schmidt et al., 2008). The RA coded the tapes for the study when he attained a high correlation with my test tape coding for onset and offset of focused attention behavior. To assess intraobserver reliability, the extent that the primary observer and RA agree with each other during the coding of the data, the RA coded all the participants throughout the coding process with a .99 for pretest and treatment and 1.00 correlations for posttest. The frequency for the pretest was .997, for treatment 1.00, and .994 for posttest for the onset and offset of focused attention and the length of FA (Schmidt et al., 2008).

Data Collection Procedure

Data collection for this study included five steps. First, preschools in the North Texas area were contacted for permission to conduct the research at the facility. Eight preschools gave permission to submit a request and two centers approved the use of the preschool. Second, a packet with a letter to the parents, an informed consent form, and the CHIMES survey was distributed by the preschool center director to all the parents. Third, the children with parent approval were videotaped during play. Fourth, the head teacher for the children in preschools participating completed the head teacher survey and returned the form at the time of videotaping in the center. Parents of preschoolers from schools that did not offer summer programs volunteered to participate and were videotaped in a preschool room of a local church.
This study took place in a preschool room of each preschool in the morning from 9 a.m. until 11:30 a.m., when children had free play time (Pre-K/Head Start, 2009). Each preschooler was videotaped to capture all of the play time. The research procedure structure followed this pretest-posttest pattern:

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 minutes</td>
<td>Pretest-no music</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Treatment-with music</td>
</tr>
<tr>
<td>5 minutes</td>
<td>Post test-no music</td>
</tr>
</tbody>
</table>

Research Classroom Setup

Four Sterlite 4-quart clear plastic containers the size of shoe boxes with toys used in preschool classrooms as math manipulatives: (a) wooden geometric blocks, (b) pop link shapes, (c) wooden alphabet blocks, (Dodge et al., 2002), and (d) LEGO® DUPLO® bricks (LEGO System, Inc., Enfield, CT, [www.lego.com](http://www.lego.com)) (Wolfgang, 2001; Wolfgang, Stannard, & Jones, 2003) were offered to each child. One table had the 4 boxes on top and the other table was empty with a child-sized chair behind the table. I sat in a chair 4½ feet in front of the child behind a Canon FS100A DC7.4 digital camera set up on an Ambico tripod, set 37 inches high and 4 feet in front of the child’s chair. This position allowed me to easily capture the child’s face whether the child was sitting down or standing up, and provided flexibility if the child moved away from the table, yet offered space for the child to move around the table and not interfere with the taping. The Sony CFO-E75 CD Radio Cassette-Corder CD-R/RW Playback Compact Disc Digital Audio sat on a table next to the video camera at a level of 40 inches off the ground.

The treatment section music incorporated the first 5 minutes of the Allegro con spirito section of Mozart’s Sonata for Two Pianos in D Major (K.448) performed by Murray Perahia and Radu Lupu, the same classical music piece used by Rauscher et al. (1993a) in the research with college students. A compact disc player set with the volume on the 3rd line of level 3 sat on
a table across from the child. Piano music avoided distraction to the child that might occur because of music with a variety of instruments. Also, only 1 piece played during the treatment to avoid distraction from rhythmic, tonal, or melodic variations (Rauscher et al., 1993a).

The CD player placed 4 feet in front of the child offered ease in starting and stopping the music during the treatment section of the research without distracting the child. This allowed the control of the sound level of the background music in every preschool setting. The music played between 50 and 58 decibels (dB) as indicated by a Radio Shack sound level calibrator held directly in front of the CD player at the level and distance from the CD player as the distance and height of the child who played at the table. The “A” weighted sound level mimics the levels heard by the ear and replicated the sound level used in Mozart effect studies (Godeli et al., 1996; Husain et al., 2002; Steele, 2000; Thompson, Schellenberg, & Husain, 2001).

Research routine with each child

(1) Each child was greeted by name and invited to play with the toys found in the boxes in any manner that he/she chose while play was videotaped.

(2) The videotaping began when the child came into the room and began looking at the boxes. The timing of pretest, treatment, and posttest sections followed the timer on the video camera to maintain consistency.

(3) The play button was pushed at 4 minutes and 57 seconds because there was a 3 second delay from the time the button was pushed to the time the song began to play. Hence, the treatment (background music) began at 5 minutes.

(4) The music ended at 10 minutes. The camera continued taping during the posttest to the 15 minute mark.
(5) The camera was turned off and the child was thanked for playing with the toys and taken back to the preschool classroom.

Data Analysis Method

Repeated-measures (RM) analysis of variance (ANOVA) was used because the observation measured each individual 3 times on the dependent variable of focused attention during play and number of episodes of focused attention to play. This study used simple and mixed RM ANOVA. Simple RM ANOVA analyzed the data when the test occasion was the effect of primary interest and there was no appropriate error term for testing the effect of differences among individuals (Hinkle, Wiersma, & Jurs, 2003). In RM ANOVA analysis the scores for one individual are dependent, but the scores for different individuals are independent with no appropriate error term for testing the effect of differences among the individuals (Hinkle et al., 2003). The underlying assumptions were met in simple RM ANOVA when: (a) the sample was randomly selected from the population; (b) the dependent variable was normally distributed in the population; and (c) the population variances for the test occasions were equal (Hinkle et al., 2003). A single RM ANOVA measured the within-subjects variances. The with-subjects variation demonstrated the differences observed among subjects exposed to the same treatment during a specific time (Hinkle et al., 2003). The differences among group means would vary due to random selection and the variation due to treatments (Hinkle et al., 2003). Then, a mixed RM ANOVA analyzed the differences between-subjects interaction of the independent variables of age, gender, race, income, and CHIMES and the means of FA, the length of FA, and the number of FA episodes.
Summary

This study gained information about the effects that background music had on the focused attention of a preschooler. The variables of gender, age, income, race, and child’s home musical experience were investigated by RM ANOVA to determine if the independent variables effected how a preschooler responded to background music during play. The observational field notes and Head Teacher Survey added information to the study. The observational field notes clarified the videotaping session of each child before and after the videotaping. The Head Teacher Survey offered explanation about the preexisting variable of the preschool experience for each child’s response to the background music.
CHAPTER IV

RESULTS

The focus of the present study was the investigation of background music on the focused attention to play (FA) in preschoolers. The purpose was to determine if a preschooler had an increase or decrease in the length of FA in a pretest (baseline), with music (treatment), and after the music (posttest). Independent variables investigated how gender, age, race, income, the child’s home musical background, and the music used in the preschool affected each preschooler’s actions and responses during the study.

Forty-three preschool children between the ages of 3 and 5 years old participated in 15-minute videotaped solitary play sessions with a pretest-posttest research design. Parents completed a survey of the child’s home musical experience (CHIMES) to gain a total score for each child’s home musical experience at the date of the research. Head teachers, in participating preschools, completed the Head Teacher Survey with information about music use in the classroom, background music used in the preschool, teacher educational level, and early childhood education music training that influenced each child in a classroom with another preexisting variable that the researcher was unable to control. The study included the use of field notes and comments from head teachers as part of a mixed method aspect to this study.

The analyses included the use of repeated measures (RM) analysis of variance (ANOVA) because each child played in the same pretest, treatment, posttest research design individually at different times. The dependent variables included the means of focused attention (FA), the length of FA, and the number of episodes of FA during the pretest, treatment, and posttest. I utilized SPSS® 17 statistical and data management package (SPSS Inc., Chicago, www.spss.com) in order to gain the following data analysis that examined the responses of the preschoolers.
Deleting Cases with Missing Data

Missing values is one of the most pervasive problems in data analysis. The importance depends on the pattern of the missing information, how much is missing, and why it is missing (Graham, Cumsille, & Elek-Fisk, 2003). If 5% of data are missing in a random pattern from a large data set, the problems are less serious, with any procedure used to handle the missing values yielding similar results. There are no firm guidelines for how much missing data can be tolerated for a sample of a given size.

Fifty-four preschool children presented completed parental consent forms and CHIMES. Forty-three of the children entered the preschool play laboratory room and played for the entire 15-minute period. Eleven children were deleted because 3 children started to play, but stopped playing and asked to leave before the 15 minutes ended, 6 children refused to participate and asked to go back to the classroom, and 2 children were ill on the days the study occurred at the center. The final participant base included 43 preschoolers.

One-Way Repeated Measures ANOVA

Within-subject single RM ANOVA compared all children at the 3 different times for the means of FA, length of FA, and the number of FA episodes. The sphericity assumption, that all the variances of differences are equal, was tested using Mauchly’s test of sphericity (Hinkle et al., 2003). The underlying assumptions of sphericity included: (a) the sample was randomly selected from the population; (b) the dependent variable was normally distributed in the population; and (c) the population variances for the test occasions were equal (Hinkle et al., 2003). The assumption was met when the statistical significance was greater than 0.05. The statement, to meet the assumption, meant that each of the time periods was approximately equally correlated with every other score. Next, the statistical significance of within-subjects
indicated if there was any difference in the results. If the significance level was less than 0.05 there was a statistical significance, then, the effect size, difference magnitude of how much the dependent variable was controlled, predicted, or explained by the independent variable (Vásquez, Gangstead, & Henson, 2000) was reported. Cohen (1988, 1990) stated that the purpose of research should be to measure the magnitude of effect rather than just to report the statistical significance that relies on \( p \) values. Carver (1978) and Snyder and Lawson (1993) concluded the need to avoid misinterpretation of a small \( p \) value, which did not necessarily mean there was a strong relationship between the independent and dependent variables. Thomas, Salazar, and Landers (1991) used the following criteria for interpreting the magnitude of partial \( \eta^2 \) with 0.2 = small magnitude, 0.5 = moderate magnitude, and 0.8 = large magnitude (Cohen, 1988; Vásquez et al., 2000). This information of sphericity, statistical significance, and effect size allowed me to interpret the data for each of the research questions.

Research Question 1

To what extent, if any, does a child react to music played in the background during a solitary play session?

The sphericity assumption was met for all 3 dependent variables: the means of FA, the length of FA, and the number of FA episodes. There was no significant statistical difference in the means of the FA, \( F (2, 84) = .946, p = .392 \) and number of FA episodes, \( F (2, 84) = 1.525, p = .224 \). However, there was statistical significance in the length of FA, \( F (2, 84) = 4.654, p = .012 \) with an effect size, partial \( \eta^2 = .100 \), which accounted for a small magnitude of effect.

Ten percent of the variability in focused play duration was accounted for by time. The length of FA decreased progressively (Figure 1) from pretest with no music (\( M = 230.72 \)), treatment with music (\( M = 224.21 \)) and then without music during the posttest (\( M = 202.58 \)). Thus, the
preschooler had less focused attention with the background music than without music in the pretest. Length of FA with the music was shorter after the music ceased to play during the posttest. Thus, background music reduced the toy play episode length and the child’s focused attention during play.

Figure 1. Within-subjects single RM ANOVA for length of focused attention during play.

Research Question 2

Mixed RM ANOVA was used to find differences between the independent and dependent variables between subjects. The independent variables were each analyzed separately to gain statistical information about the impact of each independent variable on the focused attention to play.

To what extent, if any, does a child’s gender, age, race, household income, or the child’s home musical experience (CHIMES) relate to the child’s responses to background music played during a solitary play session?
Gender

A mixed RM ANOVA revealed that the main effects for gender and means of FA, length of FA, and means of the number of FA episodes all met the sphericity assumption. There was no significant difference found between means of FA of boys and girls $F(2, 82) = 1.021, p = .365$ or for number of FA episodes $F(2, 82) = .1.843, p = .165$. There was significant statistical effect for the length of FA $F(2, 82) = 5.384, p = .006$ with a small effect size, partial $\eta^2 = .116$, that indicated a small magnitude of significance. Twelve percent of the variability in focused attention to play duration was accounted for by time. The pretest length of FA of boys ($M = 229.56$) became shorter with the music ($M = 217.72$) and became much shorter without the music ($M = 183.67$). The girls pretest length of FA ($M = 231.56$) was shorter with background music ($M = 228.88$) and was a little shorter in the posttest ($M = 216.20$). Both boys and girls both had less focused attention with the background music that became shorter during the posttest (Figure 2). However, boys had a greater loss of FA with background music and without music in the posttest than girls.

![Figure 2. Between-subjects mixed RM ANOVA for length of focused play and gender.](image-url)
Age

The mixed RM ANOVA for age met the sphericity assumption at all levels of age. There was no significance found for the means of FA $F(2, 80) = 1.106, p = .336$ or number of FA episodes $F(2, 80) = .1003, p = .371$. There was a statistical significance for the length of FA $F(2, 80) = 5.096, p = .008$ with a small effect size, partial $\eta^2 = .113$. Eleven percent of the variability in focused attention to play duration was accounted for by time. The 3-year-old preschoolers had shorter lengths of FA from the pretest ($M = 231.25$) with background music ($M = 193.42$) and less FA during the posttest ($M = 179.00$). Four-year-olds started at the same level of focused attention as 3-year-olds in the pretest ($M = 231.57$), but maintained the same length of FA with music ($M = 232.17$) and lost FA length without music in the posttest ($M = 215.09$). At the age of 5 years the length of FA during the pretest ($M = 227.50$) was longer with music ($M = 247.50$) and shortened the length of FA without music ($M = 202.00$). The 3-year-olds had shorter FA lengths with music and without music than the 4- and 5-year-olds (Figure 3).

![Figure 3. Between-subjects mixed RM ANOVA for length of focused attention to play and age.](image-url)
**Race**

Sphericity of assumptions was met in all levels of the dependent variables for race. There was no significance in the FA means, $F(2, 78) = .634, p = .533$, FA length, $F(2, 78) = .2.861, p = .063$, or number of FA episodes $F(2, 78) = 1.113, p = .334$. However, graphs showed parallel responses between the FA means for Whites and Asian Americans, and between African Americans and Hispanics. White pretest ($M = 116.38$) had a marked increase in FA with music ($M = 142.34$) and a large FA decrease in the posttest ($M = 110.86$). Asian American pretest started with a very short period of FA ($M = 42.33$) that doubled with music ($M = 83.50$), and fell greatly in the posttest ($M = 31.00$). African American pretest, the highest FA mean of all races ($M = 179.27$), dropped greatly with music ($M = 59.13$) and increased greatly when the music stopped ($M = 160.25$). Hispanic pretest ($M = 171.55$) was not quite as high as the African American, then had less FA with music ($M = 122.33$) and less FA during posttest ($M = 100.72$).

Figure 4 shows that White and Asian American preschoolers had longer FA with music and less FA after music, while African American and Hispanic preschoolers had shorter FA with music.

![Between-subjects mixed RM ANOVA for length of focused attention and race](image)

*Figure 4. Between-subjects mixed RM ANOVA for length of focused attention and race.*
Income

All dependent variables met the sphericity assumptions for household income levels. There was no statistical significance in the means of FA $F(2, 72) = .676, p = .512$, the length of FA $F(2, 72) = 2.345, p = .103$, or the number of FA episodes $F(2, 72) = 1.606, p = .208$. However the graphs of the length of FA and income showed that Levels 6 and 7 were the only levels that remained the same or increased in FA length from pretest when background music playing. Level 6 increased in length of FA from $M = 226.33$ to $M = 253.50$ when the music played, then decreased to $M = 213.00$ when the music stopped, while level 7 preschoolers began at $M = 247.67$, remained at a similar level with music ($M = 249.33$), and fell ($M = 189.33$) after the music stopped. Levels 1, 2, 3, 4 and 5 had less FA with music and the two highest income levels had longer FA with the music (Figure 5). Children from families with lower income levels had shorter length of FA with background music than children from families with higher incomes.

![Graph showing between-subjects length of focused attention to play and income](image)

*Figure 5. Between-subjects mixed RM ANOVA for length of FA to play and income.*
CHIMES

CHIMES provided a total score of each child’s home musical experience before entering preschool. The assumptions were met for all levels of the dependent variables. There was no significance for the means of FA, \( F(2, 78) = 1.091, p = .341 \), or number of FA episodes \( F(2, 78) = 1.531, p = .223 \). Statistical significance was found for length of FA \( F(2, 78) = 4.416, p = .015 \), with a small effect size, partial \( \eta^2 = .102 \). Ten percent of the variability in focused play duration was accounted for by time. Preschoolers Level 1 had the longest FA length during the pretest (\( M = 245.22 \)), which then decreased in length of FA with music (\( M = 220.27 \)) and lost FA without music (\( M = 198.67 \)). Level 2 children increased FA length during the pretest (\( M = 205.18 \)) and increased more when the music played (\( M = 220.27 \)) but had less FA length without the music in the posttest (\( M = 169.36 \)). Level 3 children maintained a similar length of FA in the pretest (\( M = 233.67 \)) and with music (\( M = 231.07 \)), but had shorter FA length after the music ceased (\( M = 214.53 \)). Level 4 preschoolers started the pretest with a long length of FA (\( M = 244.00 \)) that was shorter with music (\( M = 217.38 \)), and became a longer FA length without music (\( M = 230.25 \)). The children with more musical experience had more focused attention with background music and without music in the posttest (Figure 6).
Research Question 3

To what extent does the child’s preschool experience relate to the child’s responses to background music played during a solitary play session?

Teacher Survey Results

Each head teacher completed a survey that included questions about the lessons about music taught in the classroom, the amount of background music played in the classroom, the level of education of the teacher, and whether the teacher had taken any early childhood music training. The results included data from three head teachers. The following results relate to the students who were in each preschool class when the research was performed as reported by the head teacher.
Table 2

*Head Teacher Survey Information*

<table>
<thead>
<tr>
<th>Head teacher</th>
<th>Amount of music lessons</th>
<th>Amount of music background</th>
<th>ECE training level</th>
<th>ECE music training</th>
</tr>
</thead>
<tbody>
<tr>
<td>Classroom 1</td>
<td>16-30 min. @ wk</td>
<td>3-5 hrs. @ wk.</td>
<td>CDA</td>
<td>None</td>
</tr>
<tr>
<td>Classroom 2</td>
<td>1-2 hrs.@wk.</td>
<td>Not answered</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Classroom 3</td>
<td>15 min. @ wk.</td>
<td>16-30 min. @ wk.</td>
<td>CDA</td>
<td>One class</td>
</tr>
</tbody>
</table>

Comments from the teachers other than those in the above table included that they “just turned on music when they did not know what else to do,” a “preschool director told me to have background music playing all day long when children were playing,” “background music was used to calm the children down,” and “I like music so I play it whenever I can for the children.” These comments added data to the supposition that some teachers used background music without knowing what impact it might have on each child in the preschool classroom.

*Participants in Classroom 1*

Only 2 preschoolers participated in the classroom from head teacher 1. This resulted in data that did not meet the sphericity of assumption because of the limited number of participants and because there was no statistical significance in means of FA, length of FA, or number of FA episodes for gender, age, race, CHIMES, or income. More participants were needed to gain statistically significant data.

*Participants in Classroom 2*

Three students in Classroom 2 participated in the research. Sphericity of assumption was not met in means of FA, length of FA, or number of FA episodes for the independent variables gender, age, race, CHIMES, or income. Sphericity of assumption was met for the with-in means of FA, with-in means of length of FA, and with-in number of FA episodes. With-in subjects of
the means of FA $F(1, 2) = .016, p = .912$, with-in length of FA $F(2, 20) = .126, p = .885$, and number of FA episodes $F(2, 4) = 1.310, p = .365$, however, there was no statistical significance.

*Participants and results in Classroom 3*

All children in classroom 3 were in the 2nd year of preschool with four 3-year-olds and three 4-years-olds. The class had 4 girls and 3 boys with 5 Hispanic and 2 African American children. The teacher reported that the class had limited music lessons (15 minutes a week) and background music played 16 to 30 minutes each week.

Classroom 3 data did not meet the sphericity of assumption for with-in subjects and between-subjects statistics. There was no statistical significance found in any of the data. However, a number of graphs varied from the data from the full study. The number of FA episodes within subjects graph showed that the number of FA episodes in the pretest ($M = 2.00$) increased with music ($M = 2.57$), and then decreased ($M = 2.14$) when the music ceased. The children in classroom 3 had more FA episodes with music and fewer episodes without music, the opposite of the number of FA episodes in the full study.

*Figure 7. Within-subjects number of FA episodes of Class 3 vs. the full study.*
CHIMES length of FA in classroom 3 varied from the full study as seen in Figure 8. Level 1 preschoolers in Classroom 3 length of FA in the pretest ($M = 274.50$) was longer with music ($M = 297.50$) and then had a shorter length of FA without music ($M = 263.00$). Level 2 children length of FA during the pretest ($M = 171.50$) was less with music ($M = 106.50$) and had a slight increase in length of FA without music ($M = 112.50$). Finally, the Level 3 children during the pretest ($M = 214.33$) had less FA with the music ($M = 200.67$) and shorter length of FA during the posttest ($M = 188.33$). Classroom 3 children did not respond in the same manner as the full-study children. However, without statistical significance it is difficult to determine if the change in FA length is due to the preschool musical experience.

![Figure 8. Class 3 between-subjects length of focused attention to play and CHIMES.](image)

The number of FA episodes and CHIMES graph in classroom 3 differed from the full study results. An increase of the number of FA episodes from Level 1 pretests ($M = 1.00$) with the music ($M = 1.50$) and remained the same without music ($M = 1.50$). Level 2 maintained the same number of FA episodes from pretest ($M = 2.00$) with music ($M = 2.00$) and with no music ($M = 2.00$). Finally, Level 3 preschoolers increased in the number of episodes FA from the
pretest \((M = 2.00)\) to the treatment with music \((M = 3.67)\) and had fewer episodes of FA with no music in the posttest \((M = 2.67)\). Levels 1, 2, and 3 of CHIMES data in Classroom 3 had results opposite the results of the full study for the number of FA episodes and CHIMES (Figure 9). The lack of statistical significance for this data prohibits the conclusion that the musical experience in Classroom 3 contributed to the difference of the number of FA and CHIMES in the full study.

![Class 3 Between-subjects Number of FA Episodes and CHIMES](image)

**Figure 9.** Class 3 between-subjects number of FA episodes and CHIMES.

**Summary**

The research questions addressed, first, to what extent, if any, does a child respond to music played in the background during a solitary play session? Second, to what extent, if any, does a child’s gender, age, race, household income, or home musical experience (CHIMES) relate to the child’s responses to background music played during a solitary play session? Third, to what extent does the child’s preschool experience relate to the child’s responses to background music played during a solitary play session?
The findings for the first research question showed that the means of the length of focused attention was shorter with background music than during the pretest. The findings of the second question for gender showed that boys and girls both had shorter length of FA with the music. Boys had shorter focused attention than the girls, and 3-year-old preschoolers had shorter FA lengths with music and without music than older preschoolers at ages 4 and 5. White and Asian American preschoolers both had longer lengths of FA with the music. However, the African American and Hispanic preschoolers both had shorter lengths of FA with music. Preschoolers from lower income families had shorter lengths of FA with background music than children from the highest income levels. Children with more musical experience at home, a higher CHIMES score, had longer lengths of FA than children with less home musical experience.

The findings for the third question were not definitive because only 38% of the children in the study attended preschool during the summer months. Head teachers from participating preschools completed the Head Teacher Survey. Although there was no statistical significance found in the data for the 3 classrooms, information illustrated on some of the graphs differed greatly from the full study graphs. The preschoolers in Classroom 3 had more episodes of FA with music and fewer number of FA episodes without music. Children in Levels 1 and 3 of CHIMES varied in the length and number of FA episodes from the full study. Level 1 preschoolers had longer and more episodes of focused attention with music than the Level 1 children in the full study. Classroom 3 preschoolers with more home musical experience, Level 3, had longer and more focused attention episodes than children with less music experience. The preschool experience as reported by the head teacher in Classroom 3 who had CDA training, who took one class in early childhood music in college, and had limited use of music activities
and background music in the classroom may account for the responses of the children in Classroom 3.
CHAPTER V
DISCUSSION

The emphasis of school readiness (Pianta et al., 2007) brought more children than ever to preschool classrooms in an effort to prepare for kindergarten by means of programs that encouraged cognitive, physical, linguistic, and social/emotional development. Three areas that have been found to especially aid in the transition to kindergarten are math, reading, and attention (Duncan et al., 2007). A preschooler’s attention, the aspect of self-regulation that characterizes the child’s ability to stay focused on a task to completion and to inhibit actions because of distractions, develops from birth (Akshoomoff, 2002; Barkley, 1997; Chang & Burns, 2005; TEA, 2008). The Texas Education Agency (TEA) Pre K guidelines (2008) included attention in the social and emotional development domain under self-control skills, and control of attention as a skill required by the end of preschool. The TEA Pre K guidelines (2008) read that the “child sustains attention to personally chosen routine tasks until they are completed” (p. 43). Two common activity areas in preschool, play and music, are known to provide opportunities for children to promote cognitive development and increase attention skills (Barkley, 1997; Bodrova & Leong, 1996, 2001; Flohr, 2004; Spiegel, 2008; Trehub, 2003). This study investigated play and background music in one setting. Preschoolers were videotaped to determine how background music affected focused attention during a play session.

The present study utilized mathematical manipulatives, toys that encourage cognitive development in preschool. A pretest-posttest research design gathered data that included: a baseline of focused attention (FA) for each child, the length of FA with background music, and the length of FA without music. Mozart’s Sonata for Two Pianos in D Major (K.448), a classical music piece, was played in the Rauscher et al. (1993a) study. Videotaped data of the children
(Guidry et al., 1996) coded for focused attention using the Focused Attention Coding Manual (Ruff & Rothbart, 1996; Schmidt et al., 2008) offered clear descriptions. Research with children ages 3, 4, and 5 years required a clear definition of self-talk. “This is a bridge” or “I’m going to try this now” was reported as FA if the child did not raise his/her eyes from the toy while the preschooler spoke. When the child spoke to the camera or the researcher, the episode was listed as unfocused attention. Clean-up was not considered FA, except for one child who meticulously put each block in the box and turned it the “right way” every time until the box had been appropriately loaded. Blocks thrown into the box was not considered FA; it was merely a necessary task that was coded as unfocused play.

Results investigated the dependent variables of the means of FA, the length of FA, and the number of episodes of FA. The independent variables studied included gender, age, race, income of the family, and child’s home musical experiences (CHIMES). Finally, the variable of preschool classroom musical experiences of the child was examined. All analyses used repeated measures (RM) analysis of variance (ANOVA) because each child played in the same pretest, treatment, posttest research design individually at different times. Reports of any statistical significance and any interesting patterns found in the graphs from the data are included in this discussion.

Each research question was addressed separately. First, Research Question 1 explored to what extent, if any, a child reacted to music played in the background during a solitary play session. Data revealed that preschoolers in the study had less focused attention when the classical background music played than during the pretest. The length of focused attention decreased even more without music during the posttest. Although there were a few children who played straight through the entire play session and never lost focused attention to play, classical background
music in a classroom distracted many of the preschoolers in the study. These findings have implications for teachers and parents that classical background music, instead of increasing attention in children, might indeed decrease children’s focused attention during play activities.

The second research question addressed to what extent, if any, a child’s gender, age, ethnicity, household income, or child’s home musical experience (CHIMES) related to the child’s responses to background music played during a solitary play session. Gender findings showed that boys and girls both had less focused attention with classical background music and less focused attention with no music during the posttest. However, boys had a greater loss of focused attention than girls during the entire play session. Next, this study confirmed previous literature that younger children have shorter lengths of focused attention with and without background music (Ruff & Capozzoli, 2003; Schmidt et al., 2008). The increase of FA with music of 5-year-olds indicated that as a child matured there was an increase in attention (Ruff & Capozzoli, 2003; Schmidt et al., 2008). The use of classical background music in a 3-year-old classroom should be avoided.

Race did not have statistical significance, but there was an interesting parallelism between the Whites and Asian Americans with an increase in length of FA with music and then decreased FA without the music. African American and Hispanic children both had less length of FA with music that became shorter without music in the posttest. The effect might have been due to the type of music played in this study. The White and Asian American children might have been more familiar with classical music than the African American and Hispanic children. Teachers in classrooms with diverse racial backgrounds should show care with the use of background music while children play, and with the type of music played in the classroom.
Finally, the child’s home musical experience level, totaled from the Child’s Home Musical Experience survey (CHIMES) completed by each parent, provided a total score for each child. Children with a higher score of home musical experiences had longer focused attention episodes with the background music and without music. Therefore, home musical experience appeared to increase attention in the child and thus lessened distraction from classical background music in the study.

The third question addressed the effect of the preschool experience on a child’s focused attention. Two of the classrooms had 2 or 3 participants that offered no data to analyze. However, Classroom 3, with 7 children and a teacher with a CDA who had taken an early childhood music class, provided enough data to gain some insights into the effect of the preschool musical experience on children from a specific classroom. Only the data that varied from the results of the full study were reported. The differences in the data in Classroom 3 and the entire study occurred with the child’s home musical experience responses of focused attention length and number of focused attention episodes. The Level 3 preschoolers in Classroom 3 length of FA and number of FA episodes with music and without music were the opposite of the full study. The limited use of background music in the classroom by the head teacher might increase focused attention during the preschool music experiences. However, more data is needed for statistically significant findings.

Strengths of this study included the research design, setting, researcher as an observer, and videotaped play sessions. The pretest-posttest, quasiexperimental design enabled me to replicate the laboratory setting easily at each preschool. Also, the laboratory setting, while keeping children in a room of the preschool they attended, allowed each child to feel comfortable and avoided the classroom variables of peer distraction, teacher distraction, and distraction from
the preschool classroom. Integrity and consistency of the research process was maintained because only one person observed every play session. Finally, the videotaped data remained constant because only one child at a time was recorded.

Limitations of the study were the time of year it took place, the directors of preschools requirement that the research information be disseminated from the school and not by me personally, and geographic constraints. A study during the school year would offer me more preschool classrooms and children to study, and more information from head teachers to compare how music practices in the classroom affect the development of attention in preschoolers. Contacting preschool centers during the school year did not assure approval because of long approval procedures and because some centers did not allow children to be videotaped individually because of center privacy policies. Limited access to preschools caused a lack of diversity in the participants. Finally, the directors of the preschools solicited the parents of each center, which did not allow personal explanation of the study directly to the parents to garner more participants per preschool. Even with the access of a metropolitan Head Start preschool, a limited number of parents completed the informed consent forms. Another weakness was the limited geographical area covered by the study because of my limitations.

This research added to the information that preschool centers, directors, teachers, and parents use to know how to best prepare a child for kindergarten. Increased diversity in preschool classrooms needs to address and consider the results about how different races respond to classical background music. Future research with a larger participant base, different types of preschools, and more diversity would be beneficial. The child’s home experiences proved to be important to increase focused attention that would avoid distraction from background music. Although the teacher might not want to survey the parents in the classroom for the amount and
type of home musical experience a child brings to the preschool classroom, the presence of a variety of experience levels needs to be considered by the teacher, just as different races and income levels are taken into consideration when planning the preschool day. The inclusion of the independent variables of parent educational levels and make-up of the family in the home as part of the demographics in future research would offer more information of the child’s home background. Other replicated studies of this topic are needed to confirm the findings of this study.

Implications for practice of the teachers and parents include the need for the adults to consider how each child responds when classical background music plays. However, as demonstrated in this study caution needs to be used with the following results in mind:

- The length of focused attention shortened with background music
- Many 3-year-old children lacked adequate attention development to deal with background music
- Children from different races responded differently to classical background music
- A child’s home musical experience increased the development of focused attention needed for school readiness
- Boys lost more focused attention than girls with classical background music

Both parents and teachers need to use music as a positive activity to increase cognition and attention by singing, playing musical games, dancing, playing instruments, and sharing musical experiences with each child. At the same time, preschoolers also need plenty of play time to increase cognition and attention without distraction. Music paired with another content domain like math, literacy, or social studies with an objective for each area and an assessment of both areas is appropriate in the classroom (Flohr & Trollinger, in press). These findings have
implications for teachers and parents that classical background music, instead of increasing attention in children, might indeed decrease children’s focused attention during play activities. The use of background music might have little educational value; however, the instruction of music and use of play in preschool still offers great educational promise (Rauscher & Hinton, 2006).
APPENDIX A

CENTER REQUEST LETTER
Dear Preschool Center,

I am a Kevin Dartt a doctoral student in Early Childhood Education at the University of North Texas. Currently I am conducting a research project with preschoolers and music. This project concerns the effects of background music during play time. Parents will be asked to allow the researcher to videotape and observe the child for one session. The videotaping will be reviewed by the researcher for scoring attention responses to the music. All tapes will be kept confidential and secure in the researcher’s file cabinet and no names of children or preschool centers will be used anywhere in the study. The children will be videotaped in their preschool to avoid unnecessary disruption to child’s normal schedule. If you agree to participate in the study I will share any information that might benefit you as a parent after the study is completed.

Thank you for your cooperation in this study.

Kevin Dartt, M.A.
APPENDIX B

INFORMED CONSENT
University of North Texas Institutional Review Board

Informed Consent Form

Before agreeing to participate in this research study, it is important that you read and understand the following explanation of the purpose and benefits of the study and how it will be conducted.

Title of Study: How a preschooler’s home musical experience affects attention during center time while background music is playing in a preschool setting

Principal Investigator: Kevin M. Dartt, a graduate student in the University of North Texas (UNT) Department of Teacher Education and Administration.

Purpose of the Study: You and your child are being asked to participate in a research study to investigate how a child’s musical experience affects attention to center time play while background music plays.

Study Procedures: You will be asked to complete a questionnaire that will take about 15 minutes of your time. Each child will be observed and videotaped, after parent consent, during center time in their preschool with and without music in the background.

Foreseeable Risks: No foreseeable risks are involved in this study. Parents and preschool teachers may question whether there is a better means of using music in the lives of their children.

Benefits to the Subjects or Others: This study is not expected to be of any direct benefit to you. It may benefit the researcher and early childhood educators and parents to better meet the needs of young children in their musical experiences and attention to tasks.

Procedures for Maintaining Confidentiality of Research Records: Questionnaires will be kept in a locked file in my office in Matthews Hall 218R. The confidentiality of your individual information will be maintained in any publications or presentations regarding this study.

Questions about the Study: If you have any questions about the study, you may contact Kevin M. Dartt or the faculty advisor, Dr. George Morrison, UNT Department of Teacher Education and Administration, at telephone number.

Review for the Protection of Participants: This research study has been reviewed and approved by the UNT Institutional Review Board (IRB). The UNT IRB can be contacted at (940) 565-3940 with any questions regarding the rights of research subjects.

Research Participants’ Rights: Your signature below indicates that you have read or have had read to you all of the above and that you confirm all of the following:
• Kevin Dartt has explained the study to you and answered all of your questions. You have been told the possible benefits and the potential risks and/or discomforts of the study.
• You understand that you do not have to take part in this study, and your refusal to participate or your decision to withdraw will involve no penalty or loss of rights or benefits. The researcher may choose to stop your participation at any time.
• You understand why the study is being conducted and how it will be performed.
• You understand your rights as a research participant and you voluntarily consent to participate in this study.
• You have been told you will receive a copy of this form.

Printed Name of Participant/Parent/Guardian          Printed Name of Participant/Child

________________________________                                ____________
Signature of Participant/Parent                                     Date

For the Principal Investigator: I certify that I have reviewed the contents of this form with the participant signing above. I have explained the possible benefits and the potential risks and/or discomforts of the study. It is my opinion that the participant understood the explanation.

________________________________________               ___________
Signature of Principal Investigator
APPENDIX C

PARENT LETTER
Dear Preschool Parent,

I am a Kevin Dartt, a doctoral student in Early Childhood Education at the University of North Texas. Currently I am conducting a research project to complete my doctoral dissertation. The project investigates how a preschooler’s focused attention is affected by background music during play. The research includes the parents’ completing a 22 question survey concerning their child’s home musical experience before preschool. Then the researcher will observe and videotape the child for 24 minutes while they play with music playing.

All surveys and tapes will be kept confidential and secure in the researcher’s locked file cabinet and no names of children or preschool centers will be used anywhere in the reports or papers that result from study. The child will be videotaped in their natural preschool setting so that as little disruption will occur in the child’s normal schedule. There is no foreseeable risk to the child from participation in this research. If you agree to participate in the study I will share any information that might benefit you as a parent after the study is completed.

Thank you for your cooperation in this study.
Kevin Dartt, M.A.
REFERENCE LIST


