AN INVESTIGATION INTO THE IMPACT OF GORDON’S INSTRUMENT TIMBRE PREFERENCE TEST ON GENDER AND STUDENT INSTRUMENT CHOICE

Andrew J. Fund
AN INVESTIGATION INTO THE IMPACT OF GORDON’S INSTRUMENT TIMBRE PREFERENCE TEST ON GENDER AND STUDENT INSTRUMENT CHOICE

A dissertation submitted in partial fulfillment of the requirements for the degree of

DOCTOR OF EDUCATION

to the faculty of the Department of

ADMINISTRATIVE AND INSTRUCTIONAL LEADERSHIP

of

THE SCHOOL OF EDUCATION

at

ST. JOHN’S UNIVERSITY

New York

by

Andrew Fund

Date Submitted: March 23, 2020  Date Approved: March 23, 2020

Andrew Fund  Dr. Erin M Fahle
ABSTRACT
AN INVESTIGATION INTO THE IMPACT OF GORDON’S INSTRUMENT TIMBRE PREFERENCE TEST ON GENDER AND STUDENT INSTRUMENT CHOICE

Andrew Fund

The purpose of this study is to investigate different practices of musical instrument choice and how those relate to gender equitable outcomes of music students. Little attention has been given to a student’s preference of the timbre of the instrument that is to be learned. Rather, instrument choice has been largely determined by a teacher based on what the student reports visually and physically liking after trying multiple instruments. This study will explore whether male and female students’ instrument placement differs when using Gordon’s Instrument Timbre Preference Test (ITPT). This study will use archived data from music students in Grades 4 through 12. Students in Grades 4 and 5 used the ITPT to select an instrument. Students in Grades 6 through 12 used the traditional “petting zoo” model. However, the ITPT was administered to these students in the 2018-2019 school year. The study will first establish if there are significant differences in the timbre preferences of boys and girls in Grades 4 through 12. Then it will explore if there are significant differences in the instrument placement of boys and girls when using Gordon’s ITPT method versus the traditional instrument selection petting zoo method. Among middle and high school students who did not use the ITPT to select their instruments, it will examine if students’ instrument choices correspond to their timbre preferences as measured by ITPT and whether that differs for boys and girls and their ensemble.
DEDICATION

To every educator who has afforded me the opportunity to learn.
Earning a doctoral degree is a dream of mine, I would not have finished it if were not for the support and guidance of my teachers, friends and family. Thank you from the bottom of my heart. Mom and Dad, I am so fortunate to have the best parents and role models. Dad, you taught me to follow my heart, work hard, and pursue my dreams. Mom, thank you for always being available for editing, revising, pep talks, and reminding me of what it was like to write a dissertation a few years ago... Lisa, thank you for your encouragement and checking over my PowerPoints. Julia, thank you for your love, support, flexibility, and encouragement. You never let me give up; I am so lucky to have you in my life.

Thank you to the HWPS for allowing me to do research in your amazing school district. Thank you to Mr. Walter Lastowski for teaching me about Gordon and being one of the best educators and administrators for music and art. Thank you to the HWPS music department for affording me the time, questions, and your expertise about Gordon’s music assessment tests. Thank you to the GIML (Gordon Institute of Music Learning) society for answering my numerous questions about Gordon and teaching me his musical pedagogy.

The utmost thank you goes to the University of St. John’s faculty and staff. Dr. Fahle, you have transformed me as a student, researcher, writer, educator, and person. Each time we meet, you constantly push me to that next level. Your continuous patience and encouragement kept me focused, motivated, and determined to pursue my goal. I extend my gratitude to my committee members, Dr. Parmar and Dr. Kotok. Your
guidance and feedback were incredibly appreciated throughout this entire process. I am so lucky to have had the opportunity to work with and learn from each of you.
TABLE OF CONTENTS

DEDICATION .................................................................................................................. ii
ACKNOWLEDGMENTS .................................................................................................... iii
LIST OF TABLES ........................................................................................................... vii
LIST OF FIGURES ......................................................................................................... viii
Chapter 1 ......................................................................................................................... 1
  Purpose of the Study ................................................................................................. 3
  Theoretical & Conceptual Framework ....................................................................... 4
  Significance of the Study .......................................................................................... 5
  Connection with Social Justice and Vincentian Mission in Education ...................... 6
  Research Questions .................................................................................................... 6
  Definition of Terms ..................................................................................................... 7
Chapter 2 Review of Related Research ......................................................................... 9
  Theoretical Framework ............................................................................................... 9
  Conceptual Framework ............................................................................................. 11
    Diagnostic Musical Development ............................................................................ 12
    Instrument Choice .................................................................................................... 13
  Evidence of Gendered Instrument Preferences ......................................................... 14
  Why Do Boys and Girls Often Prefer Different Instruments? .................................... 15
  Factors that Influence Instrument Choice .................................................................. 18
  Personality and Instrument Preference ...................................................................... 26
  The Importance of Music Education .......................................................................... 27
    Academic Benefits .................................................................................................... 28
    Socioemotional Benefits .......................................................................................... 30
  Conclusion ................................................................................................................... 31
Chapter 3 Research Design ............................................................................................ 33
  Research Questions and Null Hypotheses .................................................................. 33
  Data ............................................................................................................................. 34
  Instrument ................................................................................................................. 35
  Reliability and Validity ............................................................................................... 36
  Procedures for Collecting Data .................................................................................. 38
  Research Design and Data Analysis .......................................................................... 38
Chapter 4 Results ............................................................................................................ 40
  Research Question 1 .................................................................................................... 40
    Elementary School ................................................................................................... 40
    Middle School .......................................................................................................... 41
    High School .............................................................................................................. 42
  Research Question 2 .................................................................................................... 43
  Research Question 3 .................................................................................................... 45
  Research Question 4 .................................................................................................... 46
    Ensemble .................................................................................................................. 46
    Middle School Ensemble ......................................................................................... 46
    High School Ensemble ............................................................................................. 47
    Gender ...................................................................................................................... 47
    Middle School .......................................................................................................... 48
LIST OF TABLES

Table 3.1 Total Students Enrolled in Band and Orchestra Ensembles (2018-2019).......................................................................................................................................................... 34

Table 3.2 Association of Instrument Timbre Preference Test and Instrument ........... 39

Table 4.1 Elementary School Group Means and t-Test by Gender ....................... 41

Table 4.2 Middle School Group Means and t-Test by Gender ............................... 42

Table 4.3 High School Group Means and t-Test by Gender ................................. 43

Table 4.4 Crosstabulation of Gender, Placement Method, and Instrument Family ................................................................................................................................. 44

Table 4.5 Instrument Timbre Preference Test Match of Students in Grades 4-12 ........................................................................................................................................ 46

Table 4.6 School Group Means and t-Test by Ensemble ...................................... 47

Table 4.7 School Group Means and t-Test by Gender ........................................... 48
LIST OF FIGURES

Figure 2.1 Conceptual Framework ................................................................. 11
CHAPTER 1

In the 21st century, male and female students in U.S. schools with music education typically have equal access to any instrument, yet instrument gender associations still exist (Baker, 2012). There are preconceived notions that only members of one or the other gender can play specific musical instruments, such as “girls play flute and violin” and “boys play bass and tuba.” Doubleday (2008) explains that, “an instrument’s look or sound may come to embody gendered meaning. Instruments may be imaged or named as male or female entities, as paired entities combining male-female characteristics, or as gendered members of a family” (p. 29). This is evident in society; parents and peers may be responsible for perpetuating engrained gender stereotypes that influence instrument choice (Abeles, 2009; Abeles & Porter, 1978; Conway, 2000; Delzell & Leppla, 1992; Fortney, Boyle, & DeCarbo, 1993; Green, 1993; Griswold & Chroback, 1981; Lueptow, 2001). Studies indicate that a student’s formation of gender association with an instrument can be influenced by role models, environment, and the method in which instruments are demonstrated (Abeles & Porter, 1978; Bruce & Kemp, 1993; Conway, 2000). Teachers also play a key role in helping students set aside gender stereotypes when choosing an instrument (Bayley, 2000; Brophy, 1985; Conway, 2000; Fortney et al, 1993; Green, 1993; Johnson & Stewart, 2004,).

This study examines the influence of using Edwin Gordon’s Instrument Timbre Preference Test (ITPT) during the instrument selection process, and whether the introduction of this test can reduce gender disparities in instrument selection. The process and practice of pairing students with instruments starts in third or fourth grade. In a typical music program, students in Grades 3 or 4 choose the instrument they want to play
by trying different instruments in a “petting zoo.” Students enter a room containing approximately 15 different instruments where they can see, listen, touch, and try to play a variety of instruments. Afterward, students list their top three instrument choices, and the music teacher decides which instrument is best for each child. A teacher may recommend an instrument to complement the physical characteristics of a student or to fulfill ensemble needs; for example, the teacher may recommend that a small child play a small instrument. Notably, during this process, the teacher does not have explicit information about the sounds that the student likes to hear: a student’s preference of high, low, medium sounds, which is deemed the student’s timbre preference. Once the instrument is selected, it often implies several years of learning only that instrument, regardless of changes in preferences or abilities. A poor choice may lead to a student’s loss of motivation to learn music, desire to not play an instrument, and potential to experience a sense of failure.

In contrast to the petting zoo approach, some schools draw on a placement test, such as the ITPT, developed by Gordon, which is the focus of this study. The ITPT includes 42 questions assessing students’ preferences for seven different synthetic timbres using the same brief melody. On every question, students are asked to compare two sounds and identify which sound they prefer. Each of the seven synthesized timbres is designed to represent the sound of one or more instruments: (A) flute and violin; (B) clarinet and viola; (C) saxophone and French horn; (D) oboe, English horn, and bassoon; (E) trumpet and cornet; (F) trombone, baritone, French horn, and cello; and (G) tuba, sousaphone, and string bass. After scoring the student’s preference test, the scorer will assess which timbre (A-G) has the highest score and assign that student a corresponding
instrument. For example, if a student shows a preference of 10 or greater in the A timbre preference, Gordon recommends that student should play flute or violin.

Students reported preferences for many instruments based on many factors: their preference for the sound of the instrument, their friends’ and family members’ preferences for instruments, their familiarity with the instrument, or their perceptions of whether the instrument is associated with female and/or male performers. In contrast, Gordon’s ITPT is a more objective instrument that allows the teacher, student, and parent to see and understand what timbres that student hears best (Gordon, 1984). Selecting the right instrument by timbre contributes to high achievement and continued participation in beginning instrumental music (Gordon, 1984).

The concept of instrumental families heralds back to Michael Praetorius, who made reference to the “violin family” in his treatise, *Syntagma Musicum* in 1619 (Boyden, 1984). *The New Grove Dictionary of Musical Instruments* contains a pictorial representation of “the violin family” utilizing a cello, a viola, and two violins made by Antonio Stradivari (Boyden, 1984). This concept of a family of instruments—large to small—conjures an image of the human family unit of father, mother, and babies, with the male automatically being associated with the largest instrument (Baker, 2012).

**Purpose of the Study**

The purpose of this quantitative study is to investigate the impact of the use of the ITPT on students’ instrument choice by gender, and whether the instrument choices of students who did not use the ITPT to select an instrument correspond to their timbre preferences measured later in school.
Secondary data from a suburban Long Island, New York, school district will be used to explore these questions. Starting in 2017, as part of the district’s music curriculum, second graders begin their instrumental musical journey by taking Gordon’s ITPT. Second graders were chosen because students at this level were familiar with instruments and the instrument families from previous music classes as a part of the general elementary music curriculum used by the school district. The ITPT is designed as an aid in the instrument selection process; therefore, it is beneficial to offer it to students prior to their instrument selection in the fourth grade. Students in Grades 6 through 12 only participated in Gordon’s ITPT. For students in Grades 2 through 4, the tests generate an ITPT score combined with their PMMA score that will assist students, teachers, and parents in their instrument selection. Students have the opportunity to choose an instrument to study at the beginning of the fourth-grade school year. This study investigated students’ ITPT scores in relation to selected instrument, gender, ensemble, and grade level.

Students in Grades 6 through 12 have previously chosen instruments using the traditional “instrumental petting zoo” method instead of ITPT. These students participated in Gordon’s ITPT in June of 2019. Students in Grades 4 and 5 choose their instrument solely using the results of Gordon’s ITPT.

**Theoretical & Conceptual Framework**

Music Learning Theory (Gordon, 1984) delineates the trajectory of learning as a child progresses through the types and stages of preparatory audiation and audiation over time under different conditions (Runfola, Etopio, Hamlen, & Rozendal, 2012). It is very important for music educators to measure children’s music strengths so that they can
teach to individual differences of each child and help each reach his or her potential (Gordon, 1986). Gordon created a battery of different musical development aptitude tests to help diagnose and evaluate a student’s musical potential.

The ITPT is part of Gordon’s music assessments. Gordon hypothesized that students who play music instruments for which they have a timbre preference achieve higher performance standards than students who do not prefer the timbre produced by the music instruments they play. Moreover, and more important, if greater predictive accuracy for success through future higher retention numbers and increased ensemble size in instrumental music were to be demonstrated when data from the ITPT is utilized, validity of the ITPT would be established. Gordon recommends the ITPT for students in Grades 2 through 12.

Numerous elements can contribute to a student’s instrument choice such as physical characteristics, gender, teacher influence, parental influence, gender, and timbre preference.

**Significance of the Study**

Structured music lessons significantly enhance children’s cognitive abilities, including language-based reasoning, short-term memory, planning, and inhibition, which lead to improved academic performance (Jaschke, Hooning, & Scherder, 2018). This study updated existing information about whether Gordon’s ITPT can help foster more gender equitable outcomes. This information will help practitioners and researchers to understand how the ITPT can help match students with the right instrument, regardless of external influential factors that may drive prior student factors of instrument selection.
Connection with Social Justice and Vincentian Mission in Education

St. John’s University seeks to provide all students, regardless of background, with access to high quality education. This study will add to the limited body of research in music education, directly targeting existing inequalities among male and female students. Providing the right instrument to each student will improve all students’ chances for success in music and ensure that all students reap the benefits of music education.

Research Questions

This study uses a descriptive, ex post facto design to analyze secondary data and answer the following questions:

Research Question 1: Are there significant differences in students’ timbre preferences by students school level elementary (Grades 4-5), middle (Grades 6-8), and high school (Grades 9-12) and gender?

Research Question 2: Is there a significant difference in the instrument placement between boys and girls when using the Gordon instrument selection process versus the traditional instrument selection method in elementary school?

Research Question 3: Do students’ instrument choices correspond to their timbre preferences as measured by ITPT?

Research Question 4: Among middle (Grades 6-8) and high school (Grades 9-12) students, does the degree of mismatch between choice and preference vary between boys and girls and ensemble (string and band)?
Definition of Terms

**Audiation:**

Hearing and comprehending in one’s mind the sound of music that is not or may never have been physically present. It is neither imitation nor memorization.

**Aptitude:**

A measure of a student’s potential to learn.

**Developmental Music Aptitude:**

Music potential that is affected by the quality of environmental factors; a child is in the developmental music aptitude stage from birth to approximately nine years old.

**Instrumental Timbre Preference Test (ITPT):**

Test designed to understand a student’s timbre preference. There are seven timbres, and each timbre has a group of instruments associated within each category.

**Music Aptitude Profile (MAP):**

Student’s overall test score of Rhythm and Tonal skills.

**Music Achievement:**

A measure of what a student has already learned in music.

**Primary Measures of Music Audiation (PMMA):**

Music aptitude test for students in kindergarten through third grade.

**Intermediate Measures of Music Audiation (IMMA):**

Music aptitude test for students in first through sixth grade.
Timbre:

Category of sound pitches.
CHAPTER 2
REVIEW OF RELATED RESEARCH

The following literature review first outlines this study’s theoretical framework and conceptual framework, followed by a synthesis of literature on how gender and other factors influence instrument selection and the importance of music education in students’ lives.

Theoretical Framework

The theoretical framework that grounds this study is Gordon’s Music Learning Theory (1984). Gordon’s Music Learning Theory outlines a trajectory for early childhood music development, a sequential path toward the development of audiation. The three music learning sequences include: (a) skill learning sequence, (b) tonal content learning sequence, and (c) rhythm content learning sequence. At any given time, a skill learning sequence is being combined with either tonal content learning sequence or rhythm content learning sequence. For example, tonal pattern instruction begins at the earliest level of skill learning sequence (aural/oral) using the most basic level of tonal content (tonic and dominant patterns in major tonality). Likewise, rhythm pattern instruction commences at the aural/oral level of skill learning sequences with macro and micro beat patterns in duple meter (Gordon, 2008). Gordon suggests that a newborn child’s music aptitude can only be maintained with numerous musical experiences from birth until the age of nine, when a child reaches a “stabilized” (Gordon, 1986, p. 12) music aptitude (Gordon, 1986)

Various factors contribute to students’ instrument choice and perseverance in continuing those instruments. Physical characteristics, teacher input and interest, student
sense of confidence, parents (role models), a desire to be different and unique, and an ability to withstand peer pressure from peers and others may contribute to student continuance with an opposite gender stereotyped instrument (Sinsabaugh, 2005). Some male flutists are more competitive, and as they become more successful, such as winning a position in an all-state ensemble, peer ridicule subsides (Taylor, 2009). Personality traits may also contribute to instrumental participation, continuation, and choice, especially with woodwind players; additional contributing factors are academic achievement, family structure, and gender of student (Cutietta & McAllister, 1997; Kinney, 2010; Payne, 2009). Females may be more likely than males to continue instrument study (Kinney, 2010). Students who play instruments may be more extroverted and open, inclusive of those playing opposite gender stereotyped instruments.

Gordon’s ITPT may function as a more significant indicator of instrument selection to combat students’ implicit biases as well as those of teachers and peers. Gender stereotypes can be confused with timbre preference in determining which gender is more likely to play a specific instrument (Payne, 2009). It is possible that females may simply be more attracted to upper voiced, more delicate sounding instruments while males are more attracted to more aggressive sounding instruments such as brasses and percussion. In addition, females and males may be more attracted to the sounds of instruments that align with the pitch frequencies of their own voices (Vickers, 2015).
Conceptual Framework

This conceptual framework demonstrates the numerous factors, such as students’ personality, gender, physical characteristics, parental bias, and teacher bias, that can influence students’ instrument choices (Abeles, 2009; Abeles & Porter, 1978; Conway, 2000; Delzell & Leppla, 1992; Fortney et al., 1993; Green, 1993; Griswold & Chroback, 1981; Lueptow, Garovich-Szabo; Lueptow, 2001). Studies indicate that students’ formation of gender association with an instrument can be influenced by role models’ (parents’) personality and the method in which instruments are demonstrated (Abeles & Porter, 1978; Bruce & Kemp, 1993; Conway, 2000). Teachers also play a key role in
helping students choose an instrument (Bayley, 2000; Conway, 2000; Fortney et al, 1993; Green, 1993; Johnson & Stewart, 2004). Gordon found that use of the ITPT helps students select the right instrument by timbre, which contributes to high achievement and continued participation in beginning instrumental music (Gordon, 1984).

Whatever the motivation, instrumental choice is critical to a student’s success in performance and longevity as a musician. When students have structured choice and are allowed to select the instrument they like or with which they can most closely identify, they will be more motivated to practice, more likely to continue playing, and more inspired to strive for excellence in performance (Rife, Shnek, Lauby, & Lapidus, 2001), ultimately leading to student musical success.

**Diagnostic Musical Development**

Gordon developed numerous student diagnostic musical tests to measure specific aspects of a student’s musical abilities. The outcome of these tests can help teachers, parents, and students better understand the individual musical strengths and weaknesses of the students. As a result, teachers will be able to customize their instruction to fit students’ abilities and needs. The following is a list of Gordon’s nine music tests: Audie, Primary Measures of Music Audiation (PMMA), Intermediate Measures of Music Audiation (IMMA), Musical Aptitude Profile (MAP), Advanced Measures of Music Audiation (AMMA), Harmonic Improvisation Readiness Record (HIRR), Rhythm Improvisation Readiness Record (RIRR), Instrument Timbre Preference Test (ITPT), and Iowa Tests of Music Literacy (ITML). The main reason for administering tests is to improve instruction. By testing students, teachers can effectively analyze individual students’ test results and compare them to those of other students within the same peer
group, resulting in a tailored, scaffolded curriculum to fit the students’ needs. The music aptitude and music achievement tests can be given as one of the means of measurement of a student’s aural strengths before learning an instrument (Gordon, 1991).

For this study, the school district studied administered Gordon’s PMMA and ITPT tests to students. The PMMA has been administered to students in Grades 2 through 6. The ITPT has been administered to students in Grades 2 through 12. This two-part examination allows teachers to assess and diagnose each student’s initial musical potential by identifying their rhythmic and tonal strengths. The tonal component of the PMMA has students identify similarities and differences in pitches in melodies. The rhythmic component of the PMMA assesses students’ abilities to identify similar and different rhythmic patterns (Gordon, 1984).

**Instrument Choice**

Gordon understood that little attention is given to a student’s preference for the sound of the instrument that is to be learned. Gordon’s theory maintains that one of the most important factors that contributes to high achievement and continued participation in beginning instrumental music is whether a student likes the sound of the instrument that they are playing (Gordon, 1991). The ITPT was developed to help teachers understand and indicate a student’s timbre preference. Gordon proved that students who play music instruments for which they have a timbre preference achieve higher performance standards than students who do not prefer the timbre produced by the music instruments they play. Moreover, and more important, if greater predictive accuracy for success through future higher retention numbers and increased ensemble size in
instrumental music were to be demonstrated when data from the ITPT is utilized, validity of the ITPT would be established.

Critically, for this study, I hypothesize that the ITPT reduces outside factors in instrument choice such as personal (needs and wants), environmental (family and friends), social (gender), economic (cost), and psychological (planned and impulse) (Iyengar & Lepper, 2000). Music teachers tend to show little bias when recommending instruments to students (Johnson & Stewart, 2004). In turn, it is important to limit outside influences and use assessment such as the ITPT to help guide the student to the instrument that they are naturally fit for (W. Lastowski, personal communication, November 1, 2019).

**Evidence of Gendered Instrument Preferences**

Research indicates that males and females show different instrument preferences. A study of gender and instrument preference among fourth- and fifth-grade students (9 and 10 years old) found that male students preferred drums, trombone, and tuba; female students preferred flute, oboe, and clarinet; both male and female students preferred alto saxophone, horn, and trumpet (Sinsel, Dixon, & Blades-Zeller, 1997). These preferences are consistent with previous research (Abeles & Porter, 1978; Delzell & Leppla, 1992). Student instrument stereotyping continues to occur in instrument selection. (Fortney et al., 1993). For example, female middle school band students tend to play flute and clarinet, and male students tend to play trumpet, percussion, and low brass.

Hallam, Rogers, and Creech (2008) investigated whether there are differences in the musical instruments that boys and girls play during different Key Stages. Key Stage 1 (KS1) includes children aged 5-7, Key Stage 2 (KS2) children aged 7-11, Key Stage 3
(KS3) children aged 11-14, and Key Stage 4 (KS4) children aged 14-16. Data were collected from England’s Department of Education from 150 music services. Females preferred the harp, flute, piccolo, clarinet, oboe, and violin, and boys preferred the electric guitar, bass guitar, tuba, percussion, and trombone. The least gendered instruments were African drums, trumpet, French horn, saxophone, and tenor saxophone. Overall, 60% of those learning were girls. This proportion changed from 51% in preschool to 57% in KS1, and then remained stable at 60% for the remainder of compulsory schooling. The most gendered instruments were the harp (90% girls), flute (89% girls), electric guitar (81% boys), bass guitar (81% boys), voice (80% girls), flute/piccolo (79% girls), oboe (78% girls), tuba (77% boys), kit drum (75% boys), tuba (74% boys), clarinet (73% girls), and trombone (71% boys).

Why Do Boys and Girls Often Prefer Different Instruments?

In a series of studies Abeles and Porter (1978) investigated whether parents differentially encourage the instrument choices of their children by gender. Abeles and Porter surveyed 149 adults (ages 19-52) including a scenario where they choose an instrument for their hypothetical son or daughter among the eight instruments taught in schools: cello, clarinet, drums, flute, saxophone, trombone, trumpet and violin. The study found that the adult respondents preferred clarinet, flute, and violin for daughters, and drum, trombone, and trumpet for sons. There were no gender differences in responses for the cello and saxophone at the .05 level (Abeles & Porter, 1978).

Abeles (2009) followed up his 1978 study on gender stereotyping of musical instruments with new research that examined gender associations across three decades to determine if changes in the sex stereotyping of musical instruments had occurred. First,
the study examined the paired comparison gender-instrument rankings of 180 college students. The results confirmed a reduction of instrument gender associations reported in the 1990s. The second index of gender associations employed was the instruments that middle school children played \((N = 2001)\). A comparison of the instruments played by boys and girls across three studies conducted in 1978, 1993, and 2007 showed little difference in the sex-by-instrument distribution. Girls played predominately flutes, violins, and clarinets, and most boys played drums, trumpets, and trombones. However, there was some evidence that in band settings, girls were more likely to play nonconforming gender instruments than boys (Abeles, 2009).

In a phenomenological investigation, Conway (2000) examined the origins of gender stereotypes, the characteristics of students who did or did not align with cultural norms of gendered musical instrument choice, and parental reactions toward student instrument choice. Participants \((N = 37)\) were from two high schools in the New York City metropolitan area. Students who were interviewed were ones who had broken traditional gender stereotypes in their choice of musical instruments and included a female string bass student, three female euphonium students, a female trombone student, two female trumpet students, and four male clarinetists.

Results revealed that adolescents worry about peer rejection based on the instrument they play. It seemed that the most controversial issues for many of the students regarding gender and instrument choice related to males and the flute. All of the students who were asked whether or not they would allow a daughter of theirs in the next twenty years to play a low brass instrument responded that the child should play whatever she would like. However, when asked the same question with regard to a son playing the
flute, many of the students expressed concern about the teasing that the children might experience. This study clearly demonstrates the relationship between societal expectations and peer opinions about musical instrument choice for males and females (Conway, 2000).

Kelly (1997) investigated the effects of timbre on gender-instrument associations by third-grade students. Students \(N = 261\) from four elementary schools represented diverse socioeconomic and cultural backgrounds. Students were asked to listen to a recording of two different performances by seven “typical” beginning band and orchestra instruments using the tune “Lightly Row” and “Good King Wenceslas.” The students indicated which gender they believed would select each instrument to perform. No names of the instruments were mentioned, or any visual representation of the instruments were shown. Results indicated that gender-timbre associations were strong for this age group. Males were associated with brass instruments and the cello, while females were associated with the flute and violin. Subject responses yielded no clear gender-timbre associations for saxophone and clarinet. When the subject data were divided between genders, both males and females were in agreement within their group. However, there were significant differences between the groups. The results reflected previous findings in similar research. Kelly concluded that despite a lack of any formal music ensemble experience, young students, based on timbre alone, may still observe many musical instruments along traditional gender roles and attitudes.

Griswold and Chroback (1981) explored sex stereotyping in relation to instruments and orchestral conductors with undergraduate music majors and non-music majors. The participants rated the harp as most feminine followed by flute, piccolo,
glockenspiel, cello, choral conductor, clarinet, piano, French horn, and oboe. Participants rated guitar, cymbals, instrumental conductor, saxophone, bass drum, trumpet, string bass, and tubas as having masculine connotations, confirming the earlier work of Abeles and Porter (1978).

**Factors that Influence Instrument Choice**

Fortney et al. (1993) surveyed 900 students in Grades 6 through 9 from 13 schools to rate factors that influence student instrument selection, such as parents, friends, and the sound of the instrument of their choice. While 51% of the survey respondents indicated that the most influential factor on their instrument choice was the sound of the instrument, the researchers found that males (females) ultimately tend to choose to play instruments that are considered masculine (feminine). The authors reported that 90% of the ninth-grade flutists were female, while nearly 90% of the trumpet players and percussionists were male. More than 70% of clarinet and oboe players were female, whereas 72% of the saxophone players were male. In addition, the researchers reported that the large majority of low brass players were male.

Delzell and Leppla (1992) conducted a study to determine what, if any, changes in gender association occurred as a result of the increased sensitivity during the late 1970s and early 1980s to issues related to gender stereotyping and discrimination. More than 500 fourth-grade students were asked to indicate which of eight listed instruments would be their first choice to play and which would be their second choice. A poster of each instrument was visible to the subjects and instrument names were written adjacent to the posters for subjects’ constant reference. The responses for boys were limited, the majority wanting to play drums or saxophone (combined 83%); girls’ choices were
somewhat broader and included flute, drums, saxophone, and clarinet. A chi-square analysis indicated that choices made by boys and girls were significantly different, with the researchers concluding that preference is related to gender. Respondents were asked, through an open-ended question, to explain why they chose a given instrument to play. More than one reason was allowed. Students indicated they chose the instrument because: (a) “It’s awesome,” or “I like it,” 35.7%; (b) “I like the sound of the instrument,” 35.5%; (c) “It would be easy or fun to play,” 24.2%; and (d) “I have a friend who plays” (Delzell & Leplla, 1992).

Kuhlman (2005) reviewed the literature of gender and instrument choice, in the early 2000s, on the influence of timbre choices on beginning band students and found that depending on the researcher, the results vary. Kuhlman’s findings were that sound was the most influential reason given by students for preferring an instrument. LeBlanc (1982) believed sound was the least significant reason for choosing an instrument. Fortney et al. (1993) found that 51% of middle school students indicated that the sound of the instrument was very influential in their instrument decisions. Delzell and Leplla (1992) reported that among fourth-grade instrumentalists, 35.5% claimed to have chosen their instruments because they liked the sound. Nearly the same percentage of students (35.7%) chose their instruments based on less tangible criteria such as the emotion the instrument evoked. Expressions such as, “It’s awesome,” or “I like it” or It seemed easy and fun to play” were among those offered by respondents (Delzell & Leplla, 1992, p. 99).

Abeles and Porter (1978) conducted a second study with 598 children in kindergarten through fifth grade in three different schools in Indiana and Delaware to
examine at what age sex-stereotyping of instruments begins. The researchers played sounds of eight instruments (flute, violin, clarinet, cello, saxophone, trumpet, trombone, and drum) to students while the administrator held up pictures of the instrument when the sound was played. Abeles and Porter found that boys reacted differently to the various modes of presentations of instruments, including recordings, pictures of instruments with and without someone playing them, and some pictures with children playing them. Girls, however, were not affected by the various modes. The results indicated that the sex-stereotyping in music instrument preference is weakest in kindergarten ($M = 2.205, SD = 1.095$) and becomes more noticeable with children in Grade 3 ($M = 2.9, SD = 2.17$) and beyond.

Bruce and Kemp (1993) investigated what effect the gender of an individual demonstrating a musical instrument would have on students’ instrument choices of flute, violin, cello, clarinet, trumpet, and trombone. Four schools of similar size, of similar socioeconomic and racial mix of children aged between five and seven participated in the study. There was an equal number of women and men musicians in each concert, and an equal number of girls and boys in each group. Male and female musicians demonstrated the violin, cello, woodwind, flute, clarinet, trumpet, and trombone. Results indicated that girls were influenced by the gender of the presenter when the presenter was female playing the flute (41%) and violin. In contrast, when the flute was demonstrated by a male, male students chose the flute the least (11%). Boys demonstrated a strong preference for the trombone (53%) and cello (29%) when demonstrated by a male musician. In contrast, when a male demonstrated the cello and trumpet, girls chose the cello (10%) and trumpet (11%) the least. Overall, the girls were influenced by the female
musicians and the boys were influenced by the male musicians. The girls did choose a wider variety of instruments, and the difference between the sexes was more noticeable when the girls chose the more feminine instruments such as flute, violin, and clarinet, rather than the boys’ choices of trombone, cello, and trumpet.

Harrison and O’Neill (2000) aimed to address some of the methodological shortcomings of Bruce and Kemp’s (1993) study. Harrison and O’Neill argued that Bruce and Kemp’s research offered no comparison of children’s preferences when both “masculine” and “feminine” instruments are presented together. No measurement of instrument preferences was taken prior to the concerts, and thus there is no indication of any preference change following the concerts. Additionally, the children were only allowed to look at one instrument following the concert, offering no indication of instrument preferences relative to each other. It may be that children followed their friends in looking at the instruments rather than this measure providing a true indication of children’s individual preferences. To remedy these shortcomings in the Bruce and Kemp study, Harrison and O’Neill measured the instrument preferences before and immediately following the concerts. Additionally, children were asked to rank order instruments on an activity sheet, thereby minimizing any tendency to follow peers.

Harrison and O’Neill (2000) investigated the influence of exposure to counter gender-stereotypic role models on children’s gender-typed preferences for six musical instruments (piano, trumpet, violin, drums, guitar, and flute). Three hundred fifty-seven children (aged seven-eight years) from twelve schools in the southwest region of England, ranked their preferences for learning to play the six instruments and gave their gender-stereotyped beliefs about the instruments. Intervention concerts were performed at
two of the three clusters of schools. Cluster 1 received concerts with gender-consistent role models (i.e., female playing flute, male playing drums); Cluster 2 received concerts with gender-inconsistent role models; Cluster 3 did not receive concerts (control schools). Results indicated an immediate impact of providing a counter-stereotypical role model on preferences for perceived “own-sex appropriate” instruments. Girls expressed less preference for the piano after observing a male musician playing the instrument. Boys ranked the guitar less favorably after they saw a female musician playing the guitar. The results indicated that children showed less preference for “same-sex” instruments when played by “other-sex” musicians. Boys in the gender-inconsistent group ranked all three masculine instruments above the feminine ones and ranked them in the same order as boys in the gender-consistent group. In addition, girls in the gender-inconsistent group still ranked the flute and violin more highly than the masculine instruments, despite the former being played by a member of the other sex.

Harrison and O’Neill’s (2000) findings initially appear incongruent with the earlier findings of Bruce and Kemp (1993), in which girls indicated greater interest in the piano, flute, and violin than did boys, whereas boys had a stronger preference for trumpet, guitar, and drums than did girls. Both girls and boys had similar ideas about which instruments would be played by either sex. The study found that 28.5% of girls looked at the flute when a woman demonstrated the instrument, but only 12% did so when the player was male. Similarly, 33.5% of boys looked at the trombone when it was played by a male, whereas only 20% did so when the musician was female. While the data do indeed suggest identification with same-sex player, as Bruce and Kemp argue, avoidance of same-sex instruments when played by other-sex musicians is also a feature
of Harrison and O’Neill’s data, although Bruce and Kemp did comment about this interpretation.

In an effort to consider performers’ age as well as gender, Pickering and Repacholi (2002) tried to determine whether fourth-grade students are gender-typed in their musical instrument preferences. This study used high school students (15-18 years of age), gender-consistent performers, and gender inconsistent performers as demonstration models for fourth-grade students to choose their instrument. A total of 618 fourth-grade students viewed videotapes of performances or instrument-only displays. The preferences of those who saw the gender-inconsistent performers did not fall as strongly along gender lines as they did for those who saw gender-consistent performers or instruments alone.

Instrument choice in the control group was initially examined to determine whether children displayed gender-typed instrument preferences when no musicians were presented in the drawings (Pickering & Repacholi, 2002). There was no significant difference in the proportion of control group children selecting a gender-consistent (.55) versus gender-inconsistent (.45) instrument. Interestingly, the drum was the most popular choice for control group girls (38%) as well as boys (47%). A linear analysis was conducted to determine whether child age and/or gender influenced instrument choice in the control group. More control group boys selected gender-consistent instruments than girls. This gender effect was largely due to the fourth-grade boys, the only group of control children to display a significant preference for gender-appropriate instruments.

Pickering and Repacholi (2002) suggested that while the more immediate goal is for children to not be limited by gender stereotypes, the true goal is gender neutrality for
all instruments. They further cautioned that if too heavy an emphasis is placed on
counterexamples, “We run the risk of creating a new set of stereotypes, when the goal
should be to encourage children to view these instruments as gender neutral” (p. 642).
Although their point might seem excessive given the current evidence pointing toward
firmly entrenched stereotypes, it is not inconceivable.

Killian and Satrom (2011) examined the effect of demonstrator gender on wind
instrument preferences of kindergarten, third-grade, and fifth-grade students. One
hundred four students in kindergarten and Grades 3 and 4 from six music classes at a
single elementary school participated. All participants completed a pretest to determine
what their instrument choice would be. Next, half of the students, one intact group of 41
kindergarten, third-, and fourth-grade students witnessed a demonstration with male
demonstrators, while the other half witnessed a demonstration with all female
demonstrators. The researchers determined that boys who viewed male demonstrators
chose more brass instruments, whereas girls who viewed female demonstrators chose
more woodwind instruments, although these differences were not statistically different.
Both boys and girls who saw opposite-gender demonstrators picked brass and woodwind
in nearly equal numbers. While 74% of the students changed their preferences after the
demonstrations, there was not a significant difference between the groups based on the
gender of the demonstrator. The researcher suggested that presenters should consider
presenting instruments in various ways to avoid bias.

Guilbault (1999) studied 32 students, ages three to six, to understand to what
degree young children prefer to play on struck unpitched instruments, pitched
instruments, or shaken unpitched instruments. Guilbault argued that children put more
time and care into creating thoughtful improvisations when allowed to choose a preferred musical instrument from among unpitched, pitched, or shaken percussion instruments. This study did include specific assessment tools, such as Gordon’s ITPT. Guilbault’s study only had three percussive instruments, one pitched (metallophone), one struck instrument (drum), and one shaken (maraca). Preference for certain instrument timbres was observed by Guilbault by conducting a two-way ANOVA and concluding that children’s ($n = 32$) improvisations on preferred instruments were more significant ($p < .05$) and were made up of various methods of producing sounds compared to the improvisations on nonpreferred instruments. The subjects were more focused and spent more time improvising on preferred instruments. Although there are many influences on a child’s instrument selection decision, children should be guided and properly informed to make the most educated decision they can (Guilbault, 1999).

Evidence also suggests that individuals are perceived differently when their instruments are considered typical or atypical for their gender. Cramer, Million, and Perreault (2002) found that for masculine instruments there were no discernible differences between perceptions of female and male musicians. When playing feminine instruments, males were judged more harshly than females. Males playing feminine instruments were perceived as less dominant, less active, and less capable of leadership than females playing the same instruments. Essentially, females are permitted to select from a broad spectrum of instruments, but males are permitted to select only from a set of “masculine” instruments. These findings were consistent with a study by Sinsabaugh (2005). He confirmed that boys playing feminine instruments experienced harassment because of their instrument choice.
Personality and Instrument Preference

Cutietta and McAllister (1997) wanted to determine if certain personality types begin instrumental study in schools, along with what types of personalities continue in instrumental music across grades. They also wanted to determine if a trend toward homogeneity of personality type existed among students who chose to continue in instrumental music across grade levels, and if a relationship existed between personality type and continuation on a specific music instrument. The purpose of their study was to observe student personality and instrument choices to determine whether relationships existed between these variables. Participants, 668 students from Grades 7 through 12 chosen from eight schools from rural, suburban, and urban settings, answered the Junior Eysenck Personality Questionnaire. The researchers determined that the personalities of middle and high school students studying instruments were not significantly different from those of the general population of middle and high school students. The researchers also determined that a trend toward homogeneity of personality type existed among students who chose to continue in instrumental music across grade levels and that no differences in personality type existed because of student grade or instrument played. The researchers determined that students who begin woodwind instruction represent a more diverse population than generally found in instrumental music, but that 80% of these students stopped participating between 7th and 12th grade. Therefore, the researchers suggested that directors be sensitive to a diversity of personalities among students selecting woodwind instruments.

Payne (2009) investigated the relationships among timbre preference, personality traits, gender, and music instrument selection of public-school instrumental music
ensembles. The researcher also investigated how students match to their timbre preferences, and gender stereotyping with specific instruments and timbres. Six hundred and twenty-four band students in four school districts in a southwestern state participated. The researcher collected data by employing three testing instruments: a demographics questionnaire, the Adolescent Personal Style Inventory which provided results on five personality traits (agreeableness, conscientiousness, emotional stability, extraversion, and openness), and Gordon’s ITPT. The researcher determined that a significant relationship existed between the participants’ personality trait levels of extraversion and openness and flute, clarinet, saxophone, horn, trumpet, trombone, baritone, and tuba. Gender stereotyping was observable regarding both music instrument selection and timbre preference, with gender being a significant determinant to instrument selection of flute, clarinet, trombone, baritone, horn, and tuba. A majority of beginning students (73.7%) were not performing on instruments congruent with their timbre preferences while the majority (53%) of secondary students was. The researcher determined that a significant relationship existed between gender and timbre preference and that timbre preference may be the true reason why certain genders study certain instruments as opposed to gender stereotypes, and that modeling opposite gender stereotypes may be detrimental to instrument selection.

The Importance of Music Education

Engaging, playing, participating, and enjoying music is a universal human trait and it is the right of every child to receive a music education (Schuler, 2012). Proponents of music education argue that instruction in music yields ancillary benefits to children’s development, including academic and socioemotional benefits.
**Academic Benefits**

A number of studies provide correlational evidence that learning music is associated with higher achievement. Jaffée et al. (2017) studied 265 school-age children (Grades 1 through 8, 58% female, and 86% African American) who were selected by lottery to participate in an out-of-school program offering individual- and large-ensemble training on orchestral instruments. Results indicated that, relative to controls, students in the music education program scored higher on standardized tests, t(217) 2.74, p .007; earned better grades in English language arts, t(163) 3.58, p .001, and math, t(163) 2.56, p .011; and exhibited superior performance on select tasks of executive functioning and short-term memory. Further analyses revealed that the largest differences in performance were observed between students in the control group and those who had received the music program for two to three years.

In two different samples of students attending elementary school in an urban school district in the United States, both Fitzpatrick (2006) and Kinney (2008) found that students enrolled in music classes exhibited higher standardized test scores than students not in music classes. However, students enrolled in music programs also tended to be higher scoring prior to enrollment. Instrumental students at both grade levels held higher scores than their non-instrumental classmates from the fourth grade, suggesting that instrumental music programs attract higher scorers from the outset of instruction. Elpus (2013) reported similar findings for SAT scores of high school students in a large, nationally representative sample.

Kinney (2010) investigated selected non-music predictors of urban students’ decisions to enroll and persist in middle school band programs. The independent
variables in the study included academic achievement, socioeconomic status, family structure, mobility, ethnicity, and gender. Data for 69 sixth-grade and 50 eighth-grade band students from two middle schools in the same district, both instructed by the same director, were provided by the school district. The researcher determined that academic achievement and family structure were the only significant predictors of initial enrollment decisions. The researcher found that high academically achieving students and those from two-parent or two-guardian homes also were more likely to persist in band, as were students from higher socioeconomic status. Gender also played a role, with females being twice as likely as males to stay in the band in both sixth and seventh grade.

Schellenberg (2004) conducted an experimental study of 144 six-year-olds, finding that children involved in music study (keyboard or singing) had a significantly larger increase in IQ on the Wechsler Intelligence Scale for Children (WISC III) in comparison to the control group. Children in the control groups had an average increase in IQ of 4.3 points, while children in the music groups had an average increase of 7 points. Schellenberg (2006) followed up this study with correlational study of 147 six- to eleven-year-old students. Schellenberg (2006) found that duration of music lessons in childhood was significantly associated with IQ.

Through analyzing the Department of Education’s database of 25,000 students, Catterall, Chapleau, and Iwanaga (2000) found that sustained involvement in the arts correlated with success in other subjects both generally and for children in poverty. Students concentrating in instrumental music did substantially better in mathematics than those with no involvement in music. Also, low socioeconomic status students with high involvement in music did better than the average student at attaining high levels of
mathematics proficiency. Twice as many low socioeconomic status eighth graders in band and/or orchestra scored at high levels in mathematics as did low socioeconomic status eighth graders with no reported involvement in instrumental music (National Association for Music Education, 2019).

While there is evidence of selection bias, these studies suggest a positive association between music education and academic performance. This, however, is only one benefit of music education. Other research has proven that music education enhances self-efficacy and critical thinking skills.

**Socioemotional Benefits**

Campbell, Connell, and Beegle’s (2007) qualitative study aimed to determine the significance of music and music education to middle and high school adolescents. Adolescents expressed that music had emotional benefits; life benefits, including character-building and life skills; and social benefits. Some students expressed that they play a musical instrument because it makes them feel good and it is enjoyable. Students were also attracted to music because it allowed them to be with others who share similar beliefs. Participants in the study also described how playing an instrument improved discipline and gave focus to the students.

Music students practice and perform cooperatively as an ensemble. Working together in a cooperative learning environment represents a benefit of music experiences in school (Miller & Coen, 1994). Adderley, Kennedy, and Berz (2003) interviewed students who participated in music programs to better understand what it meant to be involved with music and how students found value in music participation. They investigated student perceptions of music participation through interviewing students
from the band, orchestra, and choir. The study observed the formation of music sub-cultures in the school and related themes showing the “social impact of friends” (p. 193). Adderley et al.’s study revealed that some students in these musical sub-cultures or cliques were high academic achievers with confidence based on academic success and artistic success or both. Students described their passions for music as well as motivations such as “playing a musical instrument because my parents also played a musical instrument” (Adderley et al., 2003, p.193). Learning music is an effective way for students to gain pleasure and enjoyment from music, and those who play piano are thought to perceive themselves to be smart, energetic, outgoing, and hardworking, which may lead them to achieve better in academic learning (Duke, Flowers, & Wolfe, 1997).

**Conclusion**

Overall, students preparing for what former Federal Reserve Chairman Alan Greenspan described as America’s “economy of ideas” need an education that develops imaginative, flexible, and tough-minded thinking. Researchers found that students involved in the arts were motivated to learn not just for test results or other performance outcomes, but also for the learning experience itself (National Association for Music Education, 2019).

Instrument timbre is just one of the factors in student instrument choice. However, it may be helpful in having students become more successful in instrumental music, increase retention, and provide a positive impact in their learning experiences in music and their entire educational journey.

The present study adds to the literature by providing research on the impact of gender equitable outcomes with the use of the ITPT in instrument selection based on
timbre preference in Grades 2 through 5. This study also evaluate students ITPT in
Grades 6 through 12 to see if the instrument they currently play matches with their ITPT
preference. Moreover, this study researches the timbre preference of students in Grades 4
through 12 by analyzing their results on Gordon’s ITPT to determine if it brings gender
equitable outcomes to student instrument selection.
CHAPTER 3
RESEARCH DESIGN

This study quantitatively investigated whether the use of Gordon’s ITPT changes the instruments that students select in elementary school, with a particular focus on creating more gender equitable instrument choice.

Research Questions and Null Hypotheses

Research Question 1: Are there significant differences in students’ timbre preferences by students school level elementary (Grades 4-5), middle (Grades 6-8), and high school (Grades 9-12) and gender?

H₀₁: Preferences do not vary by gender. Each gender prefers each timbre similarly.

H₀₂: Preferences do not vary by school level. All school levels prefer each timbre similarly.

Research Question 2: Is there a significant difference in the instrument placement of boys and girls when using the Gordon instrument selection process versus the traditional instrument selection method in elementary school?

H₀₁: There is no significant difference in the instrument placement of boys and girls when using the Gordon method versus the traditional instrument selection method in elementary school

Research Question 3: Do students’ instrument choices correspond to their timbre preferences as measured by ITPT?

H₀₁: Students’ instrument choices do not correspond to their ITPT preferences.
Research Question 4: Among middle (Grades 6-8) and high school (grades 9-12) students, does the degree of mismatch between instrument choice and timbre preference vary by gender or ensemble (string vs. band)?

H₀₁: The degree of mismatch between instrument choice and timbre preference does not differ by students’ gender.

H₀₂: The degree of mismatch between instrument choice and timbre preference does not differ by students’ ensemble.

Data

Secondary data were accessed with permission from the school district in Nassau County, New York. The school district was selected as the focus for this study because the music department used the ITPT for student instrument placement beginning in the 2015 school year. Specifically, students in Grades 2 through 5 participate yearly in Gordon’s ITPT between March and April. The elementary music teachers evaluate these exams and record them for district use and individual student instrument selection. In June 2019, the district also assessed students in Grades 6 through 12 using Gordon’s ITPT. The sample in this study included all students enrolled in a music class in Grades 2 through 12 during the 2018-2019 school year. Table 3.1 provides a distribution of the study sample by school level.

Table 3.1

<table>
<thead>
<tr>
<th>School Level</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td>105</td>
<td>89</td>
<td>194</td>
</tr>
<tr>
<td>Middle</td>
<td>110</td>
<td>120</td>
<td>230</td>
</tr>
<tr>
<td>High</td>
<td>78</td>
<td>79</td>
<td>157</td>
</tr>
</tbody>
</table>
There were 787 possible students in Grades 4 through 12 to study. Prior to running data analysis, 48 percussion students were removed since this study did not include percussion instruments. In addition, 158 students were removed for ITPT scores for errors in test-taking or scoring, such as student total score was greater than 42 or a student left answers blank, bubbled in two answers for the same response, or only chose the letter A or B for each question. For this study, the total number of eligible students in grades four through twelve was N = 581.

Instrument

While all data are secondary, the researcher used results from the students ITPT score, a 42-question test used to place students with an instrument based on their timbre preference. The test took less than twenty minutes to administer, which included listening to different synthetic timbres that used the same brief melody. The timbres were all performed on a synthesizer; each of the seven synthesized timbres are intended, by Gordon, to represent the sound of one or more instruments. The seven different timbre categories and corresponding instruments in the ITPT are: (A) flute and violin; (B) clarinet and viola; (C) saxophone and French horn; (D) oboe, English horn, and bassoon; (E) trumpet and cornet; (F) trombone, baritone, French horn, and cello; and (G) tuba, sousaphone, and string bass. In all 42 questions, the student heard a pair of two different timbres. The melody and the musical expression remained constant; timbre and pitch range were the only changing factors for each question. After hearing each melodic pair, the test-taker marked which of one the two timbres was preferred.

The tests were analyzed using seven scoring masks that represent each of the seven timbres. The scorer placed each of the seven scoring masks one at a time and
counted the number of bubbled-in answers in relation to the scoring masks. The preference scores ranged from 0 (no preference) to 12 (strong preference). After scoring each student’s preference test, the scorer assessed which timbre (A-G) had the highest score, and assigned that student to one of that timbre’s corresponding instruments. It is possible for students to show no preference or to show more than one preference on this test (Gordon, 1984). Students who show no preference are encouraged to learn a woodwind, brass, or string instrument that the student finds appealing. For students who have more than one timbre preference, it is beneficial to try the instruments associated in the timbre categories to see which best fit for the student (Gordon, 2008).

**Reliability and Validity**

Through a series of two studies, Gordon calculated the test-retest reliability for the ITPT exam, using data from students who were given the ITPT two times, one week apart. Students demonstrated consistent timbre preferences from the first administration of the ITPT to the second; the test-retest reliability was .70 (Colwell, 1988).

The evidence of reliability of the ITPT is mixed. Some studies have found high reliabilities, while others have found low reliabilities. Colwell (1988) replicated Gordon’s 1984 study and found the test-retest reliability ranged from .46 to .93. Through a series of studies, Gordon reported reliability by grade and school from a range of .46 to .89. Reliability increased in the higher-grade levels. To help prove the value of the ITPT, Gordon found more than 80% of students had at least one timbre preference (Gordon, 1991). Findings from Gordon’s validity studies (1986) support the research that beginner instrumentalists who match their timbre preference have higher retention rates in their music ensemble (Kuhlman, 2005).
Gordon’s first predictive validity study was conducted in the Rush-Henrietta Central School District in New York. The Musical Aptitude Profile (MAP) and the ITPT were administered to all fifth-grade students ($N = 168$). After the first year of instruction, the experimental group, (48% of the students) discontinued instruction, whereas 64 (58%) of the students in the control group discontinued instruction. During their first year of instruction, the predictive validity of the students Musical Aptitude Profile (MAP) when used in conjunction with the ITPT of instruction in the experimental group was found to be .81. Gordon concluded that the data indicate that approximately 72% of the reason for students’ success or lack of success in beginning instrumental music is a result of a combination of their music aptitude and playing an instrument correlated with their timbre preference. Thus, the MAP and ITPT increased predictive accuracy of success in beginning instrumental music by 16% (Gordon, 1986).

Gordon’s second predictive validity study was conducted in fourth-grade classes ($N = 181$) in the Guilderland School District in Guilderland, New York. The Intermediate Measures of Music Audiation (IMMA) and the ITPT were administered to all fourth-grade students. The predictive validity of the IMMA, when used in conjunction with the ITPT, was found to be .48 in regard to students’ musical achievement on their instrument (Gordon, 1986). After two years of instruction, the predictive validity of the ITPT and IMMA regarding students’ musical achievement on their instrument, yielded higher results than when the IMMA was used alone. Gordon concluded that approximately 64% of the reason for students’ success or lack of success in beginning instrumental music is a result of a combination of their music aptitude and timbre preference. Gordon concluded that students who were studying instruments for which they demonstrated a timbre
preference had higher musical achievement (.80) than those who did not have a preference (.51) (Gordon, 1986).

**Procedures for Collecting Data**

Secondary archival data were obtained with permission from the curriculum and music department chairperson of one suburban public-school district located in Long Island, New York. The data contained each student’s grade level, gender, ITPT score, and selected instrument. No student identifiers were collected. This study was conducted in full accordance with all applicable local school district policies and procedures and all applicable Federal and State laws. This study was performed in accordance within IRB protocol.

**Research Design and Data Analysis**

To answer research question one, 21 independent sample t-tests were conducted to determine if students’ preference for each timbre (A to G) differed by gender during elementary (Grades 4-5), middle (Grades 6-8), and high school (Grades 9-12). The t-tests were run separately by each timbre and school level, comparing male and female students. Levene’s test was used to test the null hypothesis that the variance is equal across groups. If a $p$ value of less than .05 was found, it would indicate a violation of assumption. If a violation occurs, it was likely that a conducting the nonparametric equivalent of the analysis would be more appropriate.

To answer research question two, a three-way chi-square test of independence was performed, to explore if there were significant differences in the instrument family placement of males and females using the Gordon instrument selection process or the traditional petting zoo process. To avoid any violations, instruments were grouped by
their family: string (violin, viola, cello, bass), brass (trumpet, trombone, French horn, euphonium, tuba), and woodwind (flute, clarinet, oboe, bassoon); thus, all expected cell frequencies were greater than five.

To answer research question three, descriptive statistics were estimated for the middle school students (Grades 6-8) and high school students (Grades 9-12). An additional variable was created (1 = match, 0 = no match) per student that identified if the instrument and ITPT preference matched. This information allowed us to determine if the instruments students chose via the traditional method matched their ITPT preferences.

To answer research question four, four t-tests were performed to examine if the degree of mismatch differed by student gender. T-tests were estimated separately by ensemble (string/band), for the middle (Grades 6-8) and high school (Grades 9-12) students. Levene’s test was used to test the null hypothesis that the variance was equal across groups.

Table 3.2 articulates the association of the ITPT category and instrument association. Additionally, this information allowed the researcher to determine if a student’s gender or the ensemble they participated in had a significant mismatch degree. The power for all hypothesis tests was above 0.7.

Table 3.2

<table>
<thead>
<tr>
<th>ITPT Preference</th>
<th>Instrument</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Flute, Violin</td>
</tr>
<tr>
<td>B</td>
<td>Clarinet, Viola</td>
</tr>
<tr>
<td>C</td>
<td>Saxophone, French Horn</td>
</tr>
<tr>
<td>D</td>
<td>Oboe, English Horn, Bassoon</td>
</tr>
<tr>
<td>E</td>
<td>Trumpet Baritone</td>
</tr>
<tr>
<td>F</td>
<td>Trombone, Cello</td>
</tr>
<tr>
<td>G</td>
<td>Tuba, String Bass</td>
</tr>
</tbody>
</table>
CHAPTER 4
RESULTS

Research Question 1

Twenty-one independent sample t-tests were conducted to determine if students’ preference for each timbre (A to G) differed by gender during elementary (Grades 4-5), middle (Grades 6-8) and high school (Grades 9-12). The t-tests were run separately by each timbre and school level, comparing male and female students.

Elementary School

This sample included 105 male and 89 female participants (Table 4.1). For all seven timbres (A to G), Levene’s Tests of Homogeneity of Variances were non-significant, suggesting the assumption was met in all cases. Equal variances were therefore assumed in all t-tests.

There were significant gender differences on two timbres, A and G. The results for timbre A indicated that females scored higher ($M = 7.43, SD = 3.07$) than males ($M = 5.25, SD = 3.04$); $MD = -2.18, t(196) = -5.01, p < .001, d = .71$. The results for timbre G indicated that males scored higher ($M = 5.73, SD = 3.13$) than females ($M = 3.84, SD = 3.00$); $MD = 1.89, t(192) = 4.24, p < .001, d = .62$. 
Table 4.1

*Elementary School Group Means and t-Test by Gender*

<table>
<thead>
<tr>
<th>Timbre</th>
<th>Male M</th>
<th>Male SD</th>
<th>Female M</th>
<th>Female SD</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>5.25</td>
<td>3.04</td>
<td>7.43</td>
<td>3.07</td>
<td>-5.01</td>
<td>***</td>
</tr>
<tr>
<td>A</td>
<td>6.50</td>
<td>2.08</td>
<td>6.39</td>
<td>2.32</td>
<td>0.38</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>6.79</td>
<td>2.29</td>
<td>6.52</td>
<td>2.45</td>
<td>0.81</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>6.02</td>
<td>3.44</td>
<td>6.26</td>
<td>3.26</td>
<td>-0.50</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>5.86</td>
<td>2.29</td>
<td>6.01</td>
<td>2.13</td>
<td>-0.49</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>5.78</td>
<td>2.40</td>
<td>5.35</td>
<td>2.44</td>
<td>1.24</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>5.73</td>
<td>3.13</td>
<td>3.84</td>
<td>3.00</td>
<td>4.24</td>
<td>***</td>
</tr>
</tbody>
</table>

*Note:* *** p < .001; ** p < .01; * p < .05. The sample includes 105 male students and 89 female students. All t-tests assume equal variances; Levene’s test statistics were not significant for any comparison.

**Middle School**

This sample included 110 male and 120 female participants (Table 4.2). For all seven hypothesis tests, Levene’s Test of Homogeneity of Variances were non-significant, suggesting the assumption was met in all cases.

There were significant gender differences with the following four timbres: A, B, D, and G. Females preferred timbres A and B, while males preferred timbres D and G. The results for timbre A indicate that females scored higher \((M = 5.88, SD = 3.44)\) than males \((M = 4.51, SD = 3.01)\); \(MD = -1.37, t(228) = -3.21, p < .01, d = .42\). The results indicate for Timbre B that females scored higher \((M = 7.62, SD = 2.17)\) than males \((M = 7.03, SD = 2.24)\); \(MD = -0.59, t(228) = -2.03, p < .05, d = .03\). The results for timbre D indicate that males scored higher \((M = 4.89, SD = 3.56)\) than females \((M = 3.76, SD = 3.21)\); \(MD = 1.13, t(228) = 2.54, p < .05, d = .42\). The results for timbre G indicate that males scored higher \((M = 6.04, SD = 3.60)\) than females \((M = 5.14, SD = 3.39)\); \(MD =
.90, \( t(228) = 1.94, p < .05, d = .26 \). No significant differences were found for timbres C, E, and F.

Table 4.2

*Middle School Group Means and t-Test by Gender*

<table>
<thead>
<tr>
<th>Timbre</th>
<th>Male</th>
<th>Female</th>
<th>( t )</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>( M )</td>
<td>( SD )</td>
<td>( M )</td>
</tr>
<tr>
<td>A</td>
<td>4.51</td>
<td>3.01</td>
<td>5.88</td>
</tr>
<tr>
<td>B</td>
<td>7.03</td>
<td>2.24</td>
<td>7.62</td>
</tr>
<tr>
<td>C</td>
<td>7.77</td>
<td>2.62</td>
<td>8.23</td>
</tr>
<tr>
<td>D</td>
<td>4.89</td>
<td>3.56</td>
<td>3.76</td>
</tr>
<tr>
<td>E</td>
<td>5.07</td>
<td>2.71</td>
<td>4.89</td>
</tr>
<tr>
<td>F</td>
<td>6.36</td>
<td>2.46</td>
<td>6.19</td>
</tr>
<tr>
<td>G</td>
<td>6.04</td>
<td>3.60</td>
<td>5.14</td>
</tr>
</tbody>
</table>

Note: *** \( p < .001 \); ** \( p < .01 \); * \( p < .05 \). The sample includes 110 male students and 120 female students. All t-tests assume equal variances; Levene’s test statistics were not significant for any comparison.

**High School**

This sample included 78 male and 79 female participants (Table 4.3). For all seven hypothesis tests, Levene’s Test of Homogeneity of Variances were non-significant, suggesting the assumption was met in all cases.

There were significant differences with three timbres, A, F, and G. The results for timbre A indicate that females had stronger preferences (\( M = 6.56, SD = 3.01 \)) than males (\( M = 3.54, SD = 3.10 \)); \( MD = -3.02, t(155) = -6.19, p < .001, d = .99 \). Males more strongly preferred timbres F and G. The results for timbre F indicate males scored higher (\( M = 6.45, SD = 1.93 \)) than females (\( M = 5.65, SD = 1.89 \)); \( MD = .80 t(155) = 2.64, p < .01, d = .041 \). The results for timbre G indicate males scored higher (\( M = 6.65, SD = 2.88 \)) than females (\( M = 4.61, SD = 2.89 \)); \( MD = 2.05, t(155) = 4.44, p < .001, d = .07 \). The remaining five timbres did not show significant gender differences.
Table 4.3

High School Group Means and t-Test by Gender

<table>
<thead>
<tr>
<th>Timbre</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>SD</td>
</tr>
<tr>
<td>A</td>
<td>3.54</td>
<td>3.10</td>
</tr>
<tr>
<td>B</td>
<td>8.05</td>
<td>2.03</td>
</tr>
<tr>
<td>C</td>
<td>8.92</td>
<td>2.32</td>
</tr>
<tr>
<td>D</td>
<td>3.24</td>
<td>2.59</td>
</tr>
<tr>
<td>E</td>
<td>4.82</td>
<td>2.28</td>
</tr>
<tr>
<td>F</td>
<td>6.45</td>
<td>1.93</td>
</tr>
<tr>
<td>G</td>
<td>6.65</td>
<td>2.88</td>
</tr>
</tbody>
</table>

Note: *** p < .001; ** p < .01; * p < .05. The sample includes 78 male students and 79 female students. All t-tests assume equal variances; Levene’s test statistics were not significant for any comparison.

Research Question 2

In order to explore if there are significant differences in the instrument family placement of males and females using the Gordon instrument selection process or the traditional petting zoo process, a three-way chi-square test of independence was performed (Table 4.4). To avoid any violations, instruments were grouped by their family: string (violin, viola, cello, bass), brass (trumpet, trombone, French horn, euphonium, tuba), and woodwind (flute, clarinet, oboe, bassoon); thus, all expected cell frequencies were greater than five. The distribution of female and male students across instrument families did not differ based on placement methods. There were no significant associations between a student’s gender and the placement of the instrument family using the Gordon or traditional placement methods \( \chi^2 (2) = 1.10, p = .58, \phi = .04 \).

A chi-square test for independence was conducted in instrument family placement of male students using the Gordon instrument selection process or the traditional petting zoo process, all expected cell frequencies were greater than five. The results indicated
that there were no significant associations between a student’s gender and the placement of the instrument family using the Gordon or traditional placement method $\chi^2 (2) = .33, p = .85, \phi = .03$.

A chi-square test for independence was conducted in instrument family placement of female students using the Gordon instrument selection process or the traditional petting zoo process. All expected cell frequencies were greater than five. The results indicated that there were no significant associations between female students and the placement of the instrument family using the Gordon or traditional placement methods $\chi^2 (2) = .39, p = .82, \phi = .04$.

Table 4.4

\textit{Crosstabulation of Gender, Placement Method, and Instrument Family}

<table>
<thead>
<tr>
<th>Gender</th>
<th>Placement Method</th>
<th>Instrument Family</th>
<th>Total</th>
<th>$x^2$</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>String</td>
<td>Brass</td>
<td>Wood</td>
<td>Wind</td>
</tr>
<tr>
<td>Male</td>
<td>Gordon</td>
<td>34</td>
<td>44</td>
<td>27</td>
<td>105</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(32.4%)</td>
<td>(41.9%)</td>
<td>(25.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>60</td>
<td>74</td>
<td>54</td>
<td>188</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(31.9%)</td>
<td>(39.4%)</td>
<td>(28.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>94</td>
<td>118</td>
<td>81</td>
<td>293</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(32.1%)</td>
<td>(40.3%)</td>
<td>(27.6%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Female</td>
<td>Gordon</td>
<td>38</td>
<td>13</td>
<td>38</td>
<td>89</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(42.7%)</td>
<td>(14.6%)</td>
<td>(42.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>90</td>
<td>24</td>
<td>85</td>
<td>199</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(45.2%)</td>
<td>(12.1%)</td>
<td>(42.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>128</td>
<td>37</td>
<td>123</td>
<td>288</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(44.4%)</td>
<td>(12.8%)</td>
<td>(42.7%)</td>
<td>(100%)</td>
</tr>
<tr>
<td>Total</td>
<td>Gordon</td>
<td>72</td>
<td>57</td>
<td>65</td>
<td>194</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(37.1%)</td>
<td>(29.4%)</td>
<td>(33.5%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Traditional</td>
<td>150</td>
<td>98</td>
<td>139</td>
<td>387</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(38.8%)</td>
<td>(25.3%)</td>
<td>(35.9%)</td>
<td>(100%)</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>222</td>
<td>155</td>
<td>204</td>
<td>581</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(38.2%)</td>
<td>(26.7%)</td>
<td>(35.1%)</td>
<td>(100%)</td>
</tr>
</tbody>
</table>

Note: The sample includes 581 total participants, 292 males and 288 females. All expected cell frequencies were greater than five.
Research Question 3

A descriptive analysis was performed to understand if students’ instrument choices under the traditional petting zoo model correspond to their ITPT-measured timbre preference (Table 4.5). Of the students in Grades 4 through 12 (N = 581) who were placed using traditional methods, 38.5% (n = 244) did not match their timbre preference with the instrument they play, while 58% (n = 337) of students did match their timbre preference with the instrument they play.

Breaking this out into school level school, 10% of elementary school students did not match their timbre preference. Of middle schoolers, 61% did not match their timbre preference with the instrument they play, while only 53.5% of high schoolers did not match their timbre preference with the instrument they play. In other words, more high school students’ timbre preferences matched with the instrument that they play compared with middle school students. This may be a result of attrition; high schoolers who play an instrument that matches their timbre preferences may be more likely to remain in music.
Table 4.5

Instrument Timbre Preference Test Match of Students in Grades 4-12

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Percent</th>
<th>Valid Percent</th>
<th>Cumulative Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elementary</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No match</td>
<td>20</td>
<td>10.3</td>
<td>10.3</td>
<td>10.3</td>
</tr>
<tr>
<td>Match</td>
<td>174</td>
<td>89.7</td>
<td>89.7</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>194</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Middle</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No match</td>
<td>140</td>
<td>60.9</td>
<td>60.9</td>
<td>60.9</td>
</tr>
<tr>
<td>Match</td>
<td>90</td>
<td>39.1</td>
<td>39.1</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>230</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No match</td>
<td>84</td>
<td>53.5</td>
<td>53.5</td>
<td>53.5</td>
</tr>
<tr>
<td>Match</td>
<td>73</td>
<td>46.5</td>
<td>46.5</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>157</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No match</td>
<td>244</td>
<td>38.5</td>
<td>38.5</td>
<td>57.9</td>
</tr>
<tr>
<td>Match</td>
<td>337</td>
<td>58.0</td>
<td>58.0</td>
<td>100.0</td>
</tr>
<tr>
<td>Total</td>
<td>581</td>
<td>100.0</td>
<td>100.0</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Research Question 4

Four t-tests were performed to examine if the degree of mismatch differs by student gender. T-tests were estimated separately by ensemble (string/band), for each the middle (Grades 6-8) and high school (Grades 9-12) students.

**Ensemble**

There was a total of 150 string students and 236 band student participants in middle and high school (Table 4.6). Two independent samples t-tests were run to determine if there were differences of mismatch between instrument choice and timbre preference between ensemble (band/string).

**Middle School Ensemble**

This sample included 86 string and 144 band participants. The assumption of homogeneity of variances was violated as assessed by Levene’s Test for Equality of
variance ($p = .035$). A Welch t-test was run to determine if there the degree of mismatch of timbre preference and instrument choice varied by ensemble. There were no significant differences of mismatch between instrument choice and timbre preference between ensemble. Band students ($M = .42, SD = .50$) matched higher than string students ($M = .35, SD = .49$); $MD = -.61, t(183.4) = -1.03, p = .31, d = .14$.

**High School Ensemble**

This sample included 64 string and 93 band participants. Levene’s Tests of Homogeneity of Variances was non-significant, suggesting the assumption was met in all cases. Equal variances were therefore assumed in all t-tests. There were no significant differences of mismatch between instrument choice and timbre preference between ensemble. Band students ($M = .49, SD = .50$) matched higher than string students ($M = .42, SD = .50$); $MD = .07, t(155) = -.90, p = .37, d = .14$.

Table 4.6

**School Group Means and t-Test by Ensemble**

<table>
<thead>
<tr>
<th>School</th>
<th>String</th>
<th>Band</th>
<th>$T$</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
<td>$M$</td>
</tr>
<tr>
<td>Middle</td>
<td>.35</td>
<td>.49</td>
<td>.42</td>
</tr>
<tr>
<td>High</td>
<td>.42</td>
<td>.50</td>
<td>.49</td>
</tr>
</tbody>
</table>

Note: In middle school there were 86 string students and 144 band students. In high school there were 64 string students and 92 band students. The high school t-tests assume equal variances; Levene’s test statistics were not significant for middle school.

**Gender**

There was a total of 188 males and 199 female student participants in middle and high school (Table 4.7). Two independent samples t-tests were run to determine if there were differences of mismatch between instrument choice and timbre preference between gender.
Middle School

There were 110 male and 120 female participants. Levene’s Test of Homogeneity of variances was non-significant, suggesting the assumption was met in all cases. There were no significant differences of mismatch between instrument choice and timbre preference between gender. Female students ($M = .41, SD = .49$) matched higher than male students ($M = .37, SD = .49$); $MD = .036, t(228) = -1.03, p = .58, d = .08$.

High School

There were 78 male and 79 female participants. Levene’s Test of Homogeneity of variances was non-significant, suggesting the assumption was met in all cases. There were no significant differences of mismatch between instrument choice and timbre preference between gender. Female students ($M = .51, SD = .50$) matched higher than male students ($M = .42, SD = .50$); $MD = .083, t(155) = -.90, p = .30, d = .17$.

Table 4.7

<table>
<thead>
<tr>
<th>School</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Middle</td>
<td>.37</td>
<td>.49</td>
</tr>
<tr>
<td>High</td>
<td>.42</td>
<td>.50</td>
</tr>
</tbody>
</table>

Note: The sample includes 110 male students and 120 female students in middle school. In high school there were 78 male students and 79 female students. All t-tests assume equal variances; Levene’s test statistics were not significant for any comparison.
CHAPTER 5
DISCUSSION

Introduction

The key findings of this study are that: (a) there are meaningful gender differences in instrument preferences as early as elementary school and more differences appear later in school; (b) using the ITPT did not change the association between gender and instrument placement; and (c) based on their ITPT score, many students are mismatched to instruments. These findings have critical implications for students’ musical development that should be considered by music educators.

Implications of Findings

Music Learning Theory (Gordon, 1984) delineates the trajectory of learning as a child progresses through the many stages of preparatory audiation and audiation over time under different conditions (Runfola et al., 2012). To help children reach their potential, music educators can measure children’s musical strengths and tastes using tests like the ITPT (Gordon, 1987). Gordon’s ITPT can help music educators discover students’ timbre preferences and assist them in selecting an instrument that they will enjoy and choose to continue throughout their secondary school education. The conceptual framework addresses the many outside factors that may contribute to students’ instrument choices, such as the characteristics of each child, as well as the students’ ITPT results. These factors all have an influence on student instrument choice. It is hoped that these factors will contribute to a student’s instrumental success.

This study suggests that male and female children have different musical preferences as early as elementary school. While these differences were only recorded on
the extreme Timbres A (flute/violin) and G (bass/tuba), teachers and administrators should be aware of these preferences. They may help to provide the best possible instrument match to children, as that is a critical component for musical success. The implications for students using the ITPT is that they can better understand what sounds they hear and use that knowledge to find an instrument that best fits their timbre preference. Parents can gain a stronger understanding of their child’s timbre preference and how it is unique to each child. This can possibly reduce outside influences impacting the students’ instrument choice.

That said, I found no evidence that Gordon’s ITPT changed the association between gender and instrument placement; however, it did reduce the amount of mismatch between children’s timbre preferences and instrument choice. Only 10% of elementary school students played an instrument that did not align with their preferences, whereas this rate was nearly 60% for middle school students and 50% for high school students who did not use the ITPT to select an instrument. The potential effect of the reduction in the number of music students from middle and high school could impact the match outcomes by having students that stayed with the instrument really enjoy their instrument’s sound rather than just playing an instrument to be in a music ensemble.

If all middle and high school students who had dropped the music program had been tested, it could be found that the mismatch data in this study are underestimates. It is possible that students who were mismatched to their instruments based on timbre preference had a high level of attrition from the music program and therefore were not included in this study.
Relationship to Prior Research

The findings of this study add to the literature of Gordon’s ITPT. This study found a relationship existed between gender and timbre preferences for A and G, suggesting that timbre preference may be a reason why members of one gender are more likely to play certain instruments.

The results of this study corroborated the results of the studies by Byo (1991), Delzell and Leppla (1992), and Fortney et al. (1993) that females prefer instruments associated with timbre A (flute and violin). The results from this study confirm Young’s (2008) research that boys prefer lower timbres and females prefer higher timbres. Abeles’s (2009) research found similar results through a comparison of the instruments played by boys and girls across three studies conducted in 1978, 1993, and 2007: females preferred higher pitched instruments while boys preferred lower.

This study adds to the literature of examining the role of gender association as a factor of instrument selection. Timbres B, D, and F produced varied significant results of significance depending on school level. These timbres produced a difference between school levels and the preferences of male and female subjects; therefore, the gender association of musical instruments could be a societal attitude (Tarnowski, 1993).

This study questions previous research of McDonald and Simons (1989, as cited in Sims, 1989) that responses to and discrimination of timbre differences do appear to develop in early childhood. The results of this study agreed with the findings for timbres A and G; however, between males’ and females’ preferences for timbres B through F do vary by school levels from fourth through twelfth grade. As a result, boys and girls in each school level prefer each timbre differently. In order to substantiate McDonald and
Simon’s research with this study, students would need to be retested in each school level to see if their timbre preference deviates.

Outside influences can still impact student instrument selection, as shown in elementary school with 10% mismatch among children placed to instruments using the ITPT. Conway (2000) found that adolescents worry about peer rejection based on the instrument they play. Payne (2009) found that gender stereotyping was observable regarding both music instrument selection and timbre preference, with gender being a significant determinant to instrument selection. Kelly (1997) concluded that despite a lack of any formal music ensemble experience, young students, based on timbre alone, may still observe many musical instruments along the lines of traditional gender roles and attitudes.

The results of this study add new information to the existing research on instrument and gender associations. Past studies regarding this topic investigated timbre associations in combination with other variables, primarily visual aids or representations of the actual instruments being heard. The isolation of timbre as an aural cue without the aid of visual assistance enables students, music educators, and parents to further understand more specific variables that may influence students’ perceptions of instruments. This may influence each student’s choice of instrument. The results of this study lend credibility to past research (Fortney et al., 1993; Gordon, 1984, 1986), indicating that timbre can be a strong consideration in instrument success and retention throughout a student’s musical education.

Gordon (1991) attributed the use of ITPT to improved student instrumental playing and retention. Even though the high school students did not use ITPT to select
their instrument, the high school students who had the highest match rate still continued to play their instrument. The greater predictive accuracy for success through future higher retention numbers increased the ensemble size in instrumental music, as demonstrated when utilizing data from the ITPT. Limitations of the Study

Limitations of this study include the single study location and the use of a dated testing instrument. The study’s results are limited in their generalizability since the archival data were obtained from one suburban public-school district located in Long Island, New York, and analyzed quantitatively. Researchers would have to generalize the results in order to interpret and apply findings only in a similar context, making the finding relevant and meaningful. A larger sample size using multiple school districts’ music students would support more generalizable data.

The ITPTs were hand-scored using a series of seven individual masks that go over the students Scantron answer sheets. Essentially, a student’s Scantron is scored seven independent times. Each of the seven independent timbre masks is unique to each of Gordon’s timbre preference (A, B, C, D, E, F, G) categories. The scorer must be sure that each mask lines up with the starting number of the unique mask. Each individual ITPT Scantron answer sheet must be scored seven times with each timbre mask. The hand scoring of the ITPT is tedious, especially when there are 200 to 400 students per grade level. This can lead to an increases in scorer error when teachers are grading hundreds of individual Scantrons at a time. As a result, inadvertent scoring errors may have been made. There is an option for the publisher to electronically score each student’s Scantron, but there is an associated fee for this service.
The middle and high school mismatch results were from enrolled music students. The study did not reach out to students who had stopped playing their instrument and were no longer enrolled in the music class. As a result, the middle and high school mismatch findings could possibly be underestimated.

Finally, the results of this study are correlational, not causal. This study was not experimental; thus, no determination of causality can be found to understand if the ITPT enhances musicality or retention rates.

**Recommendations for Future Practice**

This study suggests that teachers should utilize multiple data sources to assist students in selecting their instruments. Data from Gordon’s ITPT could be used within the classroom to help students, teachers, and parents understand which instrument is best for each child. It will not, however, be a strong tool for reducing gender differences and stereotypes in music education. Music teachers need to be aware of gender roles and gender barriers within the classroom and should continue to seek educational strategies to minimize gender disparities within music classrooms and the profession.

**Recommendations for Future Research**

A good next step will be to follow the musical progress of the elementary students who used the Gordon ITPT to select their instrument through graduation to monitor retention, enrollment rates, and musicality. It would be beneficial to compare these students to prior traditional instrument selection method students to determine if Gordon’s ITPT placement method impacts ensemble retention, enrollment rates, and higher musical achievement. Also, a comparison of mismatch rates of the elementary school students as they progress into the middle and high school levels is recommended.
Will the mismatch rates differ from those found in the original study since these students chose their instruments via the Gordon ITPT method? A larger sample size that involves other school districts’ students would allow for analysis of gender differences by individual instruments rather than by instrument family or timbre.

Future research could also explore the social benefits and the development of 21st-century skills in students enrolled in music education. Playing with a music ensemble is collaborative event; everyone is working together as a team to produce the best sound they can. We can compare students enrolled in music classes to non-music students to see how they self-assess their perceived 21st-century skills.

Further investigation into timbre preference and gender would also be useful. It would be useful to retest students’ timbre preferences in middle and high school to see if their instrument timbre mean scores and preferences stay consistent or fluctuate. The most recent studies were from the 1990s and 2000s, and gender trends are changing. We should continue to research timbre preference of the spectrum of genders from masculinity to femininity, including intersex, transgender, and nonbinary.

**Conclusion**

The goal of this study was to help music educators and students choose an instrument that the best fits each new musician. The researcher’s hope was that Gordon’s ITPT would be the ultimate examination to assist teachers, parents, and students in finding an instrument that would best fit the student, limit outside influences, and enjoy the sound of and love to play. The results of this study determine that Gordon’s ITPT will not impact the gender imbalance throughout the instrument family, but it may impact a student’s decision of what instrument to play.
Educators and researchers should still continue to find ways reduce extraneous outside factors to help students choose the right instrument for them. Together we can help students find the right instrument and allow them to create, experience, and love music—ultimately creating lifelong music appreciators.
REFERENCES


Federal Wide Assurance: FWA00009066

Jan 13, 2020 2:04 PM EST

PI: Andrew Fund
CO-PI: Erin Fahie
Dept: Ed Admin & Instruc Leadership

Re: Initial - IRB-FY2020-337 AN INVESTIGATION INTO THE IMPACT OF EDWIN GORDON'S INSTRUMENT TIMBRE PREFERENCE TEST ON GENDER AND INSTRUMENT CHOICE

Dear Andrew Fund:

The St John's University Institutional Review Board has rendered the decision below for AN INVESTIGATION INTO THE IMPACT OF EDWIN GORDON'S INSTRUMENT TIMBRE PREFERENCE TEST ON GENDER AND INSTRUMENT CHOICE.

Decision: Exempt

PLEASE NOTE: If you have collected any data prior to this approval date, the data needs to be discarded.

Selected Category: Category 3.4(i)(A). Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection. The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects.

Sincerely,

Raymond DiGiuseppe, PhD, ABPP
Chair, Institutional Review Board
Professor of Psychology

Marie Nitopi, Ed.D.
IRB Coordinator
## APPENDIX B

### INSTRUMENT TIMBRE PREFERENCE TEST

<table>
<thead>
<tr>
<th>KEY</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>2 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>3 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>4 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>5 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>6 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>7 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>8 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>9 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>10 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>11 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>12 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>13 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>14 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>15 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>16 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>17 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>18 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>19 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>20 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>21 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>22 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>23 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>24 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>25 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>26 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>27 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>28 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>29 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>30 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>31 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>32 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>33 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>34 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>35 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>36 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>37 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>38 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>39 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>40 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>41 e1a e2a</td>
<td></td>
</tr>
<tr>
<td>42 e1a e2a</td>
<td></td>
</tr>
</tbody>
</table>

Example: 41 e1a e2a

Important: Erase completely to change.
Vita

Name  Andrew Fund

Baccalaureate Degree  Bachelor of Music, SUNY
Potsdam: Crane School of
Music, Potsdam, NY
Major: Music Education

Date Graduated  May, 2012

Other Degrees and Certificates  Master of Arts, Columbia
University: Teachers College,
Manhattan New York, Major:
Music and Music Education

Date Graduated  May, 2015