

Instrumental Music Educators' Lived Experiences of Music-Induced Hearing Loss:

A Phenomenological Study

By

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DEDICATION

This dissertation is dedicated to my parents, Gordon and Linda Steward. Words cannot truly express the love and gratitude I have for both of them. The unending encouragement, support, and love I received from both of them have been with me every step of the way through my academic pursuits and life journey. I have been so fortunate to have had both of them in my life. How can you thank someone who has given you everything? Sadly, the loss of both of my parents became emotional bookends to my doctoral studies: my mother passed away in 2009 during my first year of coursework, and my father passed away in 2015 just as I was finishing this dissertation. Although you are no longer with us, I hope that somehow, somewhere in the universe you can share this with me, and that someday we will be reunited once again.

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ABSTRACT

Music-induced hearing loss is an irreversible condition with disabling consequences for musicians and music educators. Discussions about the phenomenon of music-induced hearing loss are surprisingly absent from music education research, revealing an implicit culture of silence surrounding music-related injuries particularly in regard to instrumental music educators. The dearth of extant research on this topic raises questions regarding the stigma of impairment and disability, the implicit expectation of normativity, and the existence of ableism within music education. This study challenges the medical model of disability, used predominantly throughout the extant research on hearing impairment within music education, by employing multiple perspectives within humanities-based disability studies.

To accomplish this task, the present study makes use of transcendental phenomenology (Moustakas, 1994) as a research methodology to give voice to the lived experiences of instrumental music educators who experience music-induced hearing impairments. This study seeks to answer the central research question: how does music-induced hearing loss affect the experience of being an instrumental music educator? The study also investigates three research subquestions: (a) How might examining the lived experiences of music educators who experience the phenomenon of music-induced hearing loss contribute to our understanding of hearing impairment and disability within music education; (b) How does the use of hearing protection affect the experience of teaching within the music classroom; and (c) How might

notions of ableism encourage music educators to pass as h/Hearing at the expense of their hearing health and overall well-being?

This study presents survey and interview findings from 23 instrumental music educators from the elementary, middle, and secondary levels of public education in the state of Wisconsin. The survey findings provide the reader with background information about the participants' personal experiences regarding commonly identifiable factors associated with music-induced hearing loss. The survey findings describe the participants' personal experiences related to the following areas: (a) symptoms of music-induced hearing loss, (b) use of hearing protection, (c) frequency of audiological examinations, (d) size and instrumentation of ensembles, (e) acoustical properties of classrooms, (f) sound exposure, (g) performance history, and (h) concert attendance.

The interviews were analyzed using the research methodology of transcendental phenomenology (Moustakas, 1994). The interview findings illustrate the participants' (a) physical, (b) emotional, and (c) pedagogical experiences related to the phenomenon of music-induced hearing loss, including fourteen respective subthemes. The participants' physical experiences include four subthemes: (a) tinnitus, (b) hearing loss, (c) difficulties hearing speech, and (d) sensitivity and pain. Five subthemes encompass the participants' emotional experiences: (a) stress, anxiety, fear, and worry; (b) depression and loss; (c) burnout; (d) uncertainty; and (e) mood changes. The participants' pedagogical experiences related to five subthemes:

(a) effectiveness, (b) communication, (c) classroom management, (d) musical perception, and (e) use of hearing protection.

Further, four structural themes illustrate the underlying settings and contexts that contributed to the participants' music-induced hearing loss: (a) acoustical environments, (b) sound exposure, (c) administrative and financial support; and (d) awareness, prevention, and representation. The findings of this study suggest that: (a) music-induced hearing loss is underrepresented in teacher education and music programs; (b) workplace accommodations, assistance, and compensation for hearing health-related medical expenses for music educators is lacking; (c) music educators often feel resigned to the possibility of developing a hearing impairment as an expected consequence of teaching instrumental music; (d) music educators choose not to use hearing protection while teaching because it negatively affects musical perception, classroom management, and verbal communication; and (e) the expectations of ablebodiedness in music education reinforces the stigma of hearing impairments among musicians and music educators.

Keywords: music-induced hearing loss, sound exposure, hearing protection, instrumental music educators, impairment, disability, stigma, transcendental phenomenology

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CHAPTER ONE

INTRODUCTION

“And I find it terribly ironic that the thing that is my bread and butter, and the most important to me is what is being taken away.” – Lisa

“In order to be a band director you gotta love the sound of the band and very frankly, a band doesn’t sound the same to me anymore.” – Andrew

“... at my age, where my hearing is now, and tinnitus and everything: I don’t see how I can have a 35-year career as a band director.” – Greg

“There are way too many people that don’t understand how damaging it is and, frankly, don’t want to find out because that would cost money.” – Lori

“Every day. It rings every day. I have not heard silence in maybe twenty years.” – Larry

Background

I have spent the majority of my life in the presence of instrumental music. My musical journey began in sixth grade when my band director recruited me to play trombone in our school band; my involvement in band continued throughout high school. My middle school and high school directors recognized my musical ability and interest and encouraged me to pursue many musical opportunities throughout my school experience. During my junior and senior years in high school, I was accepted into university wind and jazz ensembles for advanced high school music students. Also during this time my school band directors began giving me several teaching

opportunities, such as working with some of the younger trombone players, directing high school trombone choir at district music festivals, and directing a piece with the middle school concert band at one of our school concerts. Midway through my senior year, I realized I was on a path toward becoming a music educator.

My undergraduate program in music education included everything one would expect while pursuing a degree in instrumental music: courses in education, music theory and history, composition and arranging, and participation in a number of performance ensembles, including private study on my primary and secondary instruments. I performed in concert band, symphonic band, orchestra, jazz ensemble, as well as playing semi-professionally with a variety of performance ensembles ranging from jazz to polka. Fulfilling my clinical teaching requirements also put me in front of many instrumental ensembles as I worked toward completing my degree and earning my professional teaching licensure. By the time I completed my undergraduate degree, I had spent a decade in the presence of instrumental music ensembles. Up to this point in my life, I enjoyed performing, teaching, and listening to instrumental music and was looking forward to beginning my career as a professional music educator.

There were moments during my undergraduate studies and in my first teaching position when I began to experience disconcerting physical responses to the sound levels produced in the ensembles with which I performed and those I directed. On one particular occasion during a jazz band rehearsal in college, I abruptly left the rehearsal due to the uncomfortable volume levels produced by an extremely bright

trumpet section in a very live rehearsal room. That experience led me to consider for the first time that my chosen profession could actually cause irreparable harm to my hearing. That very day, I purchased over-the-counter earplugs to use in uncomfortably loud rehearsal and performance situations.

Now as I enter my twelfth year of teaching, I find myself in a constant state of vigilance over the preservation of my hearing; the cacophony of sounds within the band room feels like an aural assault. Imagine a classroom of 70 middle school students, each armed with a musical instrument, randomly producing loud sounds for three agonizing minutes: this describes how class begins for most instrumental music programs at the elementary, middle and secondary levels. Exposure to this continual sound has been part of my experience with instrumental music for more than 20 years. When I was a middle school student, I remember watching students swarm my director before each class period with a barrage of questions, comments, concerns, and needs. Twenty years later I find myself in the same workday scenario: the bell rings, students begin filing into the classroom and taking their seats as I address student needs before class, all while being bombarded with constant, unrelenting noise, interrupting verbal communication and serenity of thought.

Considering the attendant noise levels produced as members of the ensemble simultaneously play their instruments, attempts to address student concerns before class is a recipe for a band director anxiety attack. This description of the band room is based on more than 20 years of observations of band rooms during my school experience, college clinical experiences, professional observations, and professional

teaching experiences at two different schools. I distinctly remember the aural chaos within the band room as a junior high and high school student, college music student, and first-year professional educator. From direct personal experience, I know that professional music educators are consistently placed in situations of aural duress on a daily basis.

Early in my career, I recognized the aural discomfort and emotional anxiety that I experienced during the first moments of every rehearsal. I told my students that I would no longer deal with any questions, comments, concerns, or needs prior to the beginning of rehearsals. It was just not appropriate or feasible to deal with instrument repairs, equipment concerns, or musical questions prior to rehearsal. This new approach to classroom management alleviated many of my anxieties before class; however in time the band warm-up procedures, rehearsal of musical selections, and small group lessons began to elicit the same anxious emotional responses I had experienced during the initial cacophonous moments before beginning rehearsals.

Within months of my first year of teaching, I began to dread the thought of working with certain instruments: individual or small group lessons with flutes, saxophones, trumpets, and percussion became excruciating to my aural tolerance. Within my first year of teaching, I no longer enjoyed listening to half of the instruments representative of a standard concert band. During my first teaching position, one of my co-workers whose classroom was directly across from the band room commented that it was beyond his comprehension how someone who loves music could teach middle school band. At the time, I laughed at his remark, and

proceeded to carry on with my professional duties; however, his tongue-in-cheek quip about the unfocused character of sound produced by young music ensembles was quickly becoming the reality of how I perceived the sounds created in my classroom.

The timbre of certain instruments became intolerable to me. Flutes were shrill; clarinets were excruciating in the high range; saxophones were raucous and out of tune; trumpets were either loud and blatty, or high and piercing; and percussion instruments became obnoxious and unbearable in any situation. Before long, I could not tolerate the sound of the instruments and the musical ensembles that comprised my chosen professional career. The fact that I experienced this discomfort during my first year of teaching was particularly troubling.

Timbre is one thing, but intonation is an entirely different matter. Two trumpet players may have fantastic tone individually but if they are playing a quarter or semi-tone out of tune with each other, the combined sound causes pain to the ear. Magnifying this intonation scenario among a 70-piece musical ensemble creates a staggering amount of nightmarish intonation possibilities. Instrumental music educators deal with the painful realities of timbre and intonation discrepancies on a daily basis.

During the course of my first year of teaching, my tolerance for loud volume levels and intonation discrepancies quickly dissipated. I found myself being short with students before class when they would approach me with questions, comments, concerns, and needs. I was quick to shut down any student who played his or her instrument loudly before class. Any sounds from the percussion section generated an

immediate and urgent response from me to eliminate such sounds from my aural proximity.

During this time in my professional career, I received invaluable advice from a veteran band director regarding the importance of hearing protection for instrumental music educators. This particular director had been diagnosed with permanent hearing loss and tinnitus from prolonged exposure to excessive sound levels and inadequate acoustical environments over the span of his 30-year teaching and performing career. His story affected me deeply and changed both my attitude and perspective regarding hearing health in instrumental music education. This led me to wonder: how many other instrumental music educators have similar stories of hearing loss or other impairments due to teaching instrumental music?

After receiving this valuable advice, I had my hearing checked by an audiologist and was fitted for a pair of custom 30-decibel musicians' earplugs, which I began using consistently as an educator and performer. My use of earplugs while teaching alleviated the anxiety and discomfort I experienced because it reduced the intensity of the sound to tolerable levels. The earplugs made it possible for me to handle the typical band room chaos just before rehearsal, which greatly improved my interactions with and attitude toward my students. I no longer dreaded working with certain instruments because I found them to be excessively loud. I no longer had headaches following concert and marching band rehearsals and pep band performances. Taking my earplugs to work became an absolute necessity, something

that I have integrated into my daily routine over the past decade. Without earplugs, I certainly would not have continued teaching instrumental music.

Although the use of hearing protection improved my teaching experience in many ways, doing so was not without its drawbacks. Communicating with students during class while wearing them was difficult and frustrating for both me and the students, considering that I would either have to ask students to speak up or repeat their questions, or I would have to pause and remove the earplugs in order to communicate effectively. Even though the earplugs did not distort the sounds that I was hearing, they made it difficult for me to identify internal harmonies, intonation subtleties, and quiet musical passages. Wearing hearing protection while playing presents many challenges, which may be suitable for classroom performance but certainly not while performing in a professional capacity. Hearing oneself play while wearing hearing protection is comparable to listening to oneself talk while underwater—the earplugs muffle the sounds and make it difficult for the performer to play with good intonation, proper dynamics, and musical nuance. Shortly after committing to the use of earplugs while teaching, I understood that I was making a decision to protect my hearing at the expense of my teaching effectiveness.

The present study is the culmination of my experience with excessively loud work environments and the use of hearing protection while teaching instrumental music. My interest in this topic stems from these experiences and the words of warning that I received from a colleague who encouraged me to protect my hearing early in my career. His words resonated with me, and hopefully this study's findings

will resonate similarly with its readers. This study gives voice to instrumental music educators who have experienced music-induced hearing loss by allowing them to share their stories, illustrating how this issue has affected their personal and professional lives.

Introduction to the Problem

Music-induced hearing loss is an irreversible condition with disabling consequences for musicians and music educators (Chesky, 2011; Cutietta, Klich, Royse, & Rainbolt, 1994; Owens, 2004). This phenomenon affects individuals who have been overexposed to sound levels exceeding the established safety standards for noise exposure in the workplace (National Institute for Occupational Safety and Health, [NIOSH], 1998, 2014; Occupational Safety and Health Administration [OSHA], 2008), and can lead to permanent hearing loss and/or tinnitus—commonly described as ringing of the ear (NIOSH, 1998). The dangers of occupational noise exposure in construction, manufacturing, and other industrial fields is widely documented (NIOSH, 1998, 2014), yet music-induced hearing loss among music educators is rarely recognized as an occupational hazard, remaining conspicuously absent from music education research (Chesky, 2011).

In light of the aural nature of music coupled with the underlying ableist expectations of music-making and music teaching (Hehir, 2002; Jorgensen, 2003), the ability to accurately identify and respond to intricate musical characteristics such as pitch, intonation, articulation, balance, and dynamics is vital to every musician's identity. Musicians subjected to prolonged or sudden periods of excessive sound

levels are more likely to experience irreversible hearing loss and tinnitus than the general population (Cutietta et al., 1994; Owens, 2004). Music-induced hearing loss has potentially devastating consequences for both musicians and for those who teach music, including the possibility of being forced to leave the profession due to the development of a significant hearing impairment such as persistent ringing in the ear, or the inability to hear certain auditory frequencies (Ross, 2001; Solomon, 1986).

Despite an increasing awareness of the damaging effects of music-induced hearing loss, many musicians remain oblivious or resigned to the risks of their profession (Cunningham, Curk, Hoffman, & Pride, 2006; Miller, Stewart, & Lehman, 2007; Zeigler & Taylor, 2001). This issue becomes even more distressing for instrumental music educators when they request accommodation, assistance, or compensation for hearing impairments directly related to their daily work environments (Longmore, 2003; Lubet, 2002). Despite the serious threat music-induced hearing loss poses to musicians, particularly those music educators who teach instrumental music, discussions regarding this phenomenon are surprisingly absent from extant studies in music education. The absence of such research raises questions regarding the stigma of impairment and disability (Brueggemann, 1997; Guptil, 2011), the implicit expectations of normativity (Straus, 2006), and the existence of ableism within music education (Hehir, 2002).

Purpose of Study

The purpose of this study is to investigate the phenomenon of music-induced hearing loss as a disabling occupational hazard for instrumental music educators and

to expose the culture of silence¹ surrounding this music-related injury in music education. This phenomenological study examines the experiences of music-induced hearing loss among elementary, middle, and secondary instrumental music educators. The phenomenon of music-induced hearing loss will be defined through the participants' personal and professional experiences to illustrate the essence² of the problem, specifically in the field of instrumental music education, and what this phenomenon implies for music educators.

Significance

Throughout this study, I examined an issue within music education that is inexplicably ignored and avoided despite the serious health consequences music-induced hearing loss poses to all music educators and particularly, instrumental music educators. Through the theoretical framework of humanities-based disability studies, the present study bridges the gap between studies that medicalize music-induced hearing loss and those that seek deeper answers regarding impairment and disability within music education. Employing a phenomenological research scaffold to investigate this phenomenon provides important understanding to existing disability studies discourse within music education. This study gives voice to music educators

¹ Freire (1985) employs the term *culture of silence* as a theoretical framework to describe the institutionalized power structures that alienate marginalized groups “from the power responsible for their silence” (p. 50).

² As I will discuss further in Chapter 3, the use of the term *essence* in transcendental phenomenology refers to the common qualities of phenomena as observed through lived experience (Moustakas, 1994). I employ this term only as an over-arching concept under which fall the shared experiences, attitudes, and feelings of music-induced hearing loss among the participants within the present study. My use of the term comes with the understanding of its problematic history associated with positivistic views regarding knowledge, power, reality, and consciousness.

and provides them with the opportunity to share their stories to increase awareness, improve understanding, and promote positive change within music education.

Delimitations

The multidisciplinary nature of this topic involves several fields of study, including performing arts medicine, acoustics, audiology, hearing impairment and d/Deafness, humanities-based disability studies, and music education.³ Each field provides important insights into the phenomenon of music-induced hearing loss and its effect on any given population; however, I limit the study to music education due to my professional background and experiences. It is important to acknowledge that the study of deafness and Deaf culture, although pertinent to this discussion, is beyond the scope of this dissertation. The present study focuses on individuals who experience symptoms of music-induced hearing loss but do not self-identify as d/Deaf.

The present study examines the effects of music-induced hearing loss upon a specific sample of instrumental music educators. This phenomenon is not limited to this group of musicians however, as it affects music students, elementary, general, and choral music educators, musicians regardless of musical genre, conductors, recording technicians, and recreational listeners and concert-goers, just to name a few. To manage the scope of this study, I limited the literature review and selection of research participants to instrumental music educators who taught both band and

³ The abbreviations and acronyms used throughout this dissertation are included in Appendix A. Definitions for all technical terms related to the hearing mechanism, hearing loss, acoustics, and audiology are included in Appendix B. Definitions for all theoretical terms related to humanities-based disability and transcendental phenomenology are included in Appendix C.

orchestra at the elementary, middle, and secondary levels. Extant research approaches the phenomenon of hearing loss as it affects musicians from different subject areas and grade levels but with limited results. In light of the central research questions referenced below and the chosen theoretical framework and methodology of this research project (described in Chapters 3 and 4), providing discrete descriptions of the phenomenon's effects upon individuals according to their subject area and grade level are beyond the scope of this study.

Research Questions

I divided the research questions into three categories: (a) the central question, (b) the subquestions, and (c) the procedural subquestions. The central question guided this study throughout its entire course and served as a touchstone for inquiry and analysis into music-induced hearing loss. The subquestions emerged during the literature review process as I investigated how the phenomenon appeared in music-related research. The subquestions evolved further once I applied the theoretical framework of humanities-based disability studies to music-induced hearing loss. Moustakas' (1994) work in transcendental phenomenology guided my crafting of the procedural subquestions and developing the interview questions that I employed throughout the data collection phase of this study.

Central Question

The central research question for the present study aims to uncover how the phenomenon of music-induced hearing loss affects the ability of music educators to

perform the everyday tasks and expectations of their profession. These include but are not limited to identifying musical phenomena, performing on multiple musical instruments, and communicating verbally with students in a classroom setting:

- (1) How does music-induced hearing loss affect the experience of being an instrumental music educator?

Subquestions

The theoretical framework of humanities-based disability studies shaped the subquestions guiding the literature review process. The first subquestion focuses on the direct experience of the phenomenon as it is defined by the participants, including how that experience may lead to new knowledge regarding hearing impairment and disability within the field of music education:

- (1) How might examining the lived experiences of music educators who experience the phenomenon of music-induced hearing loss contribute to our understanding of hearing impairment and disability within music education?

The second subquestion shares the participants' observations, perceptions, and experiences with using hearing protection while teaching in a classroom setting:

- (2) How does the use of hearing protection affect the experience of teaching within the music classroom?

The third subquestion explores how occupational pressures may lead music educators to conceal their impairment from their students, colleagues, or administrators:

- (3) How might notions of ableism encourage music educators to *pass*⁴ as h/Hearing at the expense of their hearing health and overall well-being?

Procedural Subquestions

I derived the three procedural subquestions from Moustakas' (1994) transcendental phenomenological method and employed them to shape the interview questions. The first procedural subquestion generated 328 relevant statements from the participants, which I narrowed to 48 non-overlapping and non-repetitive significant statements that described the phenomenon of music-induced hearing loss:

- (1) What statements best define the experiences of music-induced hearing loss among instrumental music educators?

The second procedural subquestion uncovered three textural themes, each with its own set of subthemes that defined the phenomenon as experienced by the participants:

- (2) What unifying themes emerge from the shared stories and experiences of instrumental music educators that illustrate the experience of music-induced hearing loss?

The third procedural subquestion defined the inherent qualities of the phenomenon through an analysis of the participants' shared experiences:

- (3) What are the inherent qualities of the phenomenon of music-induced hearing loss as experienced by instrumental music educators?

⁴ Passing is the act of hiding a physical or cognitive impairment in order to appear *normal* within the socially constructed confines of one's social environment (Linton, 1998a, pp. 19–20).

Review of Relevant Literature

The initial literature review for this dissertation began with an exhaustive search in music education research journals related to occupational hearing loss among instrumental music educators. The absence of literature specifically related to music-induced hearing loss among instrumental music educators was and remains striking. The lack of relevant studies in music education led me to expand the parameters of my search to include studies in performing arts medicine. Although a comprehensive review of the literature is provided in Chapter 2, the following literature was particularly important to this study's early stages: two cautionary tales by Solomon (1986) and Ross (2001) about their experiences of having to leave their profession due to music-induced hearing loss; Cutietta, Klich, Royse, and Rainbolt's (1994) study investigating hearing loss and the use of hearing protection among instrumental music educators; Zeigler and Taylor's (2001) investigation of the profound impact that tinnitus has upon music educators; Owens' (2003, 2004) study of the acoustic conditions of band rehearsal rooms; and Chesky's (2008) work, which identifies teaching music as a "potentially hazardous occupation" (p. 41) and discusses the ethical responsibility of music educators to inform and protect students from excessive exposure to sound.

Theoretical Framework

By employing a theoretical framework rooted in humanities-based disability studies, I aim to reexamine impairment and disability through alternative research paradigms and philosophical perspectives. The present study challenges the medical

model of disability by focusing on instrumental music educators who have been marginalized and stigmatized because of a developing or preexisting hearing impairment as a direct result of their exposure to music. Drawing on the work of Dobbs (2012), I relate four theoretical models of disability studies to the phenomenon of music-induced hearing loss in this study: the medical model (Mitchell & Snyder, 1997; Smart, 2009), the social model (Davis, 1999; Shakespeare, 2013; Siebers, 2008), the cultural model (Snyder & Mitchell, 2006), and complex embodiment (Siebers, 2013).

Another component comprising the present study's theoretical framework is the notion of *ableism*: I interrogate and disrupt the *ableist* musical traditions in music education that value musical exceptionalism and normative conceptions of the body: ableism renders bodily difference as a personal deficit (Davis, 1995, 2006a, 2013; Guptil, 2011; Hehir, 2002). The established perceptions and attitudes toward impairment and disability within music education lead many individuals to hide their impairment in an attempt to avoid the stigma of disability (Linton, 1998a; Longmore, 2003) and pass as h/Hearing at the expense of their hearing health and overall well-being (Brueggemann, 1997). Many music educators choose not to use hearing protection while teaching because they fear that they will lose musical credibility among their students, colleagues, and administrators (Chesky, 2011; Guptil, 2011; Zeigler & Taylor, 2001).

Methodology

The absence of scholarship in music education investigating music-induced hearing loss has significantly limited the profession's understanding of a phenomenon that has universal significance for instrumental music educators. The majority of extant studies investigating this phenomenon are limited to quantitative inquiry, which primarily consists of noise exposure studies, acoustical evaluations of performance spaces, or instrument-specific sound measurements. Investigating the phenomenon of music-induced hearing loss through a qualitative research methodology provides deeper understanding and fresh interpretations of the phenomenon: doing so is grounded in the participants' lived experiences.

The chosen methodology for the present study is Moustakas' (1994) adaptation of transcendental phenomenology as originated by philosopher and mathematician Edmund Husserl (1931/2012). Transcendental phenomenology "emphasizes subjectivity and discovery of the essences of experience and provides a systematic and disciplined methodology for derivation of knowledge" (Moustakas, 1994, p. 45). This philosophically grounded methodology offers a discovery of knowledge by reflecting upon what is observed through human consciousness. I chose transcendental phenomenology as the qualitative research methodology for this study because of its capacity to vividly illustrate the essence of lived human experience: in this case, instrumental music educators' experiences related to the phenomenon of music-induced hearing loss.

Role of the Researcher

My primary goal as researcher is to bring attention to an issue within music education that is critical to the hearing health of instrumental music educators. My interest in music-induced hearing loss stems from my concerns regarding my own hearing health and that of my colleagues, of whom many have developed occupational hearing impairments over the course of their careers. My role as a scholar employing transcendental phenomenology, however, was to temporarily suspend my preconceptions and prejudgments about music-induced hearing loss to achieve an unbiased analysis of the data that I collected (Moustakas, 1994). Whether this task is achievable or even desirable remains a contested issue among phenomenological researchers (Gadamer, 1975).

The Greek word *epoché* in transcendental phenomenology requires researchers to “refrain from judgment” (Moustakas, 1994, p. 33) in order to arrive at a “new way of looking at things” (p. 33). This process begins with researchers setting aside (bracketing) their preconceived perceptions and beliefs about the research topic in order to develop a fresh perspective during the stages of collecting, analyzing, and synthesizing research data (Moustakas, 1994). Creswell (2007) recommends that phenomenological researchers openly acknowledge their bias early on in the research study, making their position clear to the reader throughout the study: I set forth above my personal connection to the present study. I discussed my beliefs and experiences with the study’s participants only when they asked me direct questions, which usually occurred after completing the interview. I recognize that the phenomenological

notion of eliminating bias through bracketing is problematic and fraught with contradictions: it seems implausible for researchers to completely separate themselves from their own social, cultural, and political situatedness.

During data collection, my role as interviewer provided the participants with opportunities to confidentially share their experiences about music-induced hearing loss in a safe and consequence-free environment. The interviews were conducted in a conversational manner, employing my research protocol as a guide to provide a unifying structure to each interview. I asked each participant the same questions, but the order of the questions varied depending on the natural flow of each conversation. The interview recordings were transcribed verbatim into research transcript documents, which I employed for data analysis. I referred to the interview transcripts constantly throughout the process of data analysis in order to accurately portray each participant's experiences. I created a database cataloguing the relevant statements from each interview and coded each statement into thematic groups. Using this approach, I narrowed 328 relevant statements into a list of 48 non-overlapping significant statements that best described their experiences of music-induced hearing loss. After analyzing the list of 48 significant statements, I grouped the statements into textural and structural themes.

To ensure the credibility and trustworthiness of my study, I invited each of the participants to review, clarify, and revise the interview transcripts, textural descriptions, and structural descriptions; that is, through the use of member checks (Creswell, 2007). Each of the participants received electronic copies of these

documents via electronic mail. I encouraged each of the participants to review the documents and to identify any necessary corrections or clarifications, including any response to my interpretation of the data.

A key researcher role is to protect the confidentiality of the participants throughout the entire study. I took multiple steps to safeguard confidentiality. First, individual emails rather than one mass email were sent to all of the potential participants, which included nearly all of the instrumental music educators in the state of Wisconsin. Next, the participants were given the option of a face-to-face interview at a location of their choosing, or an over-the-phone interview. None of the interviews were conducted at the participants' place of employment. Confidentiality was maintained during the analyzing and writing of the dissertation by assigning each participant with a pseudonym. All references to the participant's place of employment, residence, college attended, and any other identifying factors were not included in the study.

Ethical Considerations

Music-induced hearing loss and the procedures used for its data collection and analysis presented multiple ethical considerations, including my obtaining Institutional Review Board (IRB) human subjects approval, consent from the participants, and maintaining confidentiality throughout the course of the study. The data collection process did not begin until receiving IRB approval from the University of Wisconsin-Madison (see Appendix D). The participants in the study volunteered to share their stories by responding to a preliminary participation flyer (see Appendix

E), which described the purpose and methods of the study prior to their participation. Each participant also signed a written consent form (see Appendix F).⁵ A key ethical consideration of this study was securing and maintaining confidentiality of the participants and their school districts. To ensure confidentiality, all of the participants' names throughout the study are pseudonyms, and the names of their school districts were omitted. The interview recordings and transcripts are stored securely on the University of Wisconsin-Madison campus and computer data is encrypted and stored on campus as well.

Outline of the Study

Chapter 2 reviews the existing relevant literature regarding the phenomenon of music-induced hearing loss and its representation in music education. This chapter is presented in five sections. In the first section, I define hearing loss, including a description of the anatomy of the hearing mechanism, as well as the causes, symptoms, and methods of identifying hearing loss. Next, I define the general characteristics of noise-induced hearing loss. I also outline the occupational noise exposure standards established by the OSHA and NIOSH, illustrating the inadequacy of these standards when applied to the daily work experience of instrumental music educators. I then define music-induced hearing loss and review the relevant bodies of literature regarding music-induced hearing loss among professional musicians, music students, and instrumental music educators. Finally, I review the common

⁵ The participants who were interviewed by phone also signed a written consent form which they received and returned by mail. These individuals were briefed about the written consent form and its contents prior to the interview. They also received this information in the preliminary participation information sent out to each participant.

components of hearing loss prevention programs, which are integral to the literature that examines music-induced hearing loss as an occupational hazard for instrumental music educators.

Chapter 3 re-examines the phenomenon of music-induced hearing loss using alternative perspectives of disability that emerge from disability studies discourses.

In this chapter, I: (a) address the problematic language often associated with impairment and disability; (b) consider music-induced hearing loss within the legal context of Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, and the Americans with Disabilities Amendments Act of 2008 by interrogating the limited protections provided to instrumental music educators under these civil rights statutes; (c) outline four theoretical models of disability studies; (d) discuss the stigma of disability, including the related concepts of passing, overcoming, and coping; (e) discuss transcendental phenomenology as a theoretical framework; and (f) apply transcendental phenomenology to disability studies in music education research.

Chapter 4 outlines the research methodology employed throughout this investigation. This chapter includes: (a) my rationale for selecting transcendental phenomenology as the research methodology for this study; (b) a description of the participants, including selection criteria and process; (c) an outline of the survey and interview protocol used during the stages of data collection; and (d) an explanation of the methods and procedures that I employed during the stages of transcendental phenomenological data analysis employed in this study.

Chapter 5 presents the findings of this study, which are grounded in the participants' responses to the survey and interview questions. I outline the individual and environmental factors contributing to the participants' experiences in order to create a comprehensive illustration identifying the inherent aspects of music-induced hearing loss. Chapter 5 contains three sections: (a) the survey findings, which outline the participants' symptoms of music-induced hearing loss, use of hearing protection, frequency of audiological exams, size and instrumentation of ensembles, acoustical properties of classrooms, intensity and duration of sound exposure, performance history, and concert attendance; (b) the interview data, which includes the significant statements, textural themes and descriptions, and structural themes and descriptions reported by the participants; and (c) the composite textural and structural descriptions of the participants' experiences, which define the overall essence of the phenomenon of music-induced hearing loss.

Chapter 6 comprises the discussion, implications, and conclusions of the present study. I present this chapter in four sections: (a) a discussion of my findings as they relate to the research questions, (b) the implications for research and teaching, (c) the procedures I employed to ensure credibility and trustworthiness of the study, and (d) my conclusions on how this study has influenced me as a music educator and scholar.

CHAPTER TWO

REVIEW OF RELEVANT LITERATURE

I present this literature review in five sections: (a) hearing loss, (b) noise-induced hearing loss, (c) occupational noise exposure standards, (d) music-induced hearing loss, and (e) hearing loss prevention. In the first section, I define hearing loss, including a description of the anatomy of the hearing mechanism, as well as the causes, symptoms, and methods of identifying hearing loss. Next, I define the general characteristics of noise-induced hearing loss. I outline the occupational noise exposure standards established by the Occupational Safety and Health Administration (OSHA) and the National Institute for Occupational Safety and Health (NIOSH), illustrating the inadequacy of these standards when applied to the daily work experience of instrumental music educators. I also define music-induced hearing loss and review the relevant bodies of literature regarding the phenomenon among professional musicians, music students, and instrumental music educators. Finally, I review the common components of hearing loss prevention programs, which are integral to the literature examining music-induced hearing loss as an occupational hazard for instrumental music educators.

Hearing Loss

In the first section of this chapter, I diagram and define the anatomy of the ear and explain the effect of hearing loss on the hearing mechanism. I distinguish between three major causes of hearing loss, including conductive (damage to the

outer or middle ear), sensorineural (damage to the inner ear), and presbycusis (hearing loss related to aging), and discuss how the factors of intensity, duration, and susceptibility affect hearing (Sataloff, 1997). Further, I outline the various symptoms of hearing loss, including tinnitus (ringing of the ear), hyperacusis (sensitivity to low or moderate sounds), diplacusis (perceiving a single pitch as two separate sounds), and distortion (changes in perception of pitch and timbre) (Woolford, Carterette, & Morgan, 1988). I conclude this section with an explanation of the traditional methods of identifying hearing loss through audiological measurements of temporary and permanent threshold shifts, sound pressure levels, and pure-tone audiograms.

Anatomy of the Hearing Mechanism

Before examining the disabling effects of hearing loss on musicians and music educators, it is first necessary to understand the physiological complexities of the hearing mechanism. Limb (2004) describes the anatomy of the human ear as an intricate and delicate system that is “susceptible to degradation over time” (p. 32). Hearing declines with age because the hair cells in the cochlea lose their regenerative capabilities; the number of hair cells we have at birth continually decrease over time (p. 32). Understanding the physiology of the ear further illustrates the delicate nature of the hearing mechanism.

The ear is composed of three sections: the outer ear, middle ear, and inner ear (see Figure 1). Before hearing occurs, sound passes through several physiological

stages on its way to the brain. First, sound enters and is collected by the pinna⁶ of the outer ear and travels through the auditory canal on the way to the middle ear. The sound then passes through the tympanic membrane (eardrum), causing it to vibrate, and continues through the malleus (hammer), incus (anvil), and stapes (stirrup) of the middle ear, before entering the cochlea (inner ear). Finally, the sensory hair cells of the inner ear transmit nerve impulses to the auditory centers of the brain. Sataloff (1997) describes the process in which sound is transmitted to the brain through the three parts of the ear:

Sound creates vibrations in the air somewhat similar to the “waves” created when a stone is thrown into a pond. The pinna collects these sound waves and funnels them down the external ear canal to the eardrum. The sound waves cause the eardrum to vibrate. These vibrations are transmitted through the middle ear over the bony bridge formed by the malleus, incus, and stapes. The vibrations in turn cause the membranes over the openings to the inner ear to vibrate, causing the fluid in the inner ear to be set in motion. The motion of the fluid in the inner ear excites the nerve cells in the organ of Corti,⁷ producing electrochemical impulses that are transmitted to the brain along the acoustic nerve. As the impulses reach the brain, we experience the sensation of hearing. (pp. 52–53)

⁶ The pinna, which is also called the auricle, is the “projecting part of the ear lying outside of the head” (Pinna, Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, 2003).

⁷ The organ of Corti is a “specialized structure located on the inner surface of the basilar membrane of the cochlea containing hair cells that transmit sound vibrations to the nerve fibers” (Organ of Corti, The American Heritage Medical Dictionary, 2007).

Figure 1. The Parts of the Ear: External, Middle, and Inner

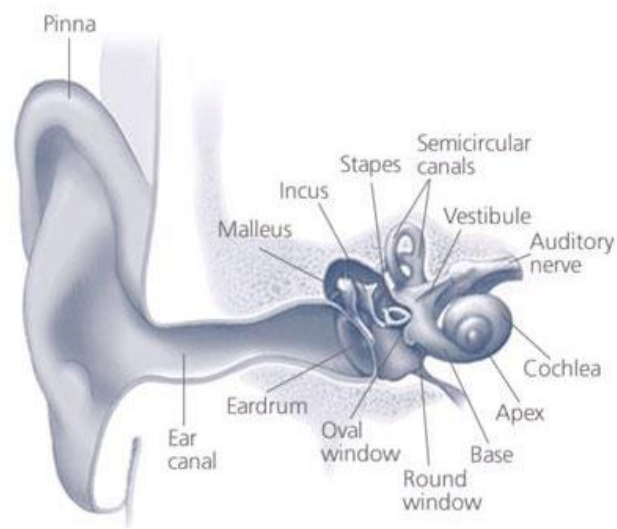


Figure 1. The parts of the ear: external, middle, and inner. The original title of this figure from the reprinted source is “Parts of the inner ear.” Reprinted from “Noise-induced hearing loss,” by the National Institute on Deafness and Other Communication Disorders, National Institutes of Health, U.S. Department of Health and Human Services, 2014. Retrieved from <http://www.nidcd.nih.gov/health/hearing/pages/noise.aspx>. Reprinted with permission.

Causes of Hearing Loss

Sataloff (1997) identifies five causes of hearing loss: (a) conductive, (b) sensorineural, (c) central, (d) functional, and (e) mixed. The causes pertinent to this study are conductive and sensorineural, each of which I discuss further in the following sections. Considering the focus of this study, I will not discuss central,

functional, and mixed hearing loss further because they do not specifically relate to the incidence of noise/music-induced hearing loss.⁸

Conductive. In conductive hearing loss, sound is not “transmitted effectively to the inner ear” (Sataloff, 1997, p. 53) due to interference in the “external canal, the eardrum, the ossicular chain, the middle-ear cavity, the oval window, the round window, or the eustachian tube” (p. 53). There is no damage to the inner ear or the neural pathway in cases of conductive hearing loss. Individuals with conductive hearing loss may benefit from surgery to repair damage to the outer or middle ear, or the use of a hearing aid to improve sound amplification. Conductive hearing loss may be caused by birth defects, blockage of the outer ear by wax or a foreign body, infection, trauma, or a tumor in the outer ear. Problems of the middle ear that may cause conductive hearing loss include ossicular abnormalities, fractures, disease, tumors, and malformations. The most common cause of conductive hearing loss in the middle ear is otosclerosis—a hereditary disease affecting the stapes of the ear from moving properly (p. 53).

Sensorineural. Sensorineural hearing loss includes hearing loss due to changes in the cochlea (inner ear). Sataloff (1997) defines *sensory hearing loss* as damage to the inner ear, and *neural hearing loss* as any damage to the auditory nerve (p. 54). Sensorineural hearing loss is characterized by a loss of loudness and clarity

⁸ Central hearing loss is located in the central nervous system, making it difficult for individuals to interpret sound (Sataloff, 1997, p. 54). Functional hearing loss is a psychological condition without any physiological damage to the hearing mechanism (p. 54). Mixed hearing loss is a combination of conductive and sensorineural hearing loss (p. 54).

due to changes in the hair cells of the inner ear, which are “responsible for analyzing auditory input and instantaneously coding it” (p. 54), and the auditory nerve, which carries “complex coded information to the brain” (p. 54). The effects of neural hearing loss may affect speech recognition; the effects of sensory hearing loss include distortion of sound quality, loudness (loudness recruitment), pitch (diplacusis) and may be accompanied by the experience of tinnitus (p. 54). Sensorineural hearing loss may be caused by ototoxic drugs,⁹ hereditary conditions, disease, trauma, and “prolonged exposure to very loud noise” (p. 54).

Noise-induced hearing loss is caused by damage to the inner ear, specifically the outer hair cells of the organ of Corti, which control hearing sensitivity and tuning (Phillips & Mace, 2008). The outer hair cells of the inner ear amplify soft sounds within the cochlea and when these cells are damaged “low-level sounds are perceived as softer or not heard at all while mid and high-level sounds can be perceived as loud” (Phillips & Mace, p. 37). Another consequence of damage to the outer hair cells is a loss of frequency specificity, which can drastically alter the perception of music (Phillips & Mace, 2008).

Presbycusis. Cutietta (1981) defines presbycusis as the “progressive loss of hearing due to age” (p. 30). This condition usually begins around the age of 40, but is generally not recognized until later in life (p. 30). Presbycusis affects the high frequencies of hearing by limiting the number of overtones individuals can recognize,

⁹ Ototoxic drugs include any medication that is harmful to the ear, or that is capable of producing tinnitus as a side effect (American Tinnitus Association, 2014, “Causes of Tinnitus”).

which often makes music sound hollow, muffled, or distorted, and can also prevent individuals from distinguishing the difference between instruments (p. 30).

Distinguishing between spoken consonants and neighboring pitches is also affected by the onset and progression of presbycusis (p. 30). Cutietta identifies two primary theories regarding the cause of presbycusis: (a) biological changes in the physical characteristics of the ear due to the natural aging process, and (b) the effects of prolonged or excessive environmental noise exposure (p. 31).

Distinguishing between presbycusis and noise-induced hearing loss is often difficult because both conditions appear on audiograms as high-frequency sensorineural hearing loss (Hench & Chesky, 1999). One difference is that the typical hearing threshold patterns associated with the identification of presbycusis appear on audiograms as a consistent downward slope without recovery at the 8 kHz frequency (Kirchner, Evenson, Dobie, Rabinowitz, Crawford, Kopke, & Hudson, 2012). Also, hearing loss due to presbycusis is usually bilaterally symmetrical (same in both ears), whereas noise-induced hearing loss is often asymmetrical (Hench & Chesky, 1999).

Intensity. Intensity is the objective measurement of directional sound wave energy (NIOSH, 1998), whereas loudness is a subjective perception. The loudness of a sound does not cause hearing loss, but rather the intensity of the sound (Pisano, 2007). Sound intensity is measured in decibels (dB)¹⁰ on a logarithmic scale and

¹⁰ A decibel (dB) is a “Unit of level when the base of the logarithm is the 10th root of 10 and the quantities concerned are proportional to power” (NIOSH, 1998, p. xii).

doubles for each increase of 3 dB, meaning 90 dB is 10 times more intense than 80 dB, and 100 dB is 100 times more intense than 80 dB (Pisano, p. 22). The slightest increase in decibel level “can generate sizable increases in the perception of sound intensity” (p. 22).

Duration. Along with intensity, the duration of exposure is another contributing factor to hearing loss. The occupational noise exposure standards established by OSHA (2008) state that workers should not be exposed to sound levels exceeding a time-weighted average of 90 dBA¹¹ over an 8-hour day; NIOSH (1998) standards are based on 85 dBA. The equal-energy rule suggests reducing the duration of exposure for every increase in sound intensity (NIOSH, 1998). OSHA recommends reducing the duration of exposure by half for every 5-dB increase in sound intensity; NIOSH recommends reducing the duration of exposure by half for every 3-dB increase (NIOSH, 1998). These standards and their implications for musicians and music educators will be discussed further later in this chapter.

Susceptibility. Susceptibility to the effects of noise-induced hearing loss varies widely among individuals (Kirchner et al., 2012). Woolford et al. (1988) describe increased susceptibility to noise-induced hearing loss among musicians as

¹¹ Decibel, A-weighted (dBA) is a “Unit representing the sound level measured with the A-weighting network on a sound level meter” (NIOSH, 1998, xii). “A-weighting approximates the nonlinearity of the human ear in loudness perception when receiving tones across frequencies” (Holland, 2004, p. 17). Considering the sensitivity of the human ear, sound level measurements are modified with “frequency-weighting networks that represent some responses of the human ear” (NIOSH, 1998, p. 33)—the A-weighted scale has become the industry standard in measuring sound pressure levels when determining occupational noise standards.

tragic, because it is “usually discovered after some hearing has been lost” (p. 269). Susceptibility varies among individuals in regard to the onset, duration, and severity of tinnitus: “A given exposure in some persons will produce a long-lasting tinnitus while in others it will have no effect at all” (Woolford et al., p. 270).

Symptoms of Hearing Loss

Tinnitus. The American Tinnitus Association (ATA) defines tinnitus, commonly referred to as “ringing in the ears,” as the “perception of sound in the ears or head where no external source is present” (2014, “What is tinnitus?,” para. 1). The ATA lists noise exposure as one of the leading causes of tinnitus because, once damaged, the hair cells of the inner ear cannot be replaced (2014, “Causes of tinnitus,” first bullet point). Zeigler and Taylor (2001) describe tinnitus as a “high-pitched clear tone in either or both ears” (p. 136), which manifests as ringing, hissing, or whooshing sounds that occur briefly or permanently.

Zeigler and Taylor (2001) conducted a study on the effects of tinnitus awareness on college music majors’ hearing conservation behaviors. The study included 200 public university and 48 private university students and found that 58.9% claimed to have tinnitus at some level (p. 136). Most respondents were either unsure about the cause of their tinnitus, or believed that it was due to “exposure to noise over an extended period of time” (p. 136). Tinnitus affects people in multiple ways: for some, the condition is a temporary nuisance, but more debilitating forms of the condition may lead to depression, anxiety, lack of concentration, or thoughts of suicide (p. 136). Considering musicians’ susceptibility to the condition, the

researchers believe that the “prevention of tinnitus is critical” (p. 137), because most forms of tinnitus are incurable, and many of the existing treatments are ineffective.

Hyperacusis. Hyperacusis is increased sensitivity to low or moderate sounds (Woolford et al., 1988). Jansen, Helleman, Dreschler, and de Laat (2009) define hyperacusis as an individual’s perception of loudness as measured through dynamic range and the volume levels that are tolerable to individuals within a given dynamic range (p. 155). Jansen et al. found that 79% (190) of musicians reported experiencing hyperacusis, with cases ranging from slight (22%, 52) to very severe (10%, 23) (p. 160).

Diplacusis. Diplacusis is the perception of a single pitch as two separate sounds (Woolford et al., 1988). Most individuals have subtle differences in pitch recognition between both ears, but the difference is so small that it goes unnoticed; however, when the pitch difference between both ears exceeds more than a quarter tone, the individual hears the pitch as doubled or dissonant (Woolford et al., p. 267). Jansen et al. (2009) state that “only a few very sensitive people experience diplacusis, but also pathological matching of frequency and pitch not experienced by a musician can cause her/him to play out of tune” (p. 162). They also found that individuals exhibiting signs of diplacusis had “increased average threshold levels” (p. 162) indicating a potential relationship between diplacusis and noise-induced hearing loss.

Distortion. Kähäri, Zachau, Eklöf, Sandsjö, and Möller (2003) define distortion as hearing frequencies, overtones and/or harmonics not “in their true

original form but as distorted, unclear, fuzzy and out of tune” (p. 281). In a different study, Kähäri, Eklöf, Zachau, Sandsjö, and Möller (2003) found distortion among 24% (33 out of 139) of rock/jazz musicians and more commonly experienced by men (p. 99). Few studies investigating music-induced hearing loss specifically address the symptoms of hearing distortion among musicians.

Other symptoms. Hart, Geltman, Schupbach, and Santucci (1987) refer to occupational sound hazards among musicians as a “hidden disease” (p. 22), which may cause physical damage to the hearing mechanism, as well as non-auditory effects, including changes to the musculoskeletal and gastrointestinal systems, equilibrium, respiration, hypertension, and mental health considerations. Samelli, Matas, Carvallo, Gomes, and de Beija (2012) suggest that noise-induced hearing loss can lead to a number of health concerns such as insomnia, cardiovascular disease, and mental health concerns, as well as sound sensitivity and discomfort, a decrease in attention to musical performance, and an increase in aggressive behavior (p. 11).

Identifying Hearing Loss

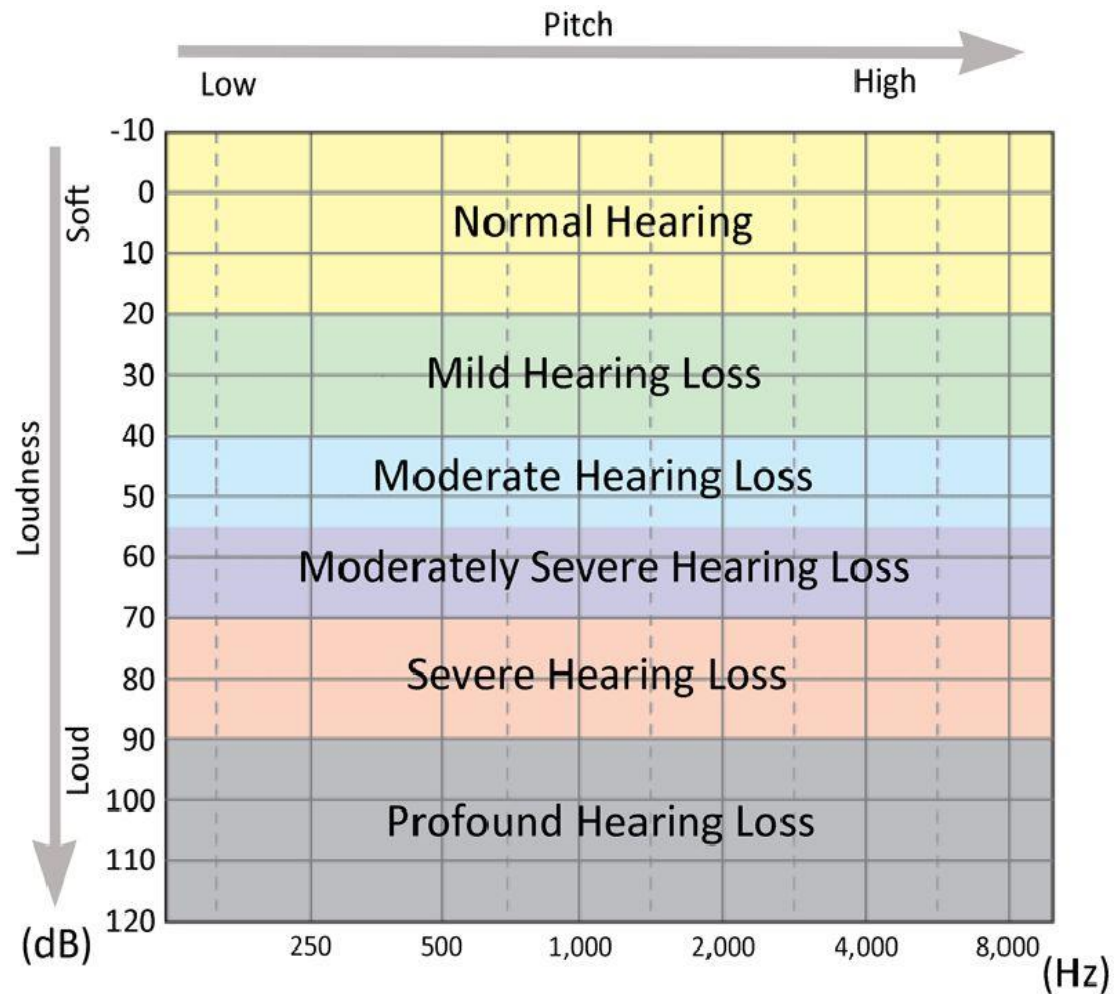
Identifying the causes and symptoms of hearing loss can be difficult if not impossible depending on the physical and environmental factors unique to each individual’s experience (Lubet, 2010). Exposure to excessive sound levels leads to temporary or permanent hearing loss depending on the amount of exposure and the susceptibility of the individual (Hart et al., 1987). Identifying occupational (and recreational) sound exposure is achieved by measuring the sound pressure levels

individuals are exposed to and the results of audiological exams traditionally conducted through methods of pure-tone audiometry (Kutz & Meyers, 2014).¹²

Figure 2 shows how to read and interpret an audiogram:

¹² Pure-tone audiometry measures hearing sensitivity of the peripheral and central auditory systems in order to determine the “softest sound audible to an individual at least 50% of the time” (Kutz & Meyers, 2014, “Audiology Pure-Tone Testing,” para. 1).

Figure 2. Hearing Levels Expressed on an Audiogram



*Figure 2. Hearing levels expressed on an audiogram. Reprinted from “Molecular Modelling-Based Investigations of a Mutant Protein in Patients with Hearing Loss” by Kazunori Namba, 2014. © 2014 Namba K. Published in *Pharmacology and Therapeutics*, edited by Sivahumar Joghi Thatha under CC By 3.0 license. Retrieved from <http://dx.doi.org/10.5772/58398>. Reprinted with permission.*

Temporary threshold shift (TTS). Temporary threshold shift is a “temporary increase in the threshold of audibility for an ear caused by exposure to high-intensity acoustic stimuli” (NIOSH, 1998, p. xv). In audiometric tests, temporary threshold shifts often appear as a temporary change in hearing acuity between 4 and 6 kHz (Woolford et al., 1998). Pisano (2007) describes temporary threshold shift as a “cotton-in-the-ears sensation” (p. 26) commonly experienced after attending a loud rock concert without the use of hearing protection. The effects of a temporary threshold shift on hearing, which are largely dependent on the intensity and duration of the sound exposure, as well as the susceptibility of the individual, can last for several days before hearing returns to normal; however, prolonged exposure to excessive sound levels can lead to a permanent shift in the hearing mechanism (Hart et al., 1987; Pisano, 2007; Sataloff, 1997).

Permanent threshold shift (PTS). Permanent threshold shift is a “permanent increase in the threshold of audibility for an ear” (NIOSH, 1998, p. xiv). Individuals with noise-induced hearing loss often display a permanent threshold shift in the 4–6 kHz frequency range on an audiogram (NIOSH, 1998). Holland (2004) defines permanent threshold shift as a “permanent shift of the hearing threshold for a specific range of frequencies” (p. 14). Permanent threshold shift occurs after repeated exposure to excessive sound levels. Limb (2004) explains how temporary threshold shifts can become permanent with increased exposure: “After repeated assaults on the auditory system and recurrent temporary shifts, however, things start changing. The

system loses its ability to rebound from the threshold shift. Eventually, the threshold shift becomes permanent and irreversible” (p. 34).

Sound pressure levels (SPL). The intensity of sound pressure is defined as the magnitude of sound (watts per meter squared) measured in decibels (Holland, 2004). The frequency of a sound is the number of vibrations of a mass (Hertz, Hz), or the “number of cycles per second of the mass in motion, which produces a tone” (Holland, p. 17). Intensity, frequency, and waveform are analogous to loudness, pitch, and timbre (p. 17). Sound pressure levels are measured by sound level meters, personal dosimeters, and impulse meters (Pisano, 2007). Sound level meters consist of a microphone, electronic amplifier, and a decibel meter display; personal dosimeters record sound exposure over a specific period of time based on a time-weighted average; impulse meters measure high intensity impact sounds such as gunshots (Pisano, p. 45).

Audiometric notch. The audiometric notch “has long been recognized as a clinical sign of exposure to noise” (McBride & Williams, 2001, p. 49). The audiometric notch is considered to be evidence of noise-induced hearing loss when there is a significant decrease of 10 to 40 dB, which appears as a dip or notch in an audiogram, around the 4 kHz frequency (Royer, 1996, p. 7). The frequencies most affected by noise-induced hearing loss are generally between 3 and 6 kHz, but can also include the 2 and 8 kHz frequencies (NIOSH, 1998). Figure 3 is an example of a typical notched audiogram indicating noise-induced hearing loss:

Figure 3. Audiometric Notch Typical of Noise-induced Hearing Loss

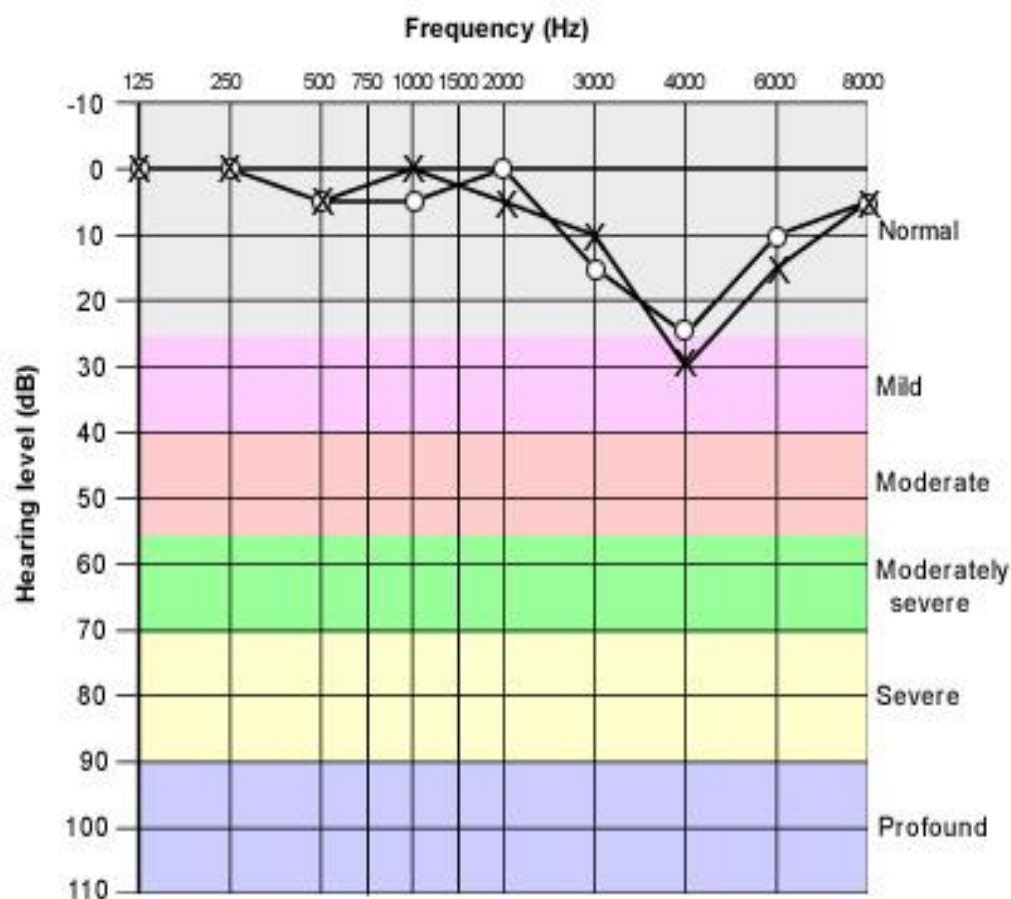


Figure 3. Audiometric notch typical of noise-induced hearing loss. X = hearing threshold of left ear; O = hearing threshold of right ear. Reprinted from “Noise-induced hearing loss,” by P. M. Rabinowitz, 2000, *American Family Physician* 61(9), p. 2749. Retrieved from www.aafp.org/afp/2000/0501/p2749.html. Reprinted with permission.

Noise-Induced Hearing Loss

OSHA (2014) defines noise-induced hearing loss as excessive noise exposure, measured in intensity and duration to unwanted sound, and estimates that the phenomenon affects approximately 30 million Americans.¹³ NIOSH (1998) recognizes the threat of noise-induced hearing loss¹⁴ as an irreversible health hazard “caused by exposure to sound levels or durations that damage the hair cells of the cochlea” (p. 11), which may result in temporary or permanent sensorineural hearing loss. The American Medical Association (AMA) (1990) further illustrates the effects of noise-induced hearing loss:

Hearing impairment associated with noise exposure can occur at any age, including early infancy, and is often characterized by difficulty in understanding speech and the potentially troublesome symptom, tinnitus (i.e., ringing in the ears). Very loud sounds of short duration, such as an explosion or gunfire, can produce immediate, severe, and permanent loss of hearing. Longer exposure to less-intense but still hazardous sounds, commonly encountered in the workplace or in

¹³ These statistics do not include workers from music-related fields.

¹⁴ In this dissertation, I do not use the accepted abbreviations for noise-induced hearing loss (NIHL) and music-induced hearing loss (MIHL), unless the abbreviations are used by an author in a direct quote. My decision not to use these abbreviations is meant to avoid further medicalizing the phenomenon through the use of jargon. I will also refrain from using abbreviations for terms such as time-weighted average (TWA), temporary threshold shift (TTS), permanent threshold shift (PTS), recommended exposure limit (REL), and sound pressure level (SPL) in order to improve the readability of the text. As mentioned in Chapter 1, all abbreviations and acronyms used throughout this dissertation can be found in Appendix A.

certain leisure-time activities, exacts a gradual toll on hearing sensitivity, initially without the victim's awareness. (p. 3185)

Figure 4 illustrates the loudness (dB) and pitch frequency (Hz) of environmental sounds (e.g., birdsong, lawnmowers, airplanes) in relation to the location of speech sounds necessary for speech recognition and language development for children:

Figure 4. The Speech Banana

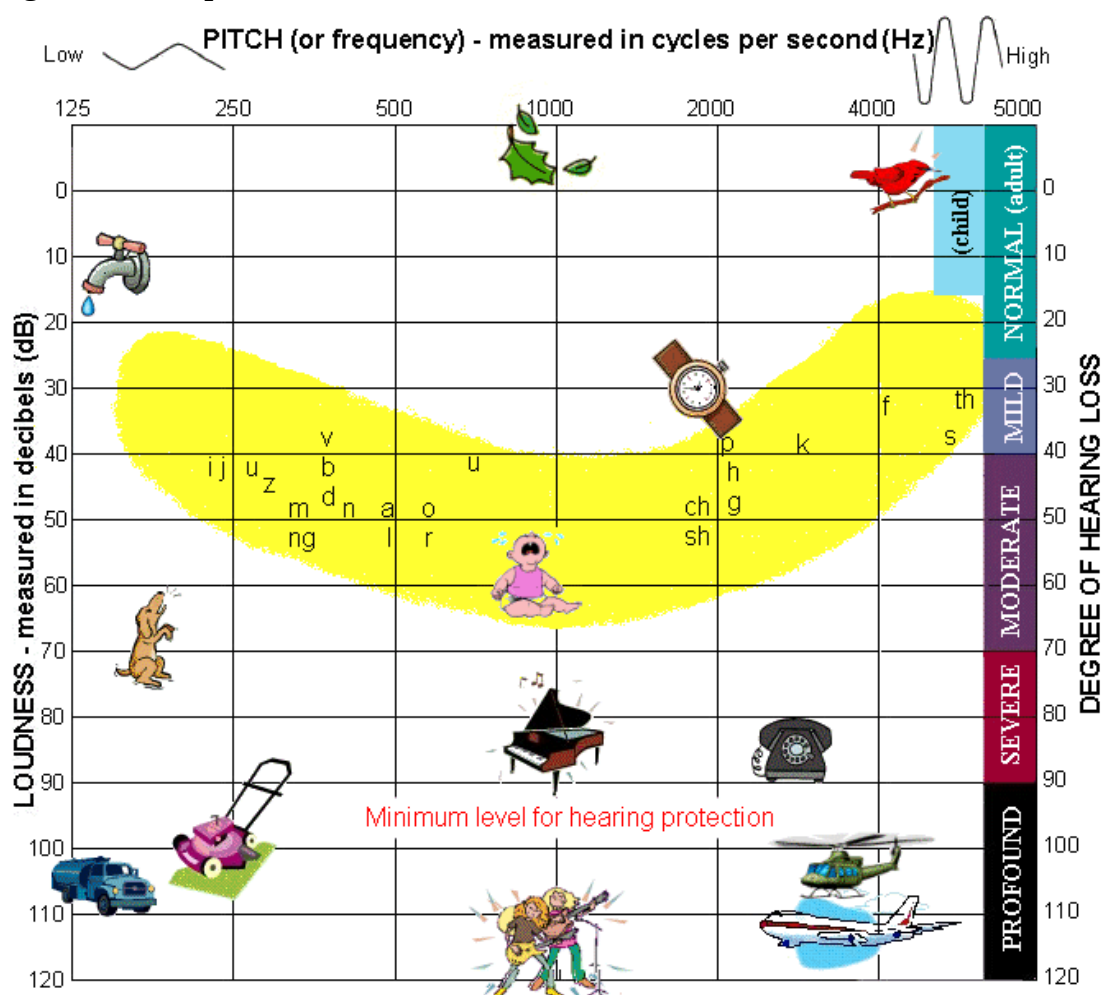


Figure 4. The speech banana. Reprinted from Listening and Spoken Language Knowledge Center, 2015. Retrieved from www.agbell.org/SpeechBanana/. Reprinted with permission.

This figure suggests that hearing protection should be used when exposed to sounds of 90 dB or louder. This figure also shows that individuals with moderate to mild hearing loss may lose the ability to hear specific speech sounds from a wide range of low and high frequencies.

In their report on occupational hearing loss for the American College of Occupational and Environmental Medicine (ACOEM), Kirchner et al. (2012) distinguish between two types of occupational noise-induced hearing loss: acoustic trauma, which is a “sudden change in hearing as a result of a single exposure to a sudden burst of sound” (p. 106); and noise-induced hearing loss, which “develops slowly over several years” (p. 106) due to “continuous or intermittent noise exposure” (p. 106). Kirchner et al. (2012) list several characteristics of occupational noise-induced hearing loss:

- Noise-induced hearing loss is always sensorineural because it affects the cochlear hair cells of the inner ear.
- Noise-induced hearing loss is typically bilateral (affecting both ears) due to the symmetrical nature of most noise exposures.
- The first sign of noise-induced hearing loss is indicated by a notched audiogram in the higher frequencies of hearing at the 3, 4, or 6 kHz mark, and shows recovery at the 8 kHz mark.
- Noise-induced hearing loss typically does not produce hearing loss greater than 75 dB in high frequencies or more than 40 dB in lower frequencies, with such a case more likely caused by presbycusis.
- Noise-induced hearing loss is due to “continuous or intermittent noise exposure” (p. 106) which leads to rapid hearing loss during the first 10 to 15 years of exposure, but the rate decreases as the hearing threshold increases; whereas hearing loss due to presbycusis continues to accelerate.

- Excessive noise-exposure does not necessarily result in an increase in sensitivity to future noise exposure.
- Research has yet to determine whether the progression of noise-induced hearing loss continues after the noise exposure is discontinued.
- Noise exposure below 85 dB (8-hour time-weighted average) carries low risk, but increases significantly with increases in sound pressure levels.
- Noise exposure with intermittent rest periods is less damaging than continuous noise exposure accumulated over the span of years.
- Temporary threshold shift, which typically disappears between 16–48 hours after the exposure, indicates that continued exposure will result in permanent threshold shift if similar exposures continue. (pp. 106–107)

Occupational Noise Exposure Standards

Occupational noise exposure standards in the United States were established after the passing of the Occupational Safety and Health Act of 1970 (Public Law 91–596), which created OSHA “to assure safe and healthy working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education, and assistance” (OSHA, 2014a, para. 1). NIOSH was formed as a division of the Department of Health and Human Services (DHHS) and was charged with developing and establishing recommendations for occupational safety and health standards in support of the policies established by OSHA. The noise exposure standards created by both of these agencies are reviewed further in the subsequent sections of this chapter.

Occupational Safety and Health Administration (OSHA)

As part of the United States Department of Labor, OSHA improves and maintains safe working conditions under the guidelines established by the Occupational Safety and Health Act of 1970. OSHA (2008) requires 90 dBA over an 8-hour time-weighted average, with a 5-dB exchange rate as a daily permissible exposure limit. The 5-dB exchange rate means that for every 5 dB increase in sound intensity, the duration of exposure must be reduced by half. Under OSHA criteria, an individual's daily exposure could be 95 dBA for four hours, 100 dBA for two hours, and 105 dBA for one hour (OSHA, 2008).

National Institute of Occupational Safety and Health (NIOSH)

Musicians receive more protection from occupational noise exposure under NIOSH standards than from OSHA requirements (Henoch & Chesky, 2000; Owens, 2004). After the passing of the Occupational Safety and Health Act of 1970, NIOSH was formed to become the primary governing body in charge of determining “occupational safety and health standards and describing exposure concentrations that are safe for various periods of employment” (NIOSH, 1998, p. iii). The safety and health standards established by NIOSH aim to protect workers from “diminished health, functional capacity, or life expectancy” (NIOSH, p. iii) directly related to their work experience. NIOSH published the first occupational noise exposure standards in 1972 and did not revise these standards until 1998, neither of which recognize music-induced hearing loss as an occupational hazard.

NIOSH (1998) conducted the National Occupational Exposure Survey (NOES) between 1981–1983 in order to “provide data describing the occupational safety and health conditions in the United States” (p. 13); however, the NOES study only investigated the effects of noise-induced hearing loss on workers from fields related to agriculture, mining, construction, manufacturing, transportation, and the military. NIOSH (1998) states that OSHA standards do not cover all fields, and “the protection that a worker receives from occupational noise depends in part on the sector in which he or she is employed” (p. 17). The OSHA noise exposure standards are inadequate for music-related fields when we consider studies that show that instrumental music educators are consistently exposed to decibel levels surpassing the allowable limits of daily noise exposure (Chesky, 2011; Owens, 2004; Walter, 2009).

NIOSH (2014) recognizes that “repeated exposures to loud noise can lead to permanent, incurable hearing loss or tinnitus” (para. 2) and recommends “removing hazardous noise from the workplace whenever possible and using hearing protectors in those situations where dangerous noise exposures have not yet been controlled or eliminated” (para. 2). According to NIOSH (1998) guidelines, the exposure limit for occupational noise should not exceed 85 dBA over an 8-hour time-weighted average. Using this baseline, NIOSH established the 3-dB exchange rate to determine the daily limit for occupational noise exposure. The 3-dB exchange rate states that the duration of worker exposure should be cut in half for every 3-dB increase in sound. Under these guidelines, the daily exposure limit for workers should not exceed 88 dB for

four hours, 91 dB for two hours, and 94 dB for one hour (NIOSH, p. iii). Table 1 compares the occupational sound exposure standards required by OSHA and NIOSH:

Table 1. Comparison of Occupational Sound Exposure Standards Between OSHA and NIOSH.

Duration of Exposure (hours/day)	Sound Pressure Level (Average dBA)	
	OSHA	NIOSH
8.00	90	85
6.00	92	86
4.00	95	88
3.00	97	89
2.00	99	91
1.00	105	94
.50	110	97
.25	115	100

Note. Adapted from “Mapping Sound Intensities by Seating Position in a University Concert Band: A Risk of Hearing Loss, Temporary Threshold Shifts, and Comparisons with Standards of OSHA and NIOSH,” by N. V. Holland III, 2004, p. 20. Reprinted with permission.

Music-Induced Hearing Loss

The occupational noise exposure standards outlined by OSHA and NIOSH are problematic when applied to music-related fields because of the blurred distinction between musical sound and hazardous noise. Santucci (2009) illustrates how music-induced hearing loss affects musicians: “The great irony of being a musician is that the sound produced—the very essence of the musical experience—represents a long-term health risk to the artist” (p. 103). In other words, noise is an unwanted

byproduct of an activity not inherently connected to the production of sound (e.g., construction, manufacturing), whereas musical sound is the desired product of music-making. The working definition of music-induced hearing loss for my study is any loss of hearing or damage to the hearing mechanism that is caused by exposure to musical sound.

Hill (2003) identifies several signs that may indicate music-induced hearing loss among instrumental music educators: difficulty hearing high-pitched instruments, difficulty identifying tuning discrepancies in high-pitched registers, asking people to repeat themselves, listening to the television at loud levels, and the perception that students are mumbling (p. 38). Hill (2003) illustrates the ramifications of music-induced hearing loss for musicians and music educators:

Many band, orchestra, and choral conductors often choose simply to live with the annoyance of hearing damage. A conductor with hearing loss is placed in a very precarious position. We may deny or try to camouflage the real problem. This denial is, of course, not only due to the professional standards required from us, but also to the fact that most of us truly enjoy our profession and do not want to retire from a hard-earned teaching position prematurely. (p. 36)

The physical symptoms of music-induced hearing loss force musicians and music educators to consider the harsh reality that music exposure has potentially career-ending consequences.

Music-induced hearing loss can affect individuals from any music-related occupation, regardless of genre (Sataloff, 1997), including professional musicians (Chesky & Henoeh, 2000), music students (Barlow, 2010, 2011; Chesky 2010, 2011; Folmer, Griest, & Martin, 2002; Henoeh & Chesky, 2000; Holland, 2004; Miller, Stewart, & Lehman, 2007; Schmidt, Verschuure, & Brocaar, 1994; Walter, 2009), and instrumental music educators (Cutietta, Klich, Royse, & Rainbolt, 1994; Cutietta, Millin & Royse, 1989; Hill, 2003; Owens, 2003; Pisano, 2007; Ross, 2001; Royer, 1996; Solomon, 1986).¹⁵ In my review of these bodies of literature, I identified several contributing factors consistently identified by researchers as related to the development of music-induced hearing loss: (a) intensity and duration¹⁶ (b) susceptibility, (c) recovery time, (d) age, (e) instrument, (f) physical placement, and (g) acoustical environment.¹⁷

¹⁵ Other populations significantly affected by music-induced hearing loss include concert-goers (Chung, DesRoches, Meunier, & Eavey, 2005) and users of personal media players (McCormick & Matusitz, 2010; Vogel, Brug, Hosli, van der Ploeg, & Raat, 2008). These populations are beyond the scope of this study.

¹⁶ My decision to treat intensity and duration as one category is due to the entwined nature of these two contributing factors to music-induced hearing loss and their frequent appearance in related research; it is nearly impossible to separate these two symbiotic factors when discussing the effects of sound exposure on hearing.

¹⁷ I employ these seven categories to organize my presentation of the relevant literature on music-induced hearing loss among professional musicians, music students, and instrumental music educators. I selected these categories based on the frequency in which they appear in the research related to each population discussed in this chapter. Some categories appear in the relevant literature more often than others, which is reflected in my treatment of each category in the subsequent sections.

Music-Induced Hearing Loss in Professional Musicians

Studies examining the effect of music-induced hearing loss on professional musicians have gained increasing attention in music education and performing arts medicine over the past four decades. The scope of such studies has been limited, however, primarily focusing on how music-induced hearing loss affects performers from the genres of rock/pop/jazz and orchestral music.¹⁸ Although professional musicians' experiences related to hearing loss are not the primary focus of the present study, these studies represent the early stages of research investigating music-induced hearing loss and illustrate how this research has evolved by eventually expanding to include other at-risk populations of musicians, such as music students and instrumental music educators.

Rock/pop/jazz musicians. Forty years ago, music-induced hearing loss among musicians was mostly considered a consequence of overexposure to excessively amplified rock music. Most of the extant literature investigating music-induced hearing loss among rock musicians includes noise exposure studies measuring sound pressure levels during rehearsals and performances. In the following section, I review the relevant literature regarding music-induced hearing loss among rock/pop/jazz musicians as it relates to the following factors: (a) intensity

¹⁸ It is important to recognize the musical diversity among professional musicians, music students, and instrumental music educators and their mobility between musical genres. For the purposes of the present study, I treat rock/pop/jazz musicians and orchestral musicians as two distinct groups of professional musicians based on how they are discussed in the relevant literature I reviewed for this study.

and duration, (b) susceptibility, (c) recovery time, (d) age, (e) instrument, and (f) physical location.

Intensity and duration. Researchers investigating music-induced hearing loss measure intensity in decibels of sound pressure, whereas the listener perceives intensity as loudness. The duration of sound exposure in music-induced hearing loss research is measured in time-weighted averages, usually expressed in 8-hour intervals based on the average work day. Although the research investigating music-induced hearing loss has produced inconsistent and often contradictory findings, Rintelman and Borus (1968) claimed that researchers generally agree that sound pressure levels between 85 dB and 105 dB “can be injurious to hearing” (p. 380). Further, they explained that “intensity can be safely increased by reducing the duration of the exposure time and increasing the interval between exposures and vice versa” (p. 380). However, they found “no evidence to show that the length of time had the effect of reducing the sensitivity of audiometric thresholds” (p. 382).

In 1964, the AMA stated that “habitual, continuous” (as cited in Rintelman and Borus, 1968, p. 384) noise exposure to average sound pressure levels of 105 dB can cause noise-induced hearing loss after more than 16 minutes.¹⁹ Speaks, Nelson, and Ward (1970) recorded sound level measurements which ranged from 105 to 120

¹⁹ The occupational noise exposure standards used by the AMA in 1964 were more closely aligned with the current standards recommended by NIOSH than OSHA when we consider the respective 3-dB and 5-dB intensity-duration exchange rates used by each organization. Using the 3-dB exchange rate, NIOSH (1998) warns that workers are at risk for hearing loss after 3.7 minutes of exposure to 105 dBA of sound pressure levels. Using the 5-dB exchange rate, OSHA (2008) allows workers to be exposed to 1 hour of 105 dBA of sound pressure levels.

dB—90 to 110 dBA using an 8-hour time-weighted average—from a single performance by 10 different rock bands including 54 musicians (p. 216). Speaks et al. (1970) found that rock musicians are exposed to “potentially hazardous” (p. 218) levels of exposure if the duration of such exposure is “repeated daily for many years” (p. 218). Jerger and Jerger (1970) recorded sound pressure levels experienced by two rock groups of nine musicians, which ranged from 104 to 124 dB, with peaks as high as 130 dB (p. 222).

Susceptibility. Rintelman and Borus (1968) concluded that some individuals are “highly susceptible to noise-induced hearing loss” (p. 383). However, they also state that individuals “can be exposed to fairly high levels of broad band continuous noise, approximately 105 dB SPL, without suffering damage to their auditory mechanism” (pp. 383–384). The rock musicians in this study were exposed to approximately 105 dB of sound pressure levels for an average of 11.4 hours a week for 2.9 years, yet 95% of them did not exhibit any symptoms of hearing loss (p. 385). The researchers of this study suggested the possibility that only a small percentage of individuals are susceptible to this type of sound exposure.

Recovery time. Many researchers consider recovery time as a contributing factor to music-induced hearing loss among rock/pop/jazz musicians, often by comparing the constancy of industrial noise with the intermittent sounds produced by musical ensembles. Making this comparison, Rintelman and Borus (1968) claimed that the intermittent nature of musical sound, as opposed to the constant sounds

produced by industrial noise, provided rock musicians with ample recovery time to prevent hearing loss (p. 384). They defined recovery time as an “interaction between intensity, on-time, and off-time” (p. 384), and described the intermittency of rock music as an “on-time of approximately three to five minutes and with a very brief off-time of usually less than one minute” (p. 384). In a more recent study, Samelli et al. (2012) also compared industrial noise to musical sound regarding recovery time and the intermittent nature of music:

Musicians are different from factory workers in several areas that make the former slightly less susceptible to hearing loss. Music tends to be intermittent, with loud passages and quiet passages intermixed, while industrial noise tends to be continuous. Perhaps this intermittency makes the music slightly less damaging than an equal intensity of noise for a similar length of time. (p. 10)

Axelsson and Lindgren (1978) also addressed recovery time in pop music, which they found was different from industrial noise because it offered “recovery and rest” (p. 229) to the musicians.

Age. Axelsson and Lindgren (1978) stated that duration of exposure and age “appear to increase the risk of hearing impairment” (p. 225) among pop musicians. Hensch and Chesky (1999) addressed the lack of research investigating the relationship between age and excessive sound exposure among musicians; however, they cited the University of North Texas Musician Health Survey (UNT-MHS), which found a higher percentage of younger musicians with hearing problems

compared to the general population (p. 77). Hoffman, Cunningham, and Lorenz (2006) stated that “assessing hearing loss associated with playing time, rather than years of experience, may be more indicative of the effects of long-term music exposure” (p. 52), and determined that “much of the relationship between hearing threshold and years of experience is accounted for by age” (p. 52). Further, they found that hearing loss was evident in percussionists at early ages, which indicated that these young musicians “placed themselves at a disadvantage at the beginning of their career” (p. 54).

Instrument. Sound pressure levels produced by specific instruments are another contributing factor in the development of hearing loss among musicians. Using the findings of the UNT-MHS survey mentioned above, Chesky and Henoch (2000) examined the incidence of hearing problems among 3,292 musicians based on primary performance area and primary instrument, with 21.7% self-reporting a hearing problem. Musicians from the following performance areas experienced the highest occurrence of hearing loss: rock/alternative/R&B/hip-hop/top-40/rap/pop musicians (32.8%), jazz/blues (26.9%), and folk/country/bluegrass (20.7%) (p. 36).²⁰ The highest occurrence of self-reported hearing loss among musicians who played instruments most closely associated with rock/pop/jazz included electric bass (36.6%), drum set (31.8%), and electric guitar (28.2%) (p. 36). Chesky and Henoch found that in comparisons between classical and nonclassical musicians by

²⁰ Music educators (22.3%) participating in the UNT-MHS survey represented the third highest group of musicians with self-reported hearing problems (p. 36).

instrument, “nonclassical musicians reported a higher rate of occurrence for hearing loss problems” (p. 37). The researchers found several notable differences between the two groups. For instance, 28.8% of nonclassical bass players reported hearing loss compared to 7.4% of classical bass players (p. 37).

Hoffman, Cunningham, and Lorenz (2006) studied hearing thresholds among percussionists in order to determine the contributing risk factors for music-induced hearing loss. They found that the percussionists displayed hearing thresholds “significantly worse” (p. 47) than their peers, and the prevalence of hearing loss among the percussionists was 39% compared to 9% in the control group. Playing rock/pop music was identified as one of the primary risk factors among the percussionists in this study.

Physical location. Physical location is a contributing factor to music-induced hearing loss among rock musicians based on where the musicians are in relation to the sound source. Generally, rock musicians are in close proximity to the sound source, usually standing in front of amplifiers and monitors (Hart et al., 1987). Kähäri, Zachau, et al. (2003) described the sound environment for rock/jazz musicians as mostly amplified, with sounds being reflected from monitors and loudspeakers, while musicians move freely about the stage (p. 287). Rintelman and Borus (1968) measured the mean, range, and overall sound pressure levels from various distances from center stage produced by six different rock bands, and found: (a) the mean linear reading (overall sound pressure level) was 105 dB, “regardless of distance from the source” (p. 378); (b) the median was 106 dB; and (c) the range was

between 91 and 114 dB (p. 378). The researchers concluded that the average sound pressure levels “varied very little as a function of distance within a range of 5 to 200 feet from the source” (p. 378).

Summary of findings. Speaks et al. (1970) found “dangerous” (p. 218) levels of temporary hearing loss and signs of permanent hearing loss among rock musicians following one performance. Jerger and Jerger (1970) concluded that “performance of contemporary rock-and-roll music poses a serious threat to hearing” (p. 223) based on their measurements of the temporary threshold shifts among two rock bands.²¹ In another study measuring temporary threshold shifts among rock musicians, Reddell and Lebo (1972) found that all 43 of their participants experienced tinnitus following rehearsals and performances, and 10 of these musicians reported “chronic hearing difficulty” (p. 2). Axelsson and Lindgren (1978) found sensorineural hearing loss of at least 20 dB among 13–30%²² of pop musicians in the 3–8 kHz frequency range and determined that “age, weekly, and total exposure time appear to increase the risk of hearing impairment” (p. 225). Examining the associations between hearing impairment and psychosocial working conditions, Kähäri, Eklöf, et al. (2003) found 74% of 139 rock/jazz musicians reported experiencing at least one hearing disorder,

²¹ Four out of five of the musicians (ages 17 to 23) from the first group exhibited 30 to 50 dB temporary threshold shifts between the 2 and 8 kHz frequency ranges following performances ranging from 104 to 124 dB; all four musicians (ages 14 to 15) from the second group showed a temporary threshold shift of at least 15 dB between the ranges of 2 and 8 kHz following performances ranging from 108 to 116 dB (Jerger & Jerger, 1970, pp. 222–223).

²² The varying percentages in Axelsson and Lindgren’s (1978) findings were determined by which scale they used to define normal hearing (p. 229).

which could include pure-tone hearing loss (decreased hearing sensitivity), tinnitus (ringing), hyperacusis (hypersensitivity to the loudness of sounds), diplacusis (sudden change in perceived pitch frequency), or distortion (unclear perception of frequencies, overtones, or harmonics) (p. 98).²³

Researchers investigating music-induced hearing loss among rock musicians have also found contrary and inconclusive findings. Rintelman and Borus (1968) concluded that the “concern over the harmful effects of rock and roll music on the hearing of young people appears to be unwarranted” (p. 385). Concurring with this study, Axelsson, Eliasson, and Israelsson (1995) found remarkably “well-preserved” (p. 245) hearing among rock musicians despite their performance history and exposure to amplified music. The majority (78%) of active musicians tested in this follow-up study had normal hearing after 26 years of exposure, yet 27 of the 40 active musicians reported an ear-related medical symptom (i.e., hearing loss, tinnitus, hyperacusis) (p. 251). The researchers suggested possible reasons for the hearing preservation among these participants: experimental evidence that music is less harmful than noise (Lindgren & Axelsson, 1983), the musicians’ positive attitude toward performing and low levels of stress while playing, and the “protective effect from a continuous contraction of the stapedius muscle” (p. 245).²⁴

²³ Although Kähäri, Eklöf, et al. (2003) found a relationship between tinnitus and a difficulty relaxing, they found no direct relationship between negative psychosocial factors and hearing disorders among the musicians in the study.

²⁴ The stapedius muscle is “a small muscle on the wall of the tympanic cavity of the middle ear. It acts reflexively in response to loud sounds to reduce excessive vibrations that could injure the internal ear by pulling the head of the stapes posteriorly out of the oval window” (Stapedius, Mosby’s Medical Dictionary, 2009).

Orchestral musicians. The majority of the literature on music-induced hearing loss examines the phenomenon's effect on professional orchestral musicians. The literature reviewed in this section provides a comprehensive look at these studies, which represent the vast majority of extant literature examining music-induced hearing loss over the past four decades. Similar to the studies examining music-induced hearing loss among rock musicians, I present the studies focusing on orchestral musicians based on the following contributing factors frequently identified in the research: (a) intensity and duration, (b) susceptibility, (c) recovery time, (d) age, (e) instrument, (f) physical location,²⁵ and (g) acoustical environment.

Intensity and duration. Westmore and Eversden (1981) reported sound pressure levels during orchestra rehearsals by conducting pure-tone audiometry tests obtained from 34 musicians. The sound pressure levels of this study were derived from 14 hours of recorded time and exceeded 90 dBA for 3.51 hours and 110 dBA for 1.2 minutes (p. 761). Sound pressure levels created by the percussion section did exceed 120 dBA, but did not last long enough to warrant measuring (p. 761). Investigating noise exposure among classical musicians in the Winnipeg Symphony Orchestra, Sabesky and Korcynski (1995) reported sound levels between 82 and 90

²⁵ Physical location is often referred to as physical placement or seating position in the literature investigating music-induced hearing loss among orchestral musicians, music students, and instrumental music educators.

dBA in their rehearsal room, theatre pit, and stage, with instantaneous peak exposures reaching levels of 140 dBA (p. 131).²⁶

Further displaying the relationship between intensity and duration, Axelsson and Lindgren (1981) recorded the maximum and minimum L_{eq} ²⁷ ranges in the Concert Hall and Lyric Theatre in Göthenburg. Respective of these two testing locations, the researchers recorded maximum and minimum sound pressure levels of 91.2 dBA and 83.3 dBA for a 2-hour performance in the Concert Hall, and 91.6 dBA and 85.9 dBA for a 2-hour and 25-minute performance in the Lyric Theatre (p. 22).

Babin (1999) examined the orchestra pits of 14 Broadway shows, based on complaints filed by performers reporting the excessive sound levels experienced by the musicians in the pit during performances. Babin found that 76% of the performances exceeded NIOSH requirements of 88 dBA for a four-hour period; two shows exceeded OSHA levels of 100 dBA for two-hour periods; and three shows surpassed the OSHA ceiling level of 130 dBA for sound exposure.

Susceptibility. Woolford et al. (1988) argued for the development of specific hearing tests to determine individual susceptibility to hearing loss. The researchers point out that individual susceptibility to hearing loss includes the development of tinnitus: “A given exposure in some persons will produce a long-lasting tinnitus while

²⁶ It should be noted here that the 80 dBA baseline required in Manitoba is more stringent than that required by OSHA and NIOSH standards, which recommend occupational sound exposure not to exceed 90 and 85 dBA, respectively.

²⁷ “ L_{eq} is the level of a constant sound, expressed in dB, that in a given time period has the same energy as does a time varying sound” (Chesky, 2010, p. 30).

in others it will have no effect at all” (p. 270). Royster, Royster, and Killion (1991) claim that musicians “may face a risk of hearing damage from on-the-job noise, depending on their long term noise exposure and their own susceptibility to noise-induced hearing loss” (p. 2794). Further, they argue that—based on research findings showing consistent evidence of audiogram patterns displaying noise-induced hearing loss—the “degree of hearing hazard is low, but that susceptible individuals may be at risk” (p. 2794). The researchers predict a “small amount” of noise-induced permanent threshold shift among musicians of “average susceptibility” (p. 2800) and suggest that musicians may experience permanent threshold shifts if they are exposed to increased sound pressure levels over the span of an 8-hour work day in relation to the 15-hour work week they tested for in the study (p. 2801).

Recovery time. Similar to the findings related to rock/pop/jazz musicians, recovery time is another contributing factor to the development of music-induced hearing loss among orchestral musicians. Cutietta et al. (1989) suggested that the “frequent interruptions during practice sessions” (p. 42), which are common in orchestral ensembles, provide these musicians with relief from sound exposure. This recovery time makes it difficult to determine the effects of sound exposure on musicians, “since both performance and practice periods are much less rigidly scheduled and controlled than are industrial work periods” (p. 42). Cutietta et al. suggested that the “breaks between practices” (p. 42) could reduce the effects and risk of music-induced hearing loss among orchestral musicians.

Age. Axelsson and Lindgren (1981) examined 139 orchestral musicians (mean age, 44.9 years) and found that 42% of the participants had a worse pure-tone threshold than expected for their age.²⁸ Musicians from the younger age groups (20–29, 30–39, and 40–49 years old) in the study described the sound levels of orchestra rehearsals and performances to be “uncomfortably loud” and “painfully loud” more often than musicians from older age groups (p. 26). Jansen et al. (2009) conducted audiological exams on 241 orchestral musicians between the ages of 23 and 64, and found that these musicians displayed a higher level of hearing loss than expected based on age and gender. The participants were tested for audiometric thresholds, loudness perception, diplacusis, tinnitus, speech perception in noise, and otoacoustic emissions.²⁹ The musicians tested for this study displayed a higher level of hearing loss than expected based on age and gender. The study found that 79% of the participants experienced hyperacusis, 51% tinnitus, 24% distortion, and 7% diplacusis (p. 160).

Instrument. The participants of Axelsson and Lindgren’s (1981) study cited specific loud instruments (i.e., piccolo, flute, trumpet, French horn, percussion) as the cause of their tinnitus (p. 26). The pure-tone audiometry tests conducted by Osti, Eller, Dahlin, and Skylv (1989) among 96 orchestra musicians from the Royal Danish

²⁸ Axelsson and Lindgren (1981) found evidence of hearing loss in the pure-tone audiograms of each participant age group: 20–29 (3 out of 24), 30–39 (17 out of 39), 40–49 (14 out of 26), 50–59 (20 out of 24), 60–69 (17 out of 17), and > 70 (9 out of 9) (p. 27).

²⁹ Otoacoustic emissions are “sounds produced by the healthy ear, by the outer hair cells in the cochlea” (Jansen et al., 2008, p. 154). The absence of otoacoustic emissions is “associated with poorly functioning outer hair cells resulting in reduced selectivity and a decreased sensitivity” (p. 154).

Theatre revealed that the percussionists (median age of 34 years, range 29–59) had the poorest hearing in the left ear of all the groups tested and showed a significant difference between both ears at the 4 kHz frequency; the musicians from the strings group also exhibited worse hearing in their left ear at the 3 and 4 kHz frequencies (p. 245). Consistent with previous research (Axelsson & Lindgren, 1981; Ostri et al., 1991), Royster et al. (1991) found significant hearing loss (5.74 dB difference at 4 kHz, 4.44 dB difference at 3 kHz) among the violinists and violists at the 3–6 kHz frequencies range of the left ear. Similar to the findings in previous studies (Axelsson & Lindgren, 1981; Ostri et al., 1991), Kähäri, Axelsson, Hellström, and Zachau (2001) also discovered lower hearing thresholds in orchestral musicians who played percussion and woodwind instruments. The percussionists from this study displayed higher hearing thresholds compared to other instrument groups, and were the most exposed to impulsive noise, including sudden sounds exceeding 130 dB (p. 22).

Physical location. Jansson and Karlsson (1983) mapped the sound levels produced during three concerts given by the Radio Symphony Orchestra and the Stockholm Philharmonic Orchestra, and two ballet performances by the Stockholm Opera Orchestra. The researchers found that the sound levels produced by the orchestra exceeded the permitted 85 dBA dose of occupational noise allowed for a full working week (NIOSH standard), and were largely determined by the placement position of the musicians within the ensemble (p. 219). Musicians sitting in exposed positions, such as in front of the trumpet or percussion sections within the orchestra, exceeded the permitted dose of sound exposure after 10 hours per week, and after 25

hours when sitting in less exposed positions (p. 219). The researchers concluded that “if the risk criteria for hearing injuries caused by noise also apply to music, measures should be taken to reduce exposure to noise when ‘heavy’ music is played” (p. 221).³⁰

Westmore and Eversden (1981) previously found that the musicians with the most severe hearing loss were woodwind players who sat directly in front of brass and percussion sections. Johnson, Sherman, Aldridge, and Lorraine (1985) examined the relationship between hearing sensitivity and seating position among 60 Minnesota Orchestra members. The researchers measured the musicians’ hearing sensitivity in the frequency ranges between 3 and 8 kHz, and found no relationship between physical placement (seating position) and hearing loss. The musicians seated in front of brass sections complained the most about sound levels, even though the researchers did not find a correlation between seating position and hearing loss.

Ostri et al. (1989) investigated seating position within orchestra pits among musicians from the Royal Danish Theatre who expressed concern about the close proximity between musicians in confined spaces. In a similar study, Babin (1999) compared standard and alternate³¹ orchestra pit seating arrangements, which included open and closed ceilings. Babin described these acoustical environments as “cramped . . . and virtually enclosed” (p. 208). She found that the alternate seating arrangement with the open ceiling placed the conductor five feet above the bells of the brass

³⁰ Jansson and Karlsson (1983) define “heavy” music as that which exceeded 90 dBA (p. 220).

³¹ The standard seating arrangements placed the conductor in front of the ensemble, with the brass stage left, the strings stage right, and the drum set in the back of the ensemble. The alternate seating arrangements consisted of placing the conductor in the center of the ensemble, with the brass directly behind the conductor, the strings and keyboards stage right, and the percussion stage left.

instruments, which reduced the complaints about excessive sound levels among the conductors. Thus, “the more the pit was enclosed, the greater was the difficulty experienced by the musicians” (p. 208). Sabesky and Korczynski (1995) also found that sound exposure among musicians in orchestra pits was reduced “as the distance increased from the brass and woodwinds” (p. 133). Further, they reported that percussionists experienced the “lowest noise exposures in the orchestra” (p. 133).

Acoustical environment. Members of the Royal Danish Theatre experienced several adverse effects, including headaches, dizziness, tinnitus, and other hearing problems during and following pit performances (Ostri et al., 1989, p. 245). Previously, Westmore and Eversden (1981) found no difference between the sound pressure levels produced in orchestra pits and concert halls, which they attributed to the “dampening effect of clothing on sound within the confined space available” (p. 763). Sabesky and Korczynski (1995) measured the sound pressure levels experienced by orchestral musicians in the Winnipeg Symphony Orchestra by comparing the acoustical environments of their rehearsal room, main stage, and orchestra pit during rehearsals. The sound pressure levels measured in the rehearsal room were 88 and 90 dBA; 85 and 86 dBA in the pit; and 82, 84, and 88 dBA on the main stage (p. 132). The researchers concluded that the acoustical environment “did not result in an appreciable difference in the L_{eq} , which ranged from 87 to 92 dBA” (p. 134).

Camp and Horstman (1992) investigated sound exposure among orchestral pit musicians while performing Wagner’s opera cycle, *The Ring of the Nibelung*. The researchers found that the “cumulative noise dose was lower in the orchestra pit and

in the rehearsal hall than during actual performances” (p. 37). They cited the larger room and chair placement in the rehearsal hall, which “allowed for greater dissipation of sound” (p. 37) as the primary contributing factors for this difference. The researchers suggested redesigning the orchestra pit in order to provide acoustic controls to lessen music exposure among musicians and conductors (p. 39).

Summary of findings. In their findings on temporary threshold shifts (TTS), Axelsson and Lindgren (1981) found “substantial losses of 20–45 dB at high frequencies” (p. 54) among orchestral musicians, and concluded that “after realistic exposures using sound levels which are produced during performance of classical music there may be pronounced TTS in the high frequency region, sometimes amounting to TTS levels which certainly indicate a possible ototraumatic character” (p. 54). However, they also stated it was unusual for the musicians to display temporary threshold shifts exceeding 15 dB when realistic concert conditions were replicated (p. 54). They found that “the frequent occurrence of loud pure tones and impulse sounds in the musical environment suggests the possibility of hearing loss by performance of classical music” (p. 7); further, if “sound level measurements during musical performances and durations of exposure exceed recognized damage risk criteria, this implies that there is a risk for sensorineural hearing loss (p. 66).”³²

³² Axelsson and Lindgren (1981) also identify etiology as an indicating factor when “hearing testing in a population of musicians show an increased incidence of hearing loss which cannot be explained by any other etiology than exposure to music” (p. 66).

Westmore and Eversden (1981) found evidence of noise-induced hearing loss among 23 of 68 ears tested, but only four of those exhibited hearing loss of more than 20 dB at 4 kHz (p. 762). Many of the musicians in the study expressed anxiety about music-induced hearing loss, but none of them reported any significant impairment following a performance (p. 763). The researchers found no immediate threat to the musicians participating in the study, but expressed concern about the added effect of potential presbycusis (age-related hearing loss) later in life, and the difficulties of prevention considering the high sound levels produced by the orchestras.

In a study conducted for the International Conference of Symphony and Opera Musicians (ICSOM), Fishbein, Middlestadt, Ottai, Straus, and Ellis (1988) investigated the prevalence of medical problems among professional musicians in a survey of 2,212 orchestral musicians. The survey results showed a high prevalence of medical problems among the musicians, with 82% of the respondents experiencing at least one medical problem and 76% reporting at least one medical problem as having a severe effect on their musical performance (p. 5). The medical problems listed by the participants were placed into two categories: musculoskeletal and non-musculoskeletal problems. The medical problems related to the ear included “earaches” (7% reported, 2% severe) and “other ear problems” (13% reported, 7% severe) (p. 5). The researchers did not identify, however, what they or the participants considered to be *other ear problems*, and whether this included hearing loss.

Middelstadt and Fishbein (1988) examined the relationship between perceived occupational stress³³ and the prevalence of psychological and physical ailments among the 2,212 musicians surveyed in the ICSOM report. The survey respondents were asked to compare their levels of occupational stress with other professional musicians. The prevalence of ear problems was reported by 22.5% of the musicians who reported feeling more stress; 16.9% by musicians with the same amount of stress; and 11.8% by musicians feeling less stress (p. 689).³⁴ The researchers concluded that this data shows that musicians who experience more occupational stress also have more health problems (p. 691).

Woolford et al. (1988) conducted measurements of pure-tone hearing sensitivity, impedance, and loudness-discomfort levels among 13 orchestral musicians from the Los Angeles Philharmonic Orchestra, and found sensorineural hearing loss in 13 out of 26 ears tested. The researchers determined that the musicians' hearing loss was due to occupational noise exposure and made the following suggestions to reduce sound levels experienced by musicians: scheduled rest times, changes in seating arrangements, and improving the acoustics of performance areas (p. 281).

³³ Middelstadt and Fishbein (1988) define stress in this study as a “mediating variable which is not solely a function of either the environment or the person, but which represents the way objective aspects of the environment are interpreted and internalized by individuals” (p. 687).

³⁴ Middelstadt and Fishbein (1988) do not specify what specific ear-related medical problems are included in the category of *other ear problems*, and this information was also not provided in the first part of this study conducted by Fishbein et al. (1988).

Ostri et al. (1989) conducted audiological examinations of 96 orchestral musicians from the Royal Danish Theatre and, based on the musicians' self-assessments, found that 13% (12/96) had difficulty hearing in noisy situations, and only 1% (1/96) had difficulty hearing in quiet environments (p. 244). Tinnitus was reported in one or both ears among 4% (4/90),³⁵ and 38% (36/96) experienced temporary threshold shift, which was defined as tinnitus, dizziness, or the sensation of hearing loss following a performance (p. 244). Despite the findings of the study which showed 58% hearing impairment among the participants (p. 248), none of the musicians claimed to have any hearing problems during performances, with their hearing impairment only affecting them in their social life (p. 247).

Karlsson, Lundquist, and Olaussen (1983) investigated the pure-tone hearing thresholds of 417 orchestral musicians over the span of six years—123 of the musicians were examined twice—and found no evidence of any increased risk of hearing impairment among the symphony musicians tested, other than a high-frequency hearing loss among 17 flute players and a 30-dB high-frequency slope in the left ear of the double-bass players; the researchers found the evidence regarding the double-bass players to be “arbitrary” (p. 262) based on the low sound levels produced by this instrument, and the physical placement of those musicians within the orchestra. Contrary to the findings of Axelsson and Lindgren (1981), Karlsson et al. (1983) found that “performing as a musician in a symphonic orchestra does not

³⁵ The researchers do not clarify why the number of participants surveyed regarding tinnitus is 90 rather than the total number of participants of the study which equaled 96.

involve an increased risk of hearing damage” (p. 264); however, the researchers also suggested that “standard criteria for industrial noise exposure are not applicable to all kinds of sounds and especially not to symphonic music” (p. 264), and that the “attitude to and the structure of the noise, particularly in the situation of the symphonic musician, can be of importance in the minimal or absence of noise-related changes observed” (p. 264).

Jansen et al. (2009) addressed the unique nature of noise-induced hearing loss among musicians as opposed to other professions:

They [musicians] are fully dependent on their hearing for their profession, and they are frequently exposed to loud music. Besides, they have a complicated relation to preventive measures, such as wearing ear muffs or using protective screens, as they may be accompanied by the loss of subtle effects that are necessary to play music and interact with fellow musicians. (p. 153)

Jansen et al. (2009) speculate that the inconsistent findings in the research on music-induced hearing loss are due to musicians’ reservations about participating in noise exposure studies (p. 154). The researchers also theorize that the inconsistent findings in research examining music-induced hearing loss may indicate that musicians are better at recognizing sounds on pure-tone audiometric exams than other populations (p. 154).

The questionnaire used in the Jansen et al. (2009) study revealed that 19% (46) of the musicians would be “ashamed of having hearing disorders” (p. 159) and

5% (12) of them felt that they “would not be a good musician in case of hearing problems” (p. 160). Further, 7% (16) were “afraid of losing their job” (p. 160) if orchestra management discovered the hearing impairment. Another finding from the questionnaire indicates that 8% (20) of the musicians felt that hearing loss is “part of the life of a musician” (p. 160). Regarding the use of earplugs, a large number of the orchestral musicians in the study used hearing protection during rehearsals (52%/152), concerts (29%/70), and other social situations (36%/87) (p. 160).

Music-Induced Hearing Loss in Music Students

The following section reviews the relevant literature on music-induced hearing loss among music students at the collegiate level. Numerous studies have been conducted which examine the incidence of hearing loss among college music students. These studies include investigations into how the phenomenon affects performers in collegiate music ensembles, music industry students, and students in teacher education programs.³⁶ Conversely, very few studies examine music-induced hearing loss among K-12 music students.³⁷ Most of the research investigating music-induced hearing loss among adolescents focuses on the recreational listening habits of this population, including concert attendance (Chung et al., 2005), and the use of

³⁶ There is considerable overlap in the research on music-induced hearing loss among music students and professional musicians, considering the mobility between musical genres among these populations.

³⁷ Folmer, Griest, and Martin (2002) reviewed existing hearing conservation education programs for K-12 students in an effort to implement hearing conservation in the curricula of all U.S. schools. However, the only curriculum reviewed in the study that specifically related to music-induced hearing loss was *Hearing Education and Awareness for Rockers (H.E.A.R.)*, which was created by professional musicians to promote hearing health awareness and conservation among musicians and music listeners.

personal media players (McCormick & Matusitz, 2010; Vogel et al., 2008).³⁸ Similar to the studies examining music-induced hearing loss among professional musicians, I present the studies focusing on music students based on the following contributing factors most frequently identified in the research related to this population: (a) intensity and duration, (b) instrument, (c) physical location, and (d) acoustical environment.

Intensity and duration. Holland (2004) collected measurements of sound pressure levels experienced by 62 members of a University of Memphis concert band, and recorded time-weighted averages of the maximum and minimum sound pressure levels in six 5-minute measurements for 11 participants (four woodwind players, five brass, and two measurements for the conductor). The mean maximum sound pressure levels recorded in the six-day measurements included 106.1 dB, 107.5 dB, 106.3 dB, 105.1 dB, 106.0 dB, and 106.7 dB; with the mean minimum sound pressure levels, 66.9 dB, 67.1 dB, 67.2 dB, 66.9 dB, 66.9 dB, 67.0 dB (pp. 75–87).

The time-weighted averages collected by Holland (2004) did not significantly exceed OSHA standards (.224 dB higher), but did significantly exceed NIOSH standards (8.136 dB higher) (pp. 121–122).³⁹ The average measurements of the sound pressure levels exceeded OSHA standards by .22% and surpassed NIOSH standards by 9.53% (p. 166). The conductor in this study experienced 3.31% (87.0

³⁸ As stated above, these populations are beyond the scope of this study.

³⁹ Holland (2004) arrived at these numbers by comparing the mean sound pressure levels (time-weighted averages) measured in the study with the permissible sound level limits established by OSHA (90 dBA) and NIOSH (85 dBA).

dBa) less exposure in the left ear and 2.50% (87.8 dBA) less exposure in the right ear when compared to the 90 dBA OSHA standard (p. 127); however, the conductor experienced 2.37% (89.2 dBA) greater exposure in the left ear and 3.24% (89.5 dBA) greater exposure in the right ear when compared to the 85 dBA NIOSH standard (p. 127). The conductor also experienced 16 (19%) temporary threshold shifts equal or greater than 10 dB at the .5 kHz (1), 1 kHz (2), 2 kHz (2), 3 kHz (5), 4 kHz (2), 6 kHz (1), and 8 kHz (3) frequencies (p. 127).

Phillips and Mace (2008) investigated the sound level exposures experienced by college music students in practice rooms at the University of North Carolina (Greensboro). The participants included 50 undergraduate student-musicians (18–22 years) from the School of Music, including 10 brass players, 10 string players, 10 woodwind players, 10 percussionists, and 10 vocalists. The sound level measurements recorded included the sound pressure level range, sound pressure level average based on an 80 dBA baseline, the time-weighted average in dBA, and the total dose for the duration of the practice session.⁴⁰ The measurements were conducted during the length of one practice session (mean, 46.54 minutes) for each participant. The average sound levels produced by all of the groups in the Phillips and Mace (2008) study were 87–95.2 dBA, showing that some of the students

⁴⁰ Each of the practice rooms had seven acoustical wall panels made of fabric-covered dense foam; the size of the practice rooms measured 3.05 x 3.66 x 2.29 meters. The percussion practice rooms had 10 acoustical wall panels and were 3.35 x 3.96 x 2.28 meters.

surpassed the allowed dose of daily exposure, with practice sessions ranging from 27.9–118.7% of the allowed daily dose (p. 40).

Phillips and Mace (2008) explain that sound level measurements are only one of the factors that determine the effects of music-induced hearing loss, and that the duration of exposure is “crucial to an understanding of the risk involved to hearing” (p. 43). For instance, one of the musicians of the study who averaged 98 dBA of sound exposure reported practicing three hours a day and seven days per week, in addition to ensemble rehearsals five days per week, equaling a sound exposure dose of 10 times the levels recommended by NIOSH (p. 44). Phillips and Mace (2008) framed the problem of music-induced hearing loss based on the theory that it takes 10,000 hours to achieve musical expertise (Ericsson, Krampe, & Tesch-Römer, 1993); this implies that musicians need to practice three hours per day for 10 years in order to achieve performance mastery. Many of these practice hours are spent in “relatively small practice rooms, where exposure to high sound pressure levels may be a threat to the hearing sensitivity of the student musician” (Phillips & Mace, pp. 36–37).

In a risk assessment of music-induced hearing loss among members of a University of North Texas college jazz ensemble, Henoch and Chesky (2000) measured the sound pressure levels experienced by the musicians during typical rehearsal settings, and used these measurements to “evaluate the potential risk for noise-induced permanent threshold shift” (p. 17) compared to the OSHA noise

exposure standards.⁴¹ The researchers found that when they used a 3-hour time-weighted average, the musicians exceeded OSHA standards for 10 out of the 15 measurements, and exceeded all of the 15 measurements when an 8-hour period was used.

Miller et al. (2007) measured noise exposure among college music students during two pep band performances, which lasted between four and six hours. A high percentage (63%) of the students reported experiencing tinnitus after exposure to music, with 88% of the students describing the tinnitus as “mildly annoying” (p. 162). The researchers point out that the “presence of intermittent or constant tinnitus suggests potential early damage to delicate inner ear structures” (p. 162). The researchers also found that the daily noise dose values ranged between 200 and 700% when using the OSHA 90 dBA criteria; the values were 1600 to 17,000% using the NIOSH 85 dBA criteria (p. 162). The alarming difference between these two criteria is to be expected, considering the differences in intensity and duration standards between the two different agencies.

Barlow’s (2010) study investigated music-induced hearing loss among 100 college students (18–64 years, 22.6 mean, and 21 median) enrolled in popular music courses, such as audio technology, popular music performance, electronic music, and music recording and production.⁴² Barlow’s study measured the participants’

⁴¹ The study adhered to OSHA noise exposure standards which, as stated earlier in this chapter, define a 100% dose of permitted noise exposure equal to 90 dB of sound pressure levels over an 8-hour period (OSHA, 2008).

⁴² Barlow (2010) also investigated the students’ sound exposure outside of school and found that 94% of the students attended a nightclub at least once per week; 43% of the students reported staying at the

exposure to loud music environments outside of school, which equaled 11.5 hours per week (p. 178). The participants reported using some form of amplification at loud levels 34% of the time, at maximum levels 2% of the time, and low levels only 4% of the time (p. 178).

Barlow (2010) found a “significant hazard” to the hearing of the music students based on the results of the measurements of the recording and rehearsal studios, which were found to be “extremely high” (p. 178). Based on a mean rehearsal duration of 2 hours and 13 minutes, he recorded a mean equivalent sound pressure level (dBA L_{eq}) of 98 dBA, which equates to a personal noise dose of 92.4 dBA for each rehearsal session (p. 178). The sound levels recorded in each of the rooms exceeded the 90 dBA baseline in 20 of the 24 measurements taken (p. 178).

Instrument. Phillips and Mace (2008) found that the brass players in their study were exposed to higher sound levels than the other groups, with a mean average sound level of 95.2 dBA, mean measured dose of 118.7%, and an estimated 3-hour dose of 180% based on a mean practice session time of 38.4 minutes (p. 40). Considering the results of the study, which found that the average sound levels during all of the practice sessions measured for the brass and woodwind players exceeded the 85 dBA criteria, these musicians would be legally required to participate in a hearing conservation program if they were in non-musical fields (Phillips & Mace, 2008).

nightclub for three hours at a time (p. 179). Barlow recorded the sound pressure levels at two of the venues attended by the participants to be between 98 and 112 dB, which would cause a “significant hazard to hearing” (p. 179) without the use of hearing protection.

Physical location. According to Henoch and Chesky (2000), “the potential risk for music-induced hearing loss depends on the instruments played, the music being performed, and the position of the musicians in relation to each other” (p. 17). In their risk assessment of music-induced hearing loss among members of a University of North Texas college jazz ensemble, Henoch and Chesky found that the lead musicians encountered the highest risk of overexposure based on their position within the ensemble. For instance, the time-weighted average of noise exposure experienced by the second chair tenor saxophone player exceeded OSHA noise exposure standards by 136% (3-hour) and 361% (8-hour) due to the musician’s seating position in front of the ensemble (p. 20). They also recorded evidence that instrument directivity affects noise exposure, citing that sound levels produced by a trumpet have the greatest degree of force beginning at the 4 kHz frequency range compared to 2 kHz by a trombone; this would explain why, within the traditional jazz band set-up, a trumpet section seems to have a greater effect on the trombone section than the effect of the trombone section on the saxophone section (p. 21).

Walter (2009) investigated the level of sound exposure among 46 collegiate wind band members to determine whether exposure changes according to the individual’s physical placement within the ensemble. The participants were selected based on their physical seating position within the ensemble, and were selected from each instrument group in order to achieve an accurate representation of sound levels produced by each instrument. Based on NIOSH criteria, Walter (2009) found that 52% (24) of the participants experienced sound levels exceeding the allowable daily

dose during at least one rehearsal, and 37% (17) of the participants “experienced a daily mean sound dose in excess of 100%” (p. 66), with the brass players experiencing a “greater mean daily dose of sound” (p. 67) than the woodwinds and percussion.

Acoustical environment. Harman (1993) investigated music-induced medical problems, including hearing loss and tinnitus, among members of a college marching ensemble. The researcher measured the sound pressure levels produced during the ensemble’s indoor rehearsals, which took place in a “large, empty, concrete building at a county fair-grounds” (p. 134). The sound pressure level readings were taken approximately five feet from each section while the entire ensemble played. The ensemble produced average sound pressure levels between 90 and 105 dB across all instrument sections, with some brass instruments reaching levels of 117–119 dB (p. 134).

College level music students, particularly those participating in athletic and drum corps ensembles, often perform in “acoustically ‘live’ environments” (Holland, 2008, p. 7). Music ensembles in secondary schools often rehearse in “inappropriate acoustical environments . . . with long reverberation time, parallel walls, and compacted ensemble seating conditions because of overcrowded facilities” (p. 7). Controlling sound pressure levels in these acoustical environments will “enable conductors and students to teach and perform music in an environment that is conducive to good hearing conservation and long and healthy hearing acuity throughout life” (p. 7).

Summary of findings. Henoch and Chesky (2000) concluded that the “hazardous levels of sound, to which students in a typical jazz band setting are being exposed, probably occur on a daily basis” (p. 21). Holland (2004) expressed his findings in relation to the maximum permissible limit of 100% noise exposure for the OSHA and NIOSH standards. The noise dose for the OSHA time-weighted average (90.2 dBA) was 102.81% of OSHA’s 8-hour, 90 dBA standard; the noise dose for the NIOSH time-weighted average (93.1 dBA) was 645.65% of NIOSH’s 8-hour, 85 dBA standard (p. 167). Although these measurements are more severe when considered within the parameters of the more conservative NIOSH standards, the sound pressure levels measured in this study surpassed both industry standards for occupational noise.

According to Miller et al. (2007), using either OSHA or NIOSH noise exposure criteria, the time-weighted averages reported in this study “are sufficiently high to warrant consistent utilization of HPDs (hearing protection devices) as well as participation in an on-going hearing conservation program” (p. 162). Under OSHA guidelines, the student musicians in this study would be required to use hearing protection and enroll in a hearing conservation program if they were exposed to the same sound levels in a non-musical occupation (p. 163). Every student musician in the study exceeded OSHA and NIOSH noise exposure criteria for daily noise dose, but they were exposed to “substantially higher” levels under NIOSH criteria (p. 163). The researchers expressed concern that OSHA criteria are “significantly underestimating the daily noise dose” (p. 163) for musicians and advocate for

comprehensive hearing programs such as sound level monitoring and annual audiometry exams.

Based on the sound level measurements recorded in their study, Phillips and Mace (2008) concluded that 48% of the participants exceeded NIOSH criteria for sound exposure (p. 45). They recommended that university music programs provide students with information about hearing protection, and that “any student identified with a high frequency hearing loss should be required to wear hearing protection designed for musicians, which provides an even attenuation across the frequency range” (p. 45). Other recommendations made by the researchers, regarding the design of university hearing conservation programs for university music students, include providing students with accurate noise exposure data, information on hearing protection devices, the recuperative value of rest time away from playing, and the anatomy and physiology of the hearing mechanism, which would motivate students “to be more aware of their listening environment and to understand the importance of hearing protection” (p. 46).

Walter (2009) indicated that one of the limitations of her study was that it did not take into account the sound exposure experienced by the participants before and after rehearsals and throughout the rest of the day (p. 68). She claims that seating position within the ensemble has “little or no effect” (p. 69), and suggests that the following methods may alleviate sound levels in rehearsal situations: implementation of annual hearing test requirements for music students at universities, availability of hearing protection devices for all students, limiting the number of musical selections

performed with extremely loud dynamic levels, and requesting that performers play softer on louder dynamic levels (p. 69). She also suggests that future research surrounding music-induced hearing loss should include:

The study of university musicians and music teachers in other contexts besides wind band, and continued study of elementary and secondary school music teachers, as these studies may yield powerful results about whether music teachers and students are at risk for NIHL, particularly since results of previous studies measuring music teachers have yielded conflicting results. (p. 69)

Barlow (2010) identified “patterns of behavior” (p. 181), which “suggest that a high proportion of these students are likely to exceed recommendations for noise exposure several times per week” (p. 181), and although the students were well informed about the risks, “many students were still choosing to use loud sound levels and opting not to use hearing protection” (p. 181). He suggests that universities provide a more “robust approach” (p. 181) to noise exposure education, such as monitoring studios and rehearsal spaces, and improved education methods in courses on this topic. In conclusion, he calls the OSHA criteria “insufficient to ensure hearing safety” (p. 182) for students and recommends following the NIOSH guidelines.

In a subsequent investigation, Barlow (2011) examined music-induced hearing loss among college music students studying courses in popular music that incorporated courses in electronic music, audio engineering, and acoustics. Barlow

conducted air conduction thresholds at the .25, .50, 1, 2, 3, 4, 6, and 8 kHz frequencies for both ears of the 50 participating college students (18–20 years). Barlow (2011) found that nearly 40% of the students showed evidence of the audiometric notch indicative of noise-induced hearing loss (p. 98). Additionally, he found that 46% of the students exhibited hearing loss in at least one of the categories outlined by the UK Health and Safety Executive (HSE).⁴³ The HSE scale determines appropriate hearing threshold levels based on age group and attempts to identify “serious or rapid hearing loss” (p. 100). No significant differences between the hearing thresholds of college music students in popular music courses and those from more traditional music courses were found in this study.

Chesky (2010) tested the sound exposure levels of two college wind ensembles at the University of North Texas and found that the exposure levels of both ensembles exceeded the allowable dose of sound exposure as defined by NIOSH. In this study, Chesky used predictor variables such as duration of noise exposure, peak sound levels, degree of variability, and time spent playing music, and found that the mean dose per event was 109.5% of the allowable daily dose, exceeding NIOSH guidelines. Chesky warned that these ensemble classes are “at-risk instructional activities” (p. 32), and called for universities to provide free hearing examinations and courses covering music-related injuries. All of the participants would be required to wear hearing protection under the European Union’s Control of Noise at Work

⁴³ The HSE system is based on the sum of hearing threshold level at 1, 2, 3, 4, and 6 kHz (Barlow, 2011, p. 98).

Regulations (2005), which standardize noise exposure in music and entertainment fields.⁴⁴

Music-Induced Hearing Loss in Instrumental Music Educators

My review of the relevant literature in music education and performing arts medicine suggests a paucity of studies that specifically focuses on the effects of music-induced hearing loss on the professional lives and personal well-being of instrumental music educators. Extant research examining hearing impairment among instrumental music educators primarily focuses on evaluating acoustical environments such as practice rooms (Phillips & Mace, 2008), rehearsal spaces (Grayston & Alvord, 1993; Royer, 1996), and performance venues (Babin, 1999; Camp & Horstman, 1992). The following studies represent the extant literature on music-induced hearing loss specifically among instrumental music educators, which until recently have comprised an underrepresented population in studies of occupational noise exposure. In the following section, I review the relevant literature regarding music-induced hearing loss among instrumental music educators as it relates to the following contributing factors: (a) intensity and duration, (b) susceptibility, (c) age, (d) instrument, and (e) acoustical environment.

⁴⁴ Since 2008, the occupational noise exposure standards outlined in the Control of Noise at Work Regulations of 2005 apply to “pubs and clubs, amplified live music events, orchestras and other premises where live music or recorded music is played” (Health and Safety Executive [HSE], 2008). Under these regulations, employees are required to wear hearing protection when average daily or weekly exposure is 85 dBA; employers must provide risk assessment information to employees when the average daily or weekly exposure is at 80 dBA (HSE, 2008).

Intensity and duration. Pang-Ching (1982) investigated the sound pressure levels experienced by secondary school instrumental music educators using band size, room acoustics, and musical dynamics as variables. He recorded sound pressure levels between 80–110 dBA with an average of 80–90 dBA (p. 287), but determined that these levels were within normal limits for a daily 8-hour time-weighted average of noise exposure. Compared to professional musicians, music-induced hearing loss among instrumental music educators is a unique experience because instrumental music in secondary schools includes marching, jazz, pep, and orchestral music, and although the sound pressure levels in these ensembles are not as intense as amplified rock music, “band directors generally have greater job longevity than ‘rock’ musicians and consequently a greater potential for developing hearing loss” (p. 284). Pang-Ching also found that the hearing sensitivity of the band directors decreased as their experience level increased (p. 285).

Royer (1996) examined sound exposure among secondary school instrumental music educators by measuring 50 sound level samples from 23 band rooms. The average sound pressure levels recorded were 89.7 dBA, with an average L_{eq} (mean equivalent) of 86.7 dBA (p. 57). During a 20-minute noise analysis, Royer found the highest maximum sound pressure levels to be 106.5 dBA, with a range of 89.3 to 106.5 dBA (p. 58). The respective maximum and minimum L_{eq} levels were 94.7 dBA and 77.8, with a mean of 86.7 dBA (p. 58).

Owens (2003) investigated sound exposure among high school band directors by measuring the sound pressure levels and reverberation times produced by 10 high

school bands in Colorado. The mean noise dose recorded in the study surpassed the OSHA, ACGIH,⁴⁵ and NIOSH standards by the respective levels of 26.4%, 142.4%, and 143.6% (p. iv). The mean projected 8-hour noise dose under the OSHA, ACGIH, and NIOSH standards was 69.2%, 366.2%, and 369.3%, respectively. The participants of the Owens (2003) study all experienced mean sound pressure levels (L_{eq}) of 90 dBA. When applying these measurements to ACGIH and NIOSH standards, 60% of the participants exceeded maximum allowable exposure, and 20% reached 70% of their maximum daily dose (p. 73).

Owens (2003) found that the mean sound pressure levels recorded in his study were lower than those measured by Millin (1981), and higher than those measured by Pang-Ching (1982). In line with Royer (1996), Owens found that the sound pressure levels did not exceed OSHA standards. The participants also conducted other ensembles throughout the school day, which according to Owens has the “potential to increase the actual exposure levels observed for each individual in this study” (p. 73). According to Owens (2003), “serious consideration” (p. 72) should be given to the application of ACGIH and NIOSH standards when determining occupational noise exposure standards for instrumental music educators.

Susceptibility. Concurring with research investigating music-induced hearing loss among professional musicians, susceptibility to this condition varies among instrumental music educators. Cutietta et al. (1994) suggested “although being a high school band director seemingly increases the risk” of music-induced hearing loss, “all

⁴⁵ American Conference of Governmental and Industrial Hygienists (ACGIH)

individuals will not necessarily be equally affected” (p. 327). In their study, fewer than one in five secondary level instrumental music educators displayed evidence of music-induced hearing loss, and the “degree of loss among them varied widely” (p. 327), which the researchers suggested “points to the individual variability in susceptibility to NIHL [noise-induced hearing loss]” (p. 327).⁴⁶

Age. Cutietta et al. (1989) investigated the effects of age on music-induced hearing loss among 32 instrumental music educators and found that every participant over the age of 40 in their study (8 of 32) showed signs of hearing loss, with 52% of those under 40 (13) showing hearing loss, and 56% of those under 30 (9) (p. 48). In their study on hearing loss among vocal (55), elementary instrumental (11), and high school instrumental music educators (38), Cutietta et al. (1994) found that 14% (15) of the participants displayed “some degree of hearing loss due to presbycusis” (p. 322). The researchers found higher percentages of presbycusis in the elementary and high school instrumental music educators than the vocal educators (57%, 23%, and 7%, respectively) (p. 322). They suggested that sound exposure accelerates the natural age-related process of hearing loss, which they based upon their findings that 45% of presbycusis in the instrumental directors was among those under the age of 40 (p. 322). They also found a connection between the degree of hearing loss and age in regard to the high school instrumental music teachers in their study, a relationship that was not found among the vocal and elementary instrumental teachers. These

⁴⁶ See Borg, Canlon, & Engstrom (1992) for an extended discussion on individual susceptibility to noise-induced hearing loss.

findings concur with previous research which also found presbycusis to be compounded by high levels of sound exposure (Mills, 1992; Westmore & Eversden, 1981; Willott, 1991).

Pisano (2007) examined the relationship between music-induced hearing loss and the musical environment of the classroom among 42 high school band directors from western Pennsylvania. The results of the study were compared to the findings of the National Health and Nutrition Examination Survey IV (NHANES) of 1999–2004 (Centers for Disease Control and Prevention, 2004). Pisano found that 25 (59.5%) participants exhibited hearing loss in at least one ear, 17 (40.5%) had hearing loss in both ears, and 21 (84%) displayed a notched audiogram in at least one ear; this concurred with the NHANES findings, which reported that 58.3% of the participants had hearing loss in at least one ear (p. iv). One of the differences between the group of instrumental music educators examined by Pisano and the NHANES group is that the former group exhibited a notched audiogram indicative of noise-induced hearing loss.

Based on the survey results of Pisano's (2007) study, 13 (31%) participants reported a decline in hearing since college graduation, and 20 (48%) reported experiencing tinnitus (pp. 124–125). Pisano found that the most significant factor between the survey responses and the audiogram results was the participant's age at the time of testing. The percentages of hearing loss between the Pisano group (59.5%) and the NHANES (58.3%) group were very close (p. 150). Based on the examination of the audiograms between the two groups, the male band directors had

better hearing in upper frequencies as they got older as compared to the participants of the NHANES study. In conclusion, Pisano (2007) stated that the results of his study “indicate that the majority of high school band directors are experiencing hearing loss with at least one of their ears . . .” (p. 154), and the audiogram results suggest that many of these cases can be attributed to music-induced hearing loss. Pisano did not find any evidence of environmental factors affecting the hearing abilities of the band directors participating in this study, other than their age at the time of testing.

Acoustical environment. Hill (2003) identified “poorly constructed rehearsal rooms” (p. 37), described as “concrete-block, low-ceilinged (nine feet or lower) rooms with concrete or linoleum floors” (p. 38), as one of the primary causes of music-induced hearing loss among instrumental music educators. Ross (2001) shared his story of developing hearing loss and tinnitus after a 25-year career as an instrumental music educator, which consisted of “thousands of rehearsals . . . in inadequate rehearsal rooms” (p. 52). After he began experiencing symptoms of music-induced hearing loss, an acoustics adviser informed Ross that his rehearsal room was too small and had inappropriate reflective surfaces throughout the room. This illustration is typical of the instrumental rehearsal rooms used by secondary and collegiate level music ensembles throughout the country.

Grayston and Alvord (1993) investigated the sound pressure levels of eight secondary school band rooms in order to project sound exposure among music educators experienced during a regular 8-hour work-day. The researchers measured

the projected dose and peak dBA levels from a location three feet from the director's podium in each band room. The researchers projected the daily dose based on the OSHA noise exposure standard of 90 dB for 8 hours. Also, peak dBA sound levels were recorded in order to measure the "most intense single sound occurring during the sampling period" (p. 6). The average peak level among the eight measurements of the study was 118.6 dBA and the average projected dose was 111.1% (p. 6). One of the rooms measured in the study produced a projected dose of 252.0%, which the researchers attributed to the small size of the room and the hard wood-paneled walls (p. 6). Several participants of this study reported experiencing tinnitus after rehearsals, and one participant left the profession due to progressive hearing loss (p. 6). The researchers found that the projected dose levels of the eight band rooms measured in this study approached or exceeded OSHA standards (p. 6). They recommend monitoring noise levels in music rooms, limiting exposure time among music educators, and improving the acoustics of music rooms when necessary (p. 6).

Royer (1996) discussed the relationships between acoustical environment and the sound pressure levels experienced by instrumental music educators. He predicted that each increase of five students produces an increase of .342 dB in the maximum sound pressure levels (pp. 179–180). Further, each increase of 50 cubic feet per student leads to a decrease of .485 dB in the maximum sound pressure levels, and conversely (p. 180). He also predicted that each increase of five students increases the L_{eq} level by .528 dB (p. 180). These findings suggest that the L_{eq} level is more

dependent on time and teaching style⁴⁷ than the maximum sound pressure levels, and the number of musicians and cubic feet per student produce significant changes in the results of these measurements (p. 180).

Royer (1996) found many inadequacies in the band rooms examined during his study. The average ceiling height was 14.3 feet, ranging from 9.1 to 24.8 feet, with a median of 14.1 feet. Eleven of the 25 band rooms measured in the study had ceiling heights lower than 14 feet. The cubic feet per student ranged from 220 to 2900 cubic feet per student (mean, 765 cubic feet), which he felt was “well within the guidelines for music rooms, but the smaller rooms and/or the larger bands present some problems for some directors” (p. 189).

Owens (2003) used dosimeters to evaluate the acoustic conditions of band rehearsal rooms by measuring sound pressure levels and reverb times in order to determine the level of noise exposure among high school band directors. The study took 63 sound pressure measurements during rehearsals of 10 high school bands in Colorado. Owens used OSHA, NIOSH, and ACGIH industrial noise standards as benchmarks for the study. The results showed that 60% of directors experienced sound pressure levels at or exceeding 90 dBA. Using an 8-hour projection of noise dosage, Owens found that these levels were within OSHA standards, but exceeded those of NIOSH and ACGIH.

⁴⁷ Royer (1996) used the term *teaching style* to describe the time efficiency (rehearsal pace) of the director, which affected the amount of student playing time and the amount of sound exposure for the directors (p. 158).

Summary of findings. Cutietta et al. (1989) examined 32 instrumental music educators and found that 66% (21) of the participants showed some signs of hearing loss in at least one hearing frequency range; 34% (11) showed no signs of hearing loss; 25% (8) displayed signs of age-related hearing loss (presbycusis); and 41% (13) of the participants with signs of hearing loss exhibited the notched audiogram typical of noise-induced hearing loss (p. 46). The researchers stated that the signs of hearing loss among the participants were not severe: seven participants showed loss of less than 20 dB at their lowest frequency, five had losses between 20–40 dB, and one displayed a loss between 40–60 dB (p. 46). The researchers concluded that “without question, there was evidence that some of these directors have noise-induced hearing loss” (p. 48), and considering that 41% exhibited notched audiograms, “their band directing experience played a role in this loss” (p. 48). The exhibited hearing loss in excess of 5–10 dB represents a “poorer than normal auditory sensitivity” (p. 48) and a “reduction in the integrity of the auditory nervous system resulting in a decrement in the quality of sound perception” (p. 48). They concluded that based on their findings, “the evidence implies that there is a relatively high incidence of noise induced hearing loss among school band directors” (p. 48).

Cutietta et al.’s (1994) study of hearing loss among vocal, elementary instrumental, and high school instrumental music teachers addresses the lack of research regarding the phenomenon among music professionals, despite “the importance that hearing acuity has in the professional effectiveness of a music educator and the number of individuals employed in the teaching profession when

compared with the numbers employed by symphony orchestras” (p. 319). The researchers maintain that the literature focusing on symphonic musicians shows most musicians have hearing within normal ranges, but all of the studies found evidence of hearing loss among some subjects (Axelsson & Lindgren, 1981; Jansson & Karlsson, 1983; Johnson et al., 1985, 1986; Karlsson et al., 1983; Ostri et al., 1989; Rabinowitz, Hausler, Bristow, & Rey, 1982; Royster et al., 1991; Westmore & Eversden, 1981; Woolford et al., 1988), suggesting that susceptibility varies between individuals (Woolford et al., 1988). Previously, Pang-Ching (1982) recommended that instrumental music educators have their hearing assessed regularly based on four considerations: “(a) the presence of significant hearing loss in some directors, (b) variable exposure levels among directors, (c) extracurricular non-school musical exposure by individual directors, and (d) high incidence of tinnitus (46% reported either constant or intermittent tinnitus)” (p. 287).

Cutietta et al. (1994) concluded that there is a “slight degree of risk” (p. 327) among high school instrumental directors, and this risk is related to age, duration of exposure, and years of teaching. The researchers also concluded that the hearing loss among the high school instrumental directors “varied widely” (p. 327), which “points to the individual variability in susceptibility” (p. 327) to noise-induced hearing loss. They suggested that a number of factors contributed to the variability of these statistics: noise exposure outside of teaching, primary instrument type, ensemble size, frequency of rehearsals, and the acoustics of rehearsal and performance rooms (pp. 327–328). Cutietta et al. (1994) warn instrumental music teachers to be cautious

about their levels of exposure to sound levels in and out of school, suggesting that directors have annual hearing exams. For those individuals already experiencing symptoms of hearing loss, they suggested the use of hearing protection, or changing music positions before having to leave the profession altogether. Despite suggesting the use of hearing protection while teaching, they questioned the reality of doing so, considering the changes to the quality and quantity of sound experienced while using earplugs (p. 328).

Royer (1996) found that the band directors examined in his study were not at risk of hearing loss using OSHA criteria, but could be at risk under different noise exposure guidelines. Royer calls the OSHA noise exposure guidelines the “most liberal and least restrictive” (p. 171), stating that the recommended exposure levels are “higher than almost every other industrialized country with noise exposure standards or regulations” (p. 172). Using NIOSH criteria, Royer reported that seven of the 23 (30%) participants of his study would be at risk of developing music-induced hearing loss based on their daily sound exposures (p. 173). He also reported that 20 of the 23 (87%) participants would be required by NIOSH to participate in a hearing conservation or hearing loss prevention program (p. 175).

Hearing Loss Prevention

Most of the research studies investigating music-induced hearing loss among musicians and music educators concluded with discussions about hearing loss prevention. Before discussing these suggestions, a distinction must be made between prevention and conservation. Hearing loss prevention attempts to anticipate the

consequences of hearing loss through intervention. Hearing loss prevention programs are a critical factor in protecting the hearing health of musicians and music educators, yet hearing conservation programs are still necessary for individuals who have already been affected by occupational noise exposure. Hearing loss conservation attempts to preserve what remains of an individual's hearing. Although a distinction exists, prevention and conservation are used interchangeably throughout the extant research on music-induced hearing loss. In my review of the relevant literature, I identified five common suggestions for hearing loss prevention and conservation: (a) raising awareness through education and advocacy, (b) monitoring hearing health through audiological exams, (c) using hearing protection devices, (d) improving acoustics in performance spaces, and (e) modifying pedagogy and classroom management.

Education and Advocacy

Owens (2008) claims that noise-induced hearing loss affects 16.1% of all American adults, yet it is completely preventable (p. 147). Chesky, Dawson, and Manchester (2006) call music-induced hearing loss a “widespread and serious public health issue” (p. 143), which receives “little or no recognition in schools of music” (p. 143). According to NIOSH (1998), “an emphasis on prevention evolves from beliefs that it should not be necessary to suffer an impairment, illness, or injury to earn a living and that it is possible to use methods to prevent occupational hearing loss” (p. 18). Woolford et al. (1988) identify the typical three-phase approach to the study of hearing impairment among musicians which includes: (a) comparative hearing studies

among musical ensembles; (b) comprehensive hearing tests of musicians' hearing; and (c) suggestions for providing musicians with "transfer, retirement, handicap, disability, and compensation" (p. 262).

Chesky (2011) argues that music students are generally unaware that music can cause irreparable damage to hearing, and music educators are unaware and unprepared to protect students and themselves from excessive sound exposure (p. S32). Music educators are unlikely to recognize hazardous conditions, address safety concerns, or promote hearing loss prevention (p. S33). Chesky suggests that music schools and music educators develop a "culture of responsibility" (p. S33) toward hearing loss prevention.

The Health Promotion in Schools of Music (HPSM) Project at the University of North Texas (UNT) address music-related injuries among music students by distributing health information and curriculum recommendations regarding neuromusculoskeletal health, vocal health, hearing conservation, and psychological health (Chesky, 2011, p. S33). The HPSM (2004) raises awareness of music-induced hearing loss as a performance-related injury among music students, but does not address the risks associated with hearing loss among music educators. Using the HPSM framework, UNT instituted safety guidelines for all ensemble-based music courses offered by the university by assigning a noise exposure safety rating to each course and developing an occupational safety course for undergraduates. Chesky (2011) argued for a unified effort among governments, universities, schools, and

music organizations to educate students and music educators about music-induced hearing loss and hearing loss prevention.

Manchester (2010) criticizes music education's handling of the issue of occupational hearing loss, contending that since the formation of the HPSM, no formal survey of university programs has been conducted, and hearing loss prevention programs are still largely absent in postsecondary settings. Manchester suggests that this is due to the lack of a model hearing protection program, which can be emulated by other schools. He also believes that an attitude barrier exists, but argues that this can be changed through education and peer interactions, if leadership is present within schools (p. 2).

Manchester (2010) suggests that music-induced hearing loss is not in the forefront of music education research because it lacks a poster child or celebrity endorser necessary to bring attention to the topic among the general public (p. 1). The issue of music-induced hearing loss among professional musicians has been addressed by several well-known musical artists: guitarist Pete Townshend of The Who infamously developed hearing loss and severe tinnitus following a pyrotechnics mishap during a live television performance and since has spoken openly about his hearing impairment. More recently, Metallica drummer Lars Ulrich spoke out about his experience with tinnitus after 30 years in the music industry (Smith, 2009). *Hearing Education and Awareness for Rockers (H.E.A.R.)* (2014) was created in 1988 in order to promote hearing health awareness and conservation among

musicians and music listeners, but advocacy organizations specifically related to hearing health awareness among music educators remain conspicuously absent.

Audiological Exams

Hart et al. (1987) encouraged those exposed to excessive sound levels in the workplace to receive complete medical and audiologic evaluations, including speech discrimination and objective measurements of the middle ear (p. 24). The researchers stated that the options for aural rehabilitation are limited to the use of hearing aids, assistive devices, optimal listening strategies, avoidance of noisy environments, and speech reading, with even fewer options available for the treatment of tinnitus, which are limited to avoiding totally quiet environments, counseling, biofeedback, and the supplemental use of hearing aids and noise makers to mask auditory symptoms (p. 24).

Traditional methods of audiology are usually composed of pure-tone air conduction hearing exams, which determine the softest sounds an individual can hear at select frequencies (American Speech-Language-Hearing Association, 2014c). Other audiological testing methods include measuring otoacoustic emissions, the sounds produced by the inner ear in response to outside sound stimulations (American Speech-Language-Hearing Association, 2014b). The two methods of otoacoustic emissions testing include (a) transient evoked otoacoustic emissions (TEOAE), which measure inner ear responses to short durations of acoustic stimuli (Campbell & Meyers, 2014), and (b) distortion product otoacoustic emissions (DPOAE), which

measure inner ear responses to two simultaneous tones of different frequencies (Campbell & Meyers, 2014).⁴⁸

Samelli et al.'s (2012) study on the effects of music exposure on the auditory pathways of rock/pop musicians is one example of the use of alternative audiological testing methods (i.e., electrophysiological, electroacoustic, and audiological assessments) in music-induced hearing loss research. The researchers found that the musicians exhibited higher pure-tone hearing thresholds at the 2 and 3 kHz, as well as the 12.5 to 18 kHz frequency ranges, and 100% of the musicians exhibited hearing loss in at least one frequency on a high-frequency audiometry test (p. 8). Comparatively, only 7.15% of the musicians displayed sensorineural hearing loss when conventional methods of audiometry were used. The researchers also tested the musicians for TEOAE, and found that 14.28% had absent TEOAEs, and 85.71% suggested only partially present TEOAEs (p. 8). These findings suggest cochlear damage among the musicians, despite the lack of evidence shown on conventional and high frequency audiometric tests conducted in the same study.⁴⁹

Another method of audiological testing measures auditory brainstem response (ABR), recording “brain wave activity in response to sound” (American Speech-

⁴⁸ Kähäri et al. (2001) argued that pure-tone audiometry does not provide enough detail when attempting to detect hearing loss and suggested that future studies employ the DPOAE tests in order to detect early signs of hearing impairment (p. 22).

⁴⁹ Schmidt et al. (1994) employed the use of pure-tone audiometry and high-frequency audiometry to measure hearing thresholds, as well as performance-intensity curves to measure speech perception, among 79 college students from the Rotterdam Music Conservatory in The Netherlands. The researchers determined that extended high-frequency audiometry “cannot serve as an early indicator on the traumatic effect by noise” (p. 193).

Language-Hearing Association, 2014a, para. 2) in order to evaluate the functionality of the inner ear and brain pathways. Samelli et al. (2012) employed this electrophysiological testing method and concluded that musical training “provides a better processing of acoustic information by the central auditory nervous system” (p. 10). The central portion of the ear was not “clearly affected by noise exposure” (p. 10), yet the peripheral portion “showed that it was already affected” (p. 10). The researchers call for the use of otoacoustic emissions and high frequency audiometry to be used to predict the damage and risk of noise-induced hearing damage among musicians.

Hearing Protection Devices

The use of hearing protection devices among musicians and music educators while performing is problematic. Hart et al. (1987) contended that the use of hearing protection while performing is not an option for some musicians due to how the sound is produced and transmitted through the body; they provided the example of the clarinet, which transmits sound to the inner ear “via bone conduction through the upper teeth” (p. 24). In this example, the clarinetist no longer heard the rich tone of the clarinet, but rather an uncharacteristic buzzing sound created by the vibration of the teeth on the mouthpiece.

Nodar (1993) questioned whether using hearing protection devices allowed individuals to accurately determine musical phenomena. If musicians cannot accurately distinguish between musical phenomena because of the inadequacy of hearing protection devices, it is understandable that they may choose not to use these

devices at all, regardless of the benefits to their hearing health. In an examination of the perception of health challenges among adult musicians, Rohwer (2008) concluded that the available accommodations for performance-related injuries (e.g. musculoskeletal, dystonia, hearing loss) were limited to items for purchase (e.g. earplugs, sound shields, etc.) or physical strategies to avoid exacerbating the problem (e.g. stretching) (p. 54).

Camp and Horstman (1992) investigated sound exposure levels in an orchestra pit during a production of Wagner's *The Ring Cycle*. The researchers reported peak exposures of 100–104 dBA, which surpassed occupational noise standards recommended by OSHA and NIOSH. The researchers placed plastic shields at shoulder height, extending eight inches above the ear, which provided the musicians with 17 dB of attenuation in the high frequencies, but offered limited protection in the lower frequency ranges. Compared to the 25 dB of attenuation achieved through the use of earplugs, Camp and Horstman (1992) concluded that the plastic shields did not provide adequate protection.

Musicians and music educators who elect to use hearing protection devices while performing or teaching must also decide when to use these devices. Walter (2009) found that few college music students wear hearing protection during practices, rehearsal, or performances. Out of a total of 46 participants, only two reported currently wearing hearing protection during practices, rehearsals, or performances, and only nine reported ever having worn earplugs while playing (p. 67). Five of the participants said they wear earplugs during practice, and six said that

they wear them during large group rehearsals (p. 67). None of the participants reported wearing earplugs during small group rehearsals, and only one reported wearing them during performances (p. 67). Harman (1993) reported that few marching musicians wore earplugs; some used them for all indoor rehearsals, and others only in certain situations. Conversely, Jansen et al. (2009) found that professional orchestral musicians used earplugs judiciously between rehearsals, concerts, and other social situations.

Zeigler and Taylor (2001) found that most students did not wear hearing protection during rehearsals, concerts, or other loud non-performance-related activities: 85% never wore hearing protection at rehearsals, 94.7% never during concerts, and 64.2% never during other loud events (p. 140). In a follow-up survey, Zeigler and Taylor found that 86% of the students did not change their hearing conservation habits after participation in the study—students at the smaller college claimed to use hearing protection more than students from the larger college (p. 136). These findings are particularly perplexing due to the fact that the participants had previously reported having experienced tinnitus, yet they continued to choose not to protect their hearing. The researchers found that many of the students responded positively to hearing protection programs when they received instruction over an extended period of time; further, they suggested that music schools conduct tinnitus awareness surveys among students periodically throughout their college careers (p. 143).

Curk and Cunningham (2006) surveyed approximately 500 amateur and professional percussionists who attended a local percussionists' convention, producing 283 completed surveys that examined behaviors and attitudes regarding hearing protection devices. They found that most percussionists are "aware that HPDs can preserve their hearing, prevent fatigue and tinnitus, make loud sounds more comfortable, and reduce loudness without causing distortion" (p. 61). The participants' survey responses revealed that 89% were aware that music-induced hearing loss is irreversible, and 74% understood that it cannot be cured with medicine or surgery (p. 61). The researchers also found that 93% of the respondents realized that the effectiveness of hearing protection devices varies (p. 61).

Despite understanding the positive benefits of hearing protection, 82% of the participants did not have their hearing tested within a year of the survey, and most of them preferred the less-effective foam style earplugs rather than custom musicians' earplugs (Curk & Cunningham, 2006, p. 61). Concurring with previous research by Zeigler and Taylor (2001), the most striking finding from Curk and Cunningham (2006) suggests that despite their understanding the consequences, the majority of musicians do not consistently wear hearing protection while performing (p. 61). Curk and Cunningham concluded that 77% of the percussionists who participated in an educational intervention program focusing on noise exposure, hearing loss, and hearing conservation strategies started to wear hearing protection more often after participating in the program (p. 62).

Miller et al. (2007) examined the musical practice and playing habits of 27 college music students (18–22 years), including their knowledge of hearing conservation, use of hearing protection, and reported experiences of tinnitus. Most of the participants of this study reported playing their instruments between six and 10 years, with 48% playing over 10 hours per week and 15% playing over 20 hours per week (p. 161). While playing their instruments, 78% (21) of the participants reported not using hearing protection, and 22% (6) stated that they did wear hearing protection (p. 161). Most of the students who reported wearing hearing protection used foam earplugs, with only one of the students using custom-made musicians' earplugs.

Regarding hearing conservation, 74% of the participants reported learning about noise-induced hearing loss and hearing health in school (Miller et al., 2007, p. 162). Considering that 59% of the students reported “unprotected exposure to loud noise outside band” (p. 162), the researchers argue that “either the education that student musicians receive regarding hearing conservation is not effective or that students are not aware of the dangerous sound levels to which they are exposed” (p. 162). They found that 74% of college music students reported having been taught about the effects of noise on hearing health, yet less than a third of them used hearing protection while playing their instrument and those who did, used it inconsistently (p. 160). Further, 63% of these students reported experiencing tinnitus after exposure to loud music, which makes their decision to not use hearing protection even more curious (p. 162).

Sataloff (1997) suggests that hearing conservation among musicians should be able to exist without affecting performance; however, most of the research suggests that individuals choose not to take preventative measures to protect their hearing, despite the evidence of the potential dangers (Curk & Cunningham, 2006; Harman, 1993; Miller et al., 2007; Zeigler & Taylor, 2001). For instance, Barlow (2010) found that despite their knowledge of hearing loss and the effects of noise exposure on hearing, only 18% of college music students stated that they “always” or “usually” wear hearing protection when in loud environments (p. 180). These individuals reported not using hearing protection because it presented communication problems and changes in musical perception (68%); they felt it was unnecessary (30%); they forgot to bring their hearing protection with them to the performance venue; or did not remember to use it (34%) (pp. 180–181).

Acoustical Modifications

Many researchers identify the acoustical properties of instrumental music classrooms as another important factor in hearing loss prevention programs. Ostri et al. (1989) identified several environmental factors that the musicians indicated as contributors to their hearing loss, including the design of an orchestra pit which placed musicians underneath a roof structure, causing some of the musicians to experience “headache(s), dizziness, tinnitus and hearing problems during and after the performance(s)” (p. 245). Grayston and Alvord (1993) found that sound levels approached or exceeded OSHA noise exposure standards in all eight of the secondary school band rooms measured for their study. Similarly, Royer (1996) reported that

instrumental music educators were at-risk for music-induced hearing loss after discovering that 20 out of the 23 music classrooms measured for the study exceeded NIOSH occupational noise standards; this would require them to participate in hearing loss prevention programs if they were in non-music occupations. The inadequacies of these music classrooms were based on ceiling height and the total cubic feet and dimensions of the room. Owens (2003) measured the reverb times of 10 music classrooms and found that the rooms exceeded NIOSH and ACGIH noise exposure standards.

Pedagogy and Classroom Management

Chesky (2008) discussed music educators' responsibilities in protecting students from excessive sound exposure and suggested that music educators make the following pedagogical and classroom management changes: (a) inform students when sound exposure levels surpass 100 dB; (b) produce music that is exciting musically, but not dangerous to the musicians; (c) use dosimeters to monitor sound pressure levels; and (d) spend more instructional time producing quieter dynamic levels, including programming softer musical selections and modifying conducting techniques (p. 40). Meyerdierks (2005) suggested that music educators require student percussionists to wear hearing protection.

Drawing a relationship between hearing loss prevention and music education pedagogy, Royer (1996) claimed that quality music teaching increases the musical maturity of the musicians: more mature musicians produce more characteristic tones, which increase the overtones and overall sound pressure levels (p. 179). Further,

successful music programs developed through quality music teaching will most likely have high student involvement, implying increased sound pressure levels based on the increased size of the ensemble (p. 179). In other words, “better music teaching produces better musicians creating a fuller and louder band sound exposing the director to higher sound levels” (p. 179). This conclusion is not noted in the remaining relevant literature reviewed for this study. Further, Royer’s conclusion illustrates the ironic reality facing instrumental music educators regarding occupational hearing loss: effective music teaching might actually increase one’s chances of acquiring a hearing impairment.

Chapter Summary

The relevant literature reviewed in this chapter revealed a striking absence of research specifically addressing the phenomenon of music-induced hearing loss among instrumental music educators. Numerous noise exposure studies examined the phenomenon among professional musicians, but only recently have instrumental music educators become a focus of such research. These studies have produced limited and often contradictory results, however. In my review of the relevant literature, three recurring themes emerged: (a) the variegated physical manifestations of music-induced hearing loss, (b) the inadequacy of industrial noise exposure standards for music-related professions, and (c) the rationale behind musicians and music educators’ decisions not to use hearing protection.

The physical manifestation of music-induced hearing loss is a difficult issue to address considering the elusive nature of identifying the onset and causes of hearing

impairments (Lubet, 2010). Numerous studies have identified intensity and duration as the primary factors in developing music-induced hearing loss (Hart et al., 1987; Pisano, 2007; Sataloff, 1997). Instances of music-induced hearing loss are identified by a 10–40 dB decline in hearing acuity in the 4–6 kHz frequencies, which appears as a well-defined dip or notch on an audiogram (Cutietta et al., 1989; NIOSH, 1998). Prolonged or excessive exposure to music can also exacerbate the onset and symptoms of presbycusis (Westmore & Eversden, 1981; Cutietta et al., 1994).

The second recurring theme is the consistent evidence demonstrating the inadequacies of the OSHA and NIOSH occupational noise exposure requirements when applied to music-related fields (Chesky, 2011; Owens, 2004; Walter, 2009). The noise exposure studies reviewed in this chapter demonstrate that musicians and instrumental music educators are subjected to sound levels that surpass OSHA and NIOSH standards (Owens, 2003). The extant research reviewed in this chapter demonstrates that OSHA standards are particularly dangerous for musicians and instrumental music educators (Barlow, 2010; Holland, 2004; Owens, 2003; Royer, 1996).

Professional musicians are the most widely documented population in the extant literature examining music-induced hearing loss. Research investigating the phenomenon and its effect on rock (Rintelman & Borus, 1968; Speaks et al., 1970; Reddell & Lebo, 1972; Axelsson & Lindgren, 1978; Kähäri et al., 2003) and orchestral musicians (Karlsson et al., 1983; Sabesky & Korcynski, 1995) documents sound exposure levels surpassing recommended exposure limits. Recently, studies

investigating music-induced hearing loss have identified college music students as a vulnerable population (Chesky, 2010, 2011), including members of college jazz bands (Henoch & Chesky, 2000; Walter, 2009) and wind ensembles (Holland, 2004; Ross, 2001).

Studies examining the contributing environmental conditions to excessive sound exposure among musicians and music educators have expanded to include those investigating performance venues (Babin, 1999; Camp & Horstman, 1992), rehearsal spaces (Owens, 2004), practice rooms (Phillips & Mace, 2008), and seating position within the ensemble (Holland, 2004; Jansson & Karlsson, 1983; Walter, 2009) which exceed OSHA and NIOSH sound exposure standards. Miller et al. (2007) also found that the practice and playing habits of college music students often exceed these exposure limits.

The third recurring theme found in my review of the literature presents musicians' and music educators' rationales for not using hearing protection. Zeigler and Taylor (2001) found that most music students did not wear hearing protection during rehearsals, concerts, or other loud social activities, and their use of hearing protection did not change after participating in a hearing conservation program. Despite understanding the positive benefits of hearing protection and the consequences of hearing loss, Curk and Cunningham (2006) found that a majority of musicians did not consistently wear hearing protection while performing. Affirming those findings, Miller et al. (2007) reported that most college music students did not wear hearing protection despite hearing conservation efforts at the college level.

Solomon (1986) suggested that music educators choose not to use hearing protection due to the stigma surrounding musicians with hearing impairments, and the perception that the sound produced from music-making is not harmful because it is music and not noise (p. 28).

The relevant literature reviewed in this chapter examined music-induced hearing loss from medicalized perspectives that focused on the causes, symptoms, and treatments of the phenomenon rather than the disabling social, cultural, and political factors that contribute to the phenomenon among music educators. Although these studies provided critical and substantive support for the present study, a gap exists in the literature: the need to critically examine the sociocultural perceptions and conditions that accept and perpetuate the existence of music-induced hearing loss among instrumental music educators.

CHAPTER THREE

LEGAL CONTEXT AND THEORETICAL FRAMEWORK

Extant research investigating the phenomenon of music-induced hearing loss among musicians is predominantly based on medicalized perspectives, focusing on the pathology and diagnosis of impairment rather than interrogating the social, cultural, and political contexts that create disabling environments. However, this literature, while valuable to our understanding of the phenomenon, has its limitations. Examining instrumental music educators' lived experiences of music-induced hearing loss through the theoretical lenses of disability studies and transcendental phenomenology provides insights that enhance our understanding of the phenomenon and our responses to impairment and disability within music education.

In this chapter I examine the phenomenon of music-induced hearing loss through the theoretical framework of humanities-based disability studies and transcendental phenomenology. I present this chapter in six sections: (a) disability and language, (b) disability's legal context, (c) four models of disability studies, (d) the stigma of disability, (e) transcendental phenomenology as a theoretical framework, and (f) transcendental phenomenology in disability studies. In the first section of this chapter, I describe the language that is associated with impairment and disability. Second, I discuss the limited protections provided to instrumental music educators with music-induced hearing loss within the legal context of Section 504 of the Rehabilitation Act of 1973, the Americans with Disabilities Act of 1990, and the

Americans with Disabilities Amendments Act of 2008. Third, I outline four models of disability—medical, social, cultural and complex embodiment. Fourth, I explore the stigma of disability and pay close attention to the socially constructed pressures on individuals to pass, overcome, or cope with physical and cognitive impairments. Fifth, I discuss how transcendental phenomenology serves as a theoretical framework for the present study. In the final section of this chapter, I discuss how transcendental phenomenology applies to disability studies in music education research.

Disability and Language

Language that identifies individuals or groups of people in relation to race, gender, sexuality, and disability requires thoughtful consideration. All individuals should have the prerogative to self-identify. When discussing disability, it is important to consider that much of the nomenclature used to identify individuals have problematic histories surrounding their origins, utilization, and contextualization. Disability, race, gender, and sexuality are not fixed, dichotomous positions, but rather fluid and dynamic ways of being within an infinite continuum of human characteristics.

Many individuals with physical or cognitive impairments understandably take exception to the word disability due to its historically negative connotations. The pejorative associations with the word disabled imply that the individual is incapable, limited, and defective. This creates an inequitable and false dichotomy between the so-called able-bodied and the disabled, the normal and the abnormal, the wanted and the unwanted. Placing individuals within one of these two binaries based solely on

physical and cognitive characteristics is another way of sorting and ordering bodies (Foucault, 1990; Koza, 2007). The able body needs the disabled body to exist. The process of categorizing people based on physical and cognitive differences began centuries ago and is evident more recently in the eugenical practices of the early twentieth century (Davis, 2013; Koza, 2007; Winfield, 2007), which institutionalized difference by relegating different bodies and minds to the peripheries of society (Baker, 2002).

The use of the term *disabled* throughout my dissertation refers not to the physical characteristics of the individual, but rather what I argue are the socially constructed discriminatory and oppressive consequences that are a direct result of society's negative perception of bodily difference. Music educators who develop hearing impairments face both the physical challenges of hearing loss and the disabling consequences of society's response to physical impairment. For example, the effects of music-induced hearing loss can deleteriously limit instrumental music educators' abilities to communicate effectively with students and accurately identify musical phenomena while teaching, conducting, and performing; yet, it is society's socially constructed responses to physical and cognitive impairments that actually disable these colleagues. Instrumental music educators experiencing occupational hearing loss become disabled when they do not receive adequate accommodation, assistance, and support from their school districts.

Disability studies scholars disagree about the appropriateness of the word disabled as a descriptor of individual identity or physical and cognitive characteristics

(Davis, 1995; Linton, 2005). Some disability studies researchers prefer using physical impairment as a secondary descriptor (i.e., individuals with disabilities) in order to recognize the individual before the impairment (Dobbs, 2012; Hammel & Hourigan, 2011). The use of people-first-disability-second language⁵⁰ is prevalent in the fields of special education, music therapy, and rehabilitation. Disability studies scholars argue, however, that disability is an important political marker of identity and should be recognized when considering its meanings within social, cultural, and political contexts (Linton, 1998a; Mitchell & Snyder, 1997; Shakespeare, 2013; Siebers, 2008). I adhere to the people-first-disability-second language, considering my currently ablebodied state and the social privileges that come with this positionality.

I employ the term *currently ablebodied* rather than *temporarily ablebodied*, considering that impairment and disability do not affect all individuals equally unless we consider the human condition as an *inevitably fatal disability*. Siebers (2001) recognizes the paradoxical relationship between ability and disability: “The cycle of life runs in actuality from disability to temporary ability back to disability, and that only if you are among the most fortunate, among those who do not fall ill or suffer a severe accident” (p. 742). Straus (2006) also discusses the universal inevitability of disability for all individuals and the sociocultural meanings assigned to experiencing disability:

⁵⁰ See Dobbs (2012) for a comprehensive and thoughtful discussion on the use of language within disability studies.

Disability is a pervasive and permanent aspect of the human condition. Like people in all times and places, most of us have been, are now, or (as we age) will be people with disabilities. Despite its universality, however, disability is not uniform or immutable. The nature of disability, the kinds of conditions that are considered disabling, and the meanings attached to disability all vary with time and place. To a significant extent, disability is socially and culturally constructed rather than given: it has a history. (p. 113)

My use of the term currently able-bodied recognizes that all individuals are susceptible to developing physical or cognitive impairments, as well as the experience of aging, illness, and injury; further, it also acknowledges the reality that some people never develop any socially recognized disabilities, allowing them to maintain the illusion of normalcy.

Disability's Legal Context

Discrimination

In this section, I examine music-induced hearing loss among instrumental music educators within a legal context, namely Section 504 of the Rehabilitation Act of 1973 (Section 504) (29 U.S.C. §794; 34 C.F.R. 104 *et seq.*), the Americans with Disabilities Act of 1990 (ADA) (Public Law 101–336, 42 U.S.C. §12101 *et seq.*), and the Americans with Disabilities Amendments Act of 2008 (ADAAA) (Public Law 110–325, 42 U.S.C. §12101 *et seq.*). These federal disability laws prohibit

discrimination on the basis of disability and broaden the scope of protection for individuals with disabilities by providing reasonable accommodations that are necessary to pursue equal education and employment opportunities (Mead, 2013). I examine music-induced hearing loss within the legal context of disability law in order to underscore the inadequacies of these laws in protecting instrumental music educators from this music-related occupational hazard.

Section 504 prohibits discrimination “on the basis of disability by any recipient of federal funds” (Mead, 2013, p. 203), including public and private schools that receive federal money (29 C.F.R. §794). This statute provides anti-discrimination protection to individuals from birth to death in order to ensure that individuals with disabilities have access to the benefits and programs offered by any federally funded school district (Mead, 2013). Section 504 defines disability using three eligibility criteria: (a) “a physical or mental impairment that substantially limits one or more major life activities; (b) a record of such an impairment; or (c) being regarded as having such an impairment” (34 C.F.R. 104.3(j)(1) *et seq.*).⁵¹

Under Section 504, major life activities include “walking, seeing, hearing, speaking, breathing, learning, and working” (34 C.F.R. 104.3(j)(2)(ii)). The disability in question may be permanent or temporary, as long as the disability “substantially affects the person for a sufficient period of time” (Mead, 2013, p. 204). Individuals who have a record of a disability (34 C.F.R. 104.3(j)(1)(ii)) or are “regarded as having” (34 C.F.R. 104.3(j)(1)(ii)) a disability are protected from discrimination

⁵¹ The ADA (1990/2008) also uses these three criteria to define disability.

under this statute. Reasonable accommodations must be provided to individuals with disabilities in order for them to pursue equal access to educational and employment opportunities (34 C.F.R. 104.11(a)(1)); however, “employers are not required to substantially alter the qualifications or essential requirements of a job in order to accommodate a worker’s disability” (Mead, p. 205), which also includes “undue administrative or financial burdens when considering accommodations (p. 205).

The original ADA extends the “non-discrimination protections of Section 504 beyond recipients of federal financial support to private employers and commercial establishments” (Mead, 2013, p. 205). The ADA (1990/2008) is divided into five sections: (Title I) employment, (Title II) public services and transportation, (Title III) public accommodations and services operated by private entities, (Title IV) telecommunications, and (Title V) miscellaneous provisions. Title I prohibits employment discrimination “on the basis of disability in regard to job application procedures, the hiring, advancement, or discharge of employees, employee compensation, job training, and other terms, conditions, and privileges of employment” (42 U.S.C. §12112(a)). Title II addresses discrimination within state and local governments concerning services, participation, and activities provided by public entities (42 U.S.C. §12131(2)) “regardless of whether they receive federal financial assistance” (Mead, p. 205). Title III prohibits public businesses from denying individuals with disabilities “full and equal enjoyment of the goods, services, facilities, privileges, advantages, or accommodations of any place of public accommodation” (42 U.S.C. §12182(a)). Title IV aims to eliminate discrimination

related to telecommunications services by creating and maintaining devices and services for the hearing impaired which also allows them to communicate via wire or radio (47 U.S.C. §225 *et seq.*). Title V includes several provisions, most notably: (a) that the ADA should not be more lenient than Section 504 standards (42 U.S.C. §12201), (b) that state immunity from suit is annulled by the ADA (§12202), and (c) the ADA applies to Congress and each of its legislative branches (§12209).⁵² In the case of instrumental music educators seeking anti-discrimination measures for occupational hearing loss, Titles I and II would be the most applicable to their cause.

Defining Disability

Following the passage of the original ADA (1990), ensuing judicial interpretations of the language within the statute resulted in a narrowing of the statutory definition of disability as well as the legal protection afforded to individuals with disabilities (Emens, 2013; Mead, 2013). Congress responded to these court rulings by amending the ADA in 2008 based on what they considered to be “inappropriate interpretations of the act by the U.S. Supreme Court” (Mead, 2013, p. 206).⁵³ The ADAAA (2008) strengthened the original statute, as well as Section 504, in four important ways. First, it expanded the definition of major life activities by adding more inclusive language, specifically the phrase “include, but are not limited

⁵² In addition to drug-use (42 U.S.C. §12210) and transvestism (§12208), the ADA excludes the following “conditions” from their definition of disability: pedophilia, exhibitionism, voyeurism, compulsive gambling, kleptomania, and pyromania (§12211).

⁵³ See *Sutton v. United Air Lines, Inc.*, 527 U.S. 471 (1999); *Toyota Motor Mfg., Kentucky, Inc. v. Williams*, 534 U.S. 184 (2002).

to” (42 U.S.C. §12102(2)).⁵⁴ Next, it clarified that a substantially limiting impairment affecting a major life activity “need not limit other major life activities in order to be considered a disability” (42 U.S.C. §12102(4)(C)). The ADAAA (2008) also established that disabilities would no longer be considered substantially limiting based on the “ameliorative effects of mitigating measures” (42 U.S.C. §12102(4)(E)(i)). Finally, the courts were explicitly directed to operationalize this definition of disability in “favor of broad coverage of individuals under this Act” (42 U.S.C. §12102(4)(A)).

The ADAAA (2008) currently defines disability as “a physical or mental impairment that substantially limits one or more major life activities” (§12102(1)(A)). For musicians, music-making is a major life activity, and one that is dependent on hearing acuity. Music-induced hearing loss can substantially limit musicians’ ability to accurately and expressively perceive musical phenomena while teaching and performing (Phillips & Mace, 2008). As stated above, the ADAAA (2008) states that a substantially limiting impairment that affects a major life activity “need not limit other major life activities in order to be considered a disability” (42 U.S.C. §12102(4)(C)). However, the level of hearing loss musicians consider substantially limiting to their ability to teach or perform might differ from the opinion of an able-bodied healthcare worker, insurance provider, or government agent with normal hearing.

⁵⁴ The ADAAA (2008) also expanded the list of examples of major life activities which now include, but are not limited to “caring for oneself, performing manual tasks, seeing, hearing, eating, sleeping, walking, standing, lifting, bending, speaking, breathing, learning, reading, concentrating, thinking, communicating, and working” (42 U.S.C. §12102(2)).

The second point of the ADAAA (2008) definition of disability states that individuals with disabilities may have a “record of such an impairment” (§12102(1)(B)). Music educators with music-induced hearing loss are often required to present a record of their hearing impairment to healthcare providers and government agencies when requesting disability compensation. Failure to produce such evidence may result in denial of medical coverage, financial assistance, or occupational accommodations (Fulford, Ginsborg, & Goldbart, 2011; Longmore, 2003; Lubet, 2010; Ross, 2001). Consequently, music educators should acquire a baseline audiogram with annual follow-ups in order to establish documentation of any hearing loss (Chesky, 2010; Cutietta, Klich, Royse, & Rainbolt, 1994).

The ADAAA (2008) also recognizes that disability includes individuals “regarded as having such an impairment” (§12102(1)(C)). Individuals fall into this category if they experience discrimination because of an “actual or perceived physical or mental impairment whether or not the impairment limits or is perceived to limit a major life activity” (§12102(3)(A)). Emens (2013) explains that the ADAAA “completely removes the need to show any substantial limitation in a major life activity” (p. 45), but argues that the courts may continue to misinterpret the definition of *substantially limiting* which may force individuals to endure a “highly medicalized inquiry” (p. 45) in order to prove their impairment. I argue that the “regarded as having” distinction in the ADAAA definition of disability be applied to musicians and music educators who face workplace discrimination for wearing hearing devices to preserve or enhance their hearing acuity. Society typically regards such

individuals as having a disability due to the social stigma associated with hearing impairments and the use of hearing protection within music education (Chesky, 2008, 2011; Cutietta et al., 1994)

Under the original ADA (1990) definition, individuals who mitigated their substantial limitations were evaluated based on their mitigated state (Emens, 2013). For instance, individuals with significant hearing loss would not be considered disabled if their condition were improved by the use of hearing aids or cochlear implants. Also, the restrictive interpretation of what constituted a major life activity in the original statute only recognized activities that were “of central importance to most people’s daily lives” (Emens, pp. 44–45).⁵⁵ I argue that this language permitted able-bodied non-musicians in positions of power to make subjective judgments about the value of music-making as a major life activity, which excluded musicians and music educators with music-induced hearing loss from receiving reasonable accommodations under the law. Although the phrase referring to activities “of central importance” no longer appears in the amended statute (ADAAA, 2008), the phrases “major life activity” and “substantially limiting” continue to blur the language of the law and its intent.

⁵⁵ Emens (2013) states that the definition of disability under the ADA was primarily concerned with “how disabled someone is” (medical model) (p. 46), but the ADAAA focuses more on issues surrounding discrimination and accommodation (social model). Emens argues however, that although the ADAAA rebroadened the definition of disability, it inadvertently created two distinct legal designations of disability: the “actually-disabled” and the “regarded-as disabled” (p. 46). Emens is concerned that the “regarded-as disabled” will not receive the same legal protections and accommodations that the “actually-disabled” receive because of the language defining reasonable accommodations within the ADAAA, stating “plaintiffs who are only regarded-as disabled have no right to accommodation” (p. 46).

ADA and Musicians' Injuries

Lubet (2010) argues that the ADA does not recognize many musicians' injuries due to the "transient, freelance nature of so much musical employment" (p. 26), which makes identifying the onset of a hearing impairment difficult, if not impossible.⁵⁶ Lubet claims that the definition of disability is more inclusive under Worker's Compensation Law (Office of Worker's Compensation Programs [OWCP], 2014) compared to the ADA:

The ADA's criterion of ability versus inability to perform quite narrowly defined major life activities differs greatly from the standards for receiving benefits, accommodations, or both under Worker's Compensation, the latter based on fine gradations of the degree of the injury or illness's severity and analogous magnitudes of intensity of medical treatment. (p. 26)

This definition of disability is problematic for instrumental music educators, considering the excessive sound levels to which they are subjected in the classroom (Chesky, 2010; Cutietta, Millin, & Royse, 1989; Cutietta et al., 1994; Royer, 1996). It is nearly impossible to determine the exact time and location of the onset of a hearing impairment, unless an individual experiences a traumatic sound event resulting in sudden hearing loss or tinnitus (McBride & Williams, 2001).

Lubet (2010) also argues that both versions of the ADA do not recognize music occupations as major life activities because music-related injuries do not

⁵⁶ The general use of the acronym ADA refers to the original ADA (1990) and the amended ADAAA (2008) version of the statute.

represent the “imagined norm” (p. 16), and the “deficit associated with impairment is measured against a hypothetical ‘normal’ person . . . rather than the individual subject” (p. 27). The concept of normal is a subjective construction that objectifies, marginalizes, and discriminates against difference, and at the same time, maintains the established power dynamic between normal and abnormal bodies. Performance-related injuries are “far from trivial for musicians, for whom, obviously, playing an instrument extremely well is certainly a ‘major life activity,’ even the defining facet of ‘musical life’” (p. 17).

Reasonable Accommodations

Despite the problematic definitions of disability in both versions of the ADA, the amended version addresses the potentially disabling realities of architectural design, which are also based on socially constructed perspectives of normalcy:

Individuals with disabilities continually encounter various forms of discrimination, including outright intentional exclusion, the discriminatory effects of architectural, transportation, and communication barriers, overprotective rules and policies, failure to make modifications to existing facilities and practices, exclusionary qualification standards and criteria, segregation, and relegation to lesser services, programs, activities, benefits, jobs, or other opportunities. (§12101(a)(5))

Considering architectural design as a form of discrimination directly applies to the occupational hazard of music-induced hearing loss among instrumental music

educators. This is evident in the failure of school districts to provide acoustically safe rehearsal and performance environments for school performance ensembles (Cutietta et al., 1994; Ross, 2001; Royer, 1996). The failure to modify architectural design practices within music education becomes apparent when considering the traditional teaching and performance expectations commonly associated with public school music programs. Such traditional expectations often promote large performance ensembles such as concert, marching, and pep bands that consistently produce harmful sound levels surpassing OSHA and NIOSH occupational noise exposure guidelines (Chesky, 2010, 2011; Henoch & Chesky, 2000; Walter, 2009).⁵⁷

In the case of music educators with hearing impairments, I claim that the currently able-bodied sit in judgment of these individuals, arbitrarily determining the value of their occupation, the degree of their impairment, and the justification for treatment, accommodations, and/or assistance. Medical providers, health insurance companies, and government policy review boards might alleviate the exclusion of individuals with disabilities by employing them in positions of authority that determine disability assistance, accommodation, and compensation. The ADAAA (2008) defines reasonable accommodations as:

- (a) making existing facilities used by employees readily accessible to and usable by individuals with disabilities; and (b) job restructuring, part-time or modified work schedules, reassignment to a vacant

⁵⁷ OSHA requires 90 dBA over an 8-hour time-weighted average, with a 5-dB exchange rate as a daily permissible exposure limit. NIOSH requires 85 dBA over an 8-hour time-weighted average. Both of these occupational standards are reviewed at length in Chapter Two.

position, acquisition or modification of equipment or devices, appropriate adjustment or modifications of examinations, training materials or policies, the provision of qualified readers or interpreters, and other similar accommodations for individuals with disabilities. (§ 12111(9)(A)(B))

The ADAAA accommodations listed above are problematic for music educators with music-induced hearing loss. Considering the effects of acoustics on occupational noise exposure (Grayston & Alvord, 1993; Royer, 1996), the architectural design of classrooms and performance spaces determines the accessibility of music facilities for music educators. Unfortunately, most school districts cannot afford state of the art music facilities with upgraded acoustical treatments (Ross, 2001). The second ADAAA accommodation of job restructuring is problematic for music educators because of the specialized aural skills needed to teach music in a performance-based music curriculum; these aural skills are based on notions of exceptionalism and normativity within music education (Chesky, 2010; Straus, 2006).

The definitions of disability and the reasonable accommodations outlined in the original and amended ADA (1990/2008) employ medicalized perspectives that devalue physical and cognitive differences. Both statutes perpetuate an ableist system that allows able-bodied individuals in positions of power to make subjective judgments that determine who is disabled enough to receive accommodation, assistance, or compensation. These decisions, based on a medical model of disability,

consider physical and cognitive impairments as personal deficits in need of medical intervention. In the following section of this chapter, I review four models of disability, including the medical model, and relate each model to the experience of music-induced hearing loss among instrumental music educators.

Four Models of Disability Studies

In a critical analysis of disability studies discourse in the *Journal of Research in Music Education (JRME)*, Dobbs (2012) identifies four theoretical models of disability: (a) the medical model, (b) the social model, (c) the cultural model, and (d) complex embodiment. She explores the discursive constructions of disability within music education, which has historically viewed hearing impairment as an embodied deficit and hence, a potential threat to an individual's career. Employing Dobbs' work, I apply each of the four models of disability to the phenomenon of music-induced hearing loss as an occupational hazard in order to reimagine our understanding of an issue—music induced hearing loss—that I argue is largely ignored within music education.

Dobbs (2012) focuses on how definitions of disability influence children's musical experiences and the manner in which music educators teach children. Using this confluence as a launching point, the present study focuses on how definitions of disability affect instrumental music educators' musical experiences, including how these definitions influence our perceptions of what constitutes a safe working environment regarding occupational noise exposure.

The Medical Model

The medical model sets forth the management, rehabilitation, and repair of physical and cognitive impairments through medical interventions (Lubet, 2002; Smart, 2009).⁵⁸ This model defines disability “as an individual’s impaired condition, treats it as a disease[ed] state requiring intervention/cure, and privileges the knowledge, skills, and even the power of health care personnel and other clinicians in fields such as social work and special education” (Lubet, 2002, p. 59). When one applies the principles of the medical model to instrumental music educators’ experiences with music-induced hearing loss, one focuses on the physical symptoms of the condition rather than the disabling contexts which create the phenomenon.

Dobbs (2012) reminds us however, that definitions of disability are perpetually shifting and contingent based on existing social constructions. By examining the invocation, construction, and deployment of disability within the *JRME*, Dobbs found that the medical model was the predominant model in disability studies within that publication, stating that the “textual construction of disability within *JRME* is one of embodied, functional deficit” (p. 8).⁵⁹ Within the medical model, disability is:

Diagnosed and pathologized by medical as well as many therapeutic and educational professionals as comprising discrete physical or cognitive impairments or combinations thereof—disability lives

⁵⁸ Smart (2009) refers to the medical model of disability as the biomedical model (p. 4).

⁵⁹ Davis (2006a) defines an *embodied deficit* as any deviance from the medical norm of physical and cognitive capabilities.

strictly *within the body*, is often perceived as a personal issue, and serves as a stigmatic social marker of negative difference. (Dobbs, 2012, p. 9, italics in original)

Davis (2006b) articulates how identity formation is influenced within the medical model by the “biases, prejudices, and ideology of disability studies toward minorities, ethnicities, and racialized groups” (p. xiii). He maintains that the medical model presumes disability to be a universal constant:

The medical model treats disability as a disease in need of a cure, while the rehabilitation model sees disability as in need of repair, concealment, remediation, and supervision. The results of these two models are activities like implanting cochlear devices in the deaf, forcing mobility-impaired people to use prosthetics to walk “normally,” or performing painful and invasive corrective surgery for cosmetic purposes. (Davis, 1999, p. 506)

Davis’ comments regarding identity formation within the medical model has multiple implications for instrumental music educators and musicians who experience music-induced hearing loss, considering the profound effect hearing loss has on a musician’s identity (Hill, 2003; Santucci, 2009).

Davis’ (1995) concept of *enforced normalcy* challenges music educators to consider how social conceptions of ability and disability affect classroom instruction and performance practice. The conception of what is normal (normative) within music education is evident in the accepted standards found within curriculum,

pedagogy, performance practice, and aesthetics. Many of the accepted pedagogical and performance practices within instrumental music education are grounded in the European conservatory model of music instruction, which is steeped in its own set of beliefs, values, and biases (Jorgensen, 1997, 2003). Individual musicians and performance ensembles are judged on their ability to conform to established performance criteria regarding tone, technique, and musicality, based on 19th century musical traditions of Western art music, which are “rooted in contemporaneous notions of normality and abnormality” (Straus, 2006, p. 122). In other words, physical or mental differences are treated as deficiencies and are considered detrimental to musical performance.

Smart (2009) states that the (bio)medical model classifies, quantifies, measures, and standardizes disability, but “ignores the social aspects of disablement and essentially treats all individuals with the same diagnosis with identical treatment plans, regardless of differences in the individuals’ needs, resources, or assets” (p. 4). Smart recognizes the medical successes achieved through the medical model and does not advocate for its abandonment, but instead reminds us of the importance of challenging this model by comparing it to other definitions of disability (p. 4). Smart provides three criticisms of the medical model: (a) it separates members of the disabled community into groups based on their particular impairment, (b) it views disability as an individual inferiority, and (c) it responds slowly to the changing definitions of disability (p. 5). Further, she addresses the medical model’s inability to

recognize the social aspects of individuals or their subjective experience, which is based on their social, cultural, and political identities (p. 5).

Linton, Mello, and O'Neill (1995) acknowledge the role of the medical model in helping individuals receive medical benefits and accommodations, but they argue that this function has consequently led to a loss of freedom and individual rights. They claim that “medical, educational, and social service personnel have wielded enormous power over people with disabilities using the tools of diagnosis, labeling, treatment, and institutionalization (p. 8). These researchers argue that society defines disability in medical terms rather than with social and political definitions:

The solution to the “problem” of disability is seen as residing in the resources and facilities of the medical establishment, rather than in legislative bodies and social institutions. The arrangement buys into the assumption that people with disabilities are more concerned with cures than rights, are more plagued with their condition than with discrimination. It also assumes that all human variations labeled “disabilities” require a medical definition. (Linton et al., p. 8)

Further, they argue that over-reliance on the medical field has led to the desire to make human beings more perfect by eliminating “undesirable characteristics from the population” (p. 8). An example of this desire to eliminate disability manifests in the use of cochlear implants for individuals with hearing impairments (Cherney, 1999).

Garland-Thomson (2005) discusses how medical interventions create societal pressures to standardize the body through technological and medical interventions in

order to “banish disability from our lives” (p. 524). Pathologizing hearing impairment labels the individual with the hearing impairment as damaged. Under the medical model of disability, hearing impairments are seen as personal and embodied deficits that must be corrected. Garland-Thomson posits that as a society, we devalue physical and mental variety and expect modern medicine to eliminate disability from our lives; we respond to disability with “silence, denial, shame, or determined and desperate vows to ‘fight it’” (p. 525).

Society’s need to standardize bodies by banishing disability is evident in the response to the phenomenon of music-induced hearing loss among music educators. The development and utilization of technological medical interventions such as hearing aids and cochlear implants attempt to normalize individuals with hearing impairments (Davis, 1999). Such attempts at curing hearing impairments constitute evidence of the societal tendency to devalue disability. Physical variety in hearing ability is an unacceptable trait within musical fields because it does not conform to traditional music performance standards (Chesky, 2011) rooted in ableist conceptions of normativity that devalue disability (Hehir, 2002). Social responses that devalue impairment put occupational pressures on musicians to hide developing or preexisting hearing impairments from their students, colleagues, or administrators (Guptil, 2011).

Siebers (2001) maintains that the diagnosis and treatment of impairment under the medical model incorrectly represents impairment as an individual problem, which deprives individuals with disabilities of a “sense of political community by those whom they need to address their pain” (p. 743). My review of the relevant literature

in Chapter 2 revealed numerous quantitative studies that attempt to treat the phenomenon of music-induced hearing loss as an individual experience by cataloguing incidences of occupational noise exposure. Many of these studies point out that variability and susceptibility differ among individuals (Cutietta et al., 1994; Woolford et al., 1988), suggesting that music-induced hearing loss is an individual problem. Siebers opposes treating disability as merely an individual problem because it isolates individuals from those who would benefit from collective action, stating that individuals with disabilities “must fight against their individuality rather than to establish it—unlike political action groups based on race and gender” (p. 743).

Longmore (2003) argues that individuals with disabilities are marginalized by society and only achieve social acceptance through medical interventions. He also claims that preoccupation with the medical model of disability in health care, social services, education, private charities, and public policies has “institutionalized prejudice and discrimination” (p. 218). He describes the institutionalization of disability as being “produced through the dynamic interplay of a complicated constellation of factors” (p. 238), including physical and cognitive impairments, architectural environments, sociocultural values, and public policies. He suggests that the inclusion of more perspectives from individuals with disabilities in disability studies discourse would move us away from the medical perspective of disability and toward a minority group model.

Related to the medical model of disability, the functional model addresses issues of therapy, accommodation, and adaptation and focuses on the functions and

roles individuals are no longer able to perform because of a disability (Smart, 2009). Under the functional model, the lack of accommodations is a “cause/source of handicapping conditions” (Smart, 2009, p. 6). Proponents of the functional model are only concerned with the individual’s ability to function within the workplace, which “reduces individuals with disabilities to their economic value or their ability to contribute to the economy” (p. 6). Smart argues that the limitations of this model lead to prejudice and discrimination towards individuals who do not work “because of the limitations of their disability . . . due to the strong work disincentives system constructed by the government,” (p. 6), resulting in the perception of individuals with disabilities as burdens on society.

Dobbs (2012) describes the functional model of disability as one that expects the individual to adapt to the environment, rather than the environment adapting to the individual. For example, advocates of the functional model of disability would expect instrumental music educators concerned with occupational hearing loss to wear hearing protection devices, rather than investigating and correcting materially and socially disabling characteristics of the profession. Siebers (2001) describes the desire among individuals with disabilities to be able to function independently:

People with disabilities want to be able to function: to live with their disability, to come to know their body, to accept what it can do, and to keep doing what they can for as long as they can. They do not want to feel dominated by the people on whom they depend for help, and they

want to be able to imagine themselves in the world without feeling
ashamed. (p. 750)

Within the functional model of disability, instrumental music educators with occupational hearing loss are expected to learn to live with their hearing impairment if they wish to continue teaching.

The Social Model

The emergence of humanities-based disability studies over the past 25 years challenges the embodied, medical deficit perspectives of ability, disability, and human difference; hence, scholars in this field have developed contrasting models. The social model of disability is one of the first to challenge the medical model. One of the central principles of the social model is separating disability from impairment, which Dobbs (2012) refers to as an intentional decoupling (p. 10). Dobbs (2012) outlines the central tenets of the social model:

Disability is socially, culturally, and corporeally constructed; bodies matter in their materiality and multifacetedness; disability is both private *and* public and therefore political; disability can be constructed as part of one's identity; and disability is rich, complex, and meaningful to people's lives. (p. 10, italics in original)

Dobbs' definition provides a clear illustration of the stark contrast between the social and medical models of disability.

Disability studies researchers assert that it is not the impairment that disables the individual, but rather society's response to the impairment (Davis, 1995; Garland-

Thomson, 2005). For instance, a wheelchair user is only disabled if the individual is faced with entering a building that does not accommodate wheelchair users. The social model of disability is a “social process in which no inherent meanings attach to physical difference other than ones assigned by a community” (Davis, 1999, p. 506). Proponents of the social model often condemn the medical model for its “single-minded reliance on technology, institutionalization, and remediation” (p. 506).

Shakespeare (2013) addresses three strengths of the social model of disability: (a) political strength, which builds a social movement for disabled people⁶⁰ that clearly articulates the need for change; (b) instrumental strength, which liberates disabled people by identifying oppressive and exclusionary social barriers; and (c) psychological strength, which improves the esteem of disabled people by creating a positive sense of collective identity (pp. 216–217). Considering its simplicity and the small number of its activists, Shakespeare suggests that the social model has four general weaknesses: (a) the denial of impairment; (b) the assumption of oppression; (c) the blurred lines between the barriers of impairment and the barriers of disability; and (d) the unrealistic expectations of a utopian, barrier-free society (pp. 217–219).

I address each of the four weaknesses of the social model outlined by Shakespeare (2013) and referenced above. The denial of impairment in the social model is so strong that it “risks implying that impairment is not a problem” (p. 218). This is not a realistic implication for instrumental music educators when faced with

⁶⁰ Shakespeare (2013) explains that the term *disabled people* is appropriated by social model advocates for political identification, as opposed to the mainstream term of *individuals with disabilities*.

the reality of music-induced hearing loss, given the profound effect hearing loss has on musicians. The assumption of oppression in the social model is particularly problematic for qualitative researchers, considering the fact that many individuals who identify as disabled do not consider themselves oppressed (p. 218). The blurred distinction between impairment and disability is entangled in such a way that it is nearly impossible to distinguish between the impact of impairment and the impact of disability on the individual (p. 218). For instance, determining the cause of depression among instrumental music educators with hearing impairments is nearly impossible: are they depressed because of the impairment, or because of society's oppressive response to their impairment? The concept of a barrier-free, utopian society is difficult to conceptualize, much less operationalize (p. 219). In the case of occupational noise exposure for instrumental music educators, a utopian society would consist of state-of-the-art music facilities with perfect acoustics for every school; both the design and the financing for such a project is unimaginable.

The Cultural Model

The cultural model of disability recognizes the social and biological realities of disability and impairment but is primarily concerned with how these elements shape the “ways disabled people experience their environments and their bodies” (Snyder & Mitchell, 2006, p. 6). Snyder and Mitchell examine the “interactional space between embodiment and social ideology” (p. 7), by focusing on cultural locations of disability in a variety of social contexts. In other words, the cultural model recognizes “therapeutic beliefs about disability and disabled people's

experience” (p. 7). Snyder and Mitchell see impairment as “human variation encountering environmental obstacles *and* socially mediated differences that lends group identity and phenomenological perspective” (p. 10, italics in original). This viewpoint recognizes the complexities of disability and its “potentially meaningful materiality” (p. 10) without ignoring the material effects of disability. Contrasting the social model, Snyder and Mitchell further define the cultural model:

The formulation of a cultural model allows us to theorize a political act of renaming that designates disability as a site of resistance and a source of cultural agency previously suppressed—at least to the extent that groups can successfully rewrite their own definition in view of a damaging material and linguistic heritage. (p. 10)

Snyder and Mitchell (2006) identify cultural locations of disability as *sites of violence* against individuals with disabilities who become subjects for “eugenic care, control, rehabilitation, evaluation, roundup, exclusion and social erasure” (p. x). This concept has many ramifications within music education. Music classrooms and performance areas might be considered potentially oppressive cultural locations, considering the profoundly disabling effects of music-induced hearing loss, the occupational and social consequences of hearing impairment, the eugenical cataloguing and quantifying of occupational noise exposure, and the lack of accommodation and financial support for individuals with hearing impairments. As Snyder and Mitchell urge, researchers in music education need to continue to strive towards “revelatory and transformative” (p. 10) work on the issue of impairment and

disability within music education, in order to foster “political resistance, cultural identification, meaningful knowledge, and understanding” (p. 10) within disability studies discourse.

Complex Embodiment

Siebers (2013) defines disability as a cultural and minority identity through the theory of *complex embodiment*, which provides an understanding of embodied variation by examining the liminal spaces between disability and lived reality. The ideologies attached to our perception of ability limit our understanding of disability based on two contradictory beliefs about human existence: (a) the body does not define our identity yet we strive to perfect it; and (b) the existence of the body is finite yet we attempt to make it infinite (p. 279). Complex embodiment examines the connections between disability, race, gender, sexuality and the positive effects of claiming a disabled identity for individuals with disabilities. Siebers argues that disability is not a pathological condition but rather a complex social location, which influences the experiences that shape individual identity (p. 283). Minority identity gives voice to the oppression and struggle experienced by these individuals in the hope of forming political solidarity (p. 284).

Siebers (2013) explains that knowledge is situated based on the perspectives of individuals from marginalized social positions, which are formed from embodiment and lived experience (p. 288). The historical traditions of Western music-making and the professional expectations of American music education within the public school system form a situated knowledge about what is expected of

musicians or music educators: musicians with hearing impairments become disabled in an ableist society. Being a musician with hearing loss constitutes a complex embodiment that is not only restricted to the physical impairment but also includes the valuable insights gained from the experience, which lead to new perceptions of hearing loss and its effect on teaching and performing.

An important distinction between complex embodiment and the social model of disability is that complex embodiment does not deny the perceived negatives associated with impairment and disability, whereas the social model aims to separate impairment from disability. Siebers (2013) insists that disability studies “develop a theory of complex embodiment that values disability as a form of human variation” (p. 290). Considering music educators with music induced hearing loss, complex embodiment not only reveals the disabling environments and situations that contribute to music-induced hearing loss, but it also recognizes the physical realities of hearing impairment and its effect on musicians’ lived experiences.⁶¹

Summary of the Four Models of Disability Studies

Each of the four models of disability studies reviewed above offer distinct viewpoints of impairment and disability. Applying each of these models to the representation of impairment and disability in music education shines a light on the disabling environments and situations that contribute to occupational hearing loss among instrumental music educators. The medical model devalues human variation

⁶¹ Dobbs (2012) argues that complex embodiment does not consider how individuals with disabilities “internalize and make meaning of their lived experiences” (p. 11); further, she asks why some individuals resist ableist stereotypes, yet others succumb to these negative perceptions of disability.

and considers physical and cognitive impairments as personal deficits that must be treated or cured. The medical model privileges the physical symptoms of impairment rather than the social, cultural, and political contexts that create disabling environments. As discussed in Chapter 2, the medical model is used predominantly in literature investigating music-induced hearing loss among music educators and musicians. I recognize the value of medical interventions in the prevention and treatment of hearing loss, thus I am not advocating for the complete abandonment of the medical model; however, in line with Smart (2009), I suggest that we challenge this model by considering other definitions of disability and the social, cultural, and political aspects of each individual's subjective experience.

The social model of disability intentionally decouples disability from impairment. Advocates of the social model assert that individuals are disabled by society's response to impairment, rather than the actual physical or cognitive realities of the impairment. The social model provides political strength in an effort to spark social change, identifies oppressive and exclusionary social barriers, and creates a positive sense of collective identity among individuals with disabilities (Shakespeare, 2013, pp. 216–217). The social model does not provide an adequate lens in which to consider music-induced hearing loss among instrumental music educators; as identified above, the weaknesses of the social model include four general areas: (a) denies the physical and cognitive realities of impairment, (b) assumes that individuals with disabilities are oppressed, (c) blurs the lines between the barriers of impairment and the barriers of disability, and (d) presents unrealistic expectations to create a

utopian society (Shakespeare, 2013). Musicians and music educators with hearing impairments must face the physical and cognitive realities of their impairment; however, this does not necessarily mean that all of these individuals identify as disabled or part of an oppressed population. Distinguishing between the barriers of impairment and the barriers of disability is also a problematic entanglement, which is largely determined by each individual's unique experience. Finally, insisting upon the concept of a barrier-free, utopian society to the classroom and performance spaces used by instrumental music educators in public schools across the country is an unrealistic expectation considering the financial realities facing public education.

In the present study, I adhere to the cultural model of disability, which recognizes the social and biological realities of disability and impairment and how these realities shape how individuals experience their environments and their bodies (Snyder & Mitchell, 2006, p. 6). I consider music classrooms and performance spaces to be cultural locations of disability that shape the experience of music-induced hearing loss among instrumental music educators. This viewpoint recognizes the social, cultural, and political complexities of disability without ignoring the material effects of physical and cognitive impairments. Music classrooms and performance spaces become sites of violence (Snyder & Mitchell, 2006) toward music educators when we consider the disabling effects of music-induced hearing loss, the occupational and social consequences of hearing impairment, the eugenical cataloguing and quantifying of occupational noise exposure, and the lack of accommodation and financial support for individuals with hearing impairments. It is

my hope that the present study deepens our knowledge and understanding of this issue in order to improve occupational conditions for instrumental music educators.

The theory of complex embodiment has also shaped my beliefs regarding impairment and disability within music education. Complex embodiment theorizes disability not as a pathological condition but rather a complex social location, which influences the experiences that shape individual identity (Siebers, 2013, p. 283). Complex embodiment considers the positive effects of claiming a disabled identity for individuals with disabilities and aims to give voice to these individuals as a minority identity in order to form political solidarity (p. 284). One of my goals in the present study was to provide the participants with a venue to share their experiences in order to amplify the realities surrounding hearing impairment among instrumental music educators. Within complex embodiment, knowledge is situated within the perspectives of individuals from marginalized social positions, which are formed from embodiment and lived experience (p. 288). As stated above, instrumental music educators are rooted in the historical traditions of Western music-making and the professional expectations of American music education within the public school system. These expectations create ableist expectations that disable individuals with disabilities who do not adhere to what is accepted as normative within the social context of music education. Musicians with hearing loss exemplify a complex embodiment that is not restricted to their physical impairment but instead embraces the valuable insights gained from their experience, which in turn contribute to our perceptions of hearing loss and its effect on teaching and performing.

The Stigma of Disability

Goffman (1963) defines stigma as a “deeply discrediting” (p. 3) attribute based on a socially undesirable characteristic of bodily difference. Goffman’s seminal work explores the formation of identity, management of *spoiled identity*, and the stigmatizing result of societal norms, including how individuals deviate from those norms. The central elements to Goffman’s definition of stigma include how individuals feel about stigma and how individuals navigate their social and personal identities before and after their encounter with those individuals considered by society to be normative. Preceding the emergence of humanities-based disability studies, Goffman (1963) identified the concepts of normal and stigma as socially constructed perspectives rather than appropriate ways to identify individuals.

Straus (2006) extends Goffman’s thinking by defining disability as any “culturally stigmatized bodily difference” (p. 119), which may be desirable or disabling, depending on context. Straus’ definition avoids medicalizing disability, instead focusing on society’s reaction and treatment of an individual’s particular impairment based on the socially constructed normativity of the body. According to Mitchell and Snyder (2000), one of the aims of disability studies is to “reclaim the power of formerly stigmatized representations” (p. 36). They inform us that the stigma of disability is a “reminder that the body proves no less mutable or unpredictable than the chaos of nature itself” (p. 126).

Passing as Ablebodied

The stigmatization of disability forces individuals with disabilities to hide their impairment in an effort to appear as normative within the socially constructed confines of society. *Passing* is the act of hiding a physical or cognitive impairment in order to appear normal within one's social environment:

Disabled people, if they are able to conceal their impairment or confine their activities to those that do not reveal their disability, have been known to pass. For a member of any of these groups, passing may be a deliberate effort to avoid discrimination or ostracism, or it may be an almost unconscious, Herculean effort to deny to oneself the reality of one's racial history, sexual feelings, or bodily state. The attempt may be a deliberate act to protect oneself from the loathing of society or may be an unchecked impulse spurred by an internalized self-loathing. (Linton, 1998a, pp. 19–20)

Instrumental music educators who experience music-induced hearing loss may attempt to hide their impairment from students, colleagues, and administrators in order to pass as ablebodied, so as to fulfill the ableist expectations of music education.

Brueggemann and Kleege (2003) describe their experiences with mainstream education in the 1960s as they tried to pass as normative despite each of their respective disabilities as blind and deaf. They recognize that the social pressure to

pass as able-bodied conditioned them to conceal their impairments, which created internalized messages of shame about their physical impairments:

So, we lied sometimes about what we could and couldn't do, avoided asking for help, became good problem-solvers, motivated ourselves more than anyone else ever could, revelled in our often extreme independence, grew decidedly a little stubborn, worked extra hard at the things we knew we could do well (writing, memorizing homework) and surreptitiously avoided those we couldn't (public speaking, reading aloud, group activities). (Brueggemann & Kleege, p. 179)

This description of passing exemplifies the theory of complex embodiment: the authors acknowledge the negative impacts that each of their impairments had on certain activities, but they also recognize the unique perspectives and knowledge gained because of their impairments.

Brueggemann, Chrisman, and Lupo (2005) describe the disclosure of disability as an act of emerging agency based on right and privilege, rather than the historical practices of the medical model, which they argue denies, silences, and erases agency not only for individuals with disabilities, but also for members of the general population experiencing illness, disease, and aging (p. 111). Brueggemann (1997) maintains that there is a price to pay for passing, however, and the fear of

being discovered is far worse than the initial moment of disclosure. She describes the act of passing between d/Deaf and h/Hearing⁶²:

The mirror in my ears threw back odd images—distorted, illuminating, disturbing, fantastic, funny—but all somehow reflecting part of me. It put my passing in various perspectives: perspectives of tense and time (past, present, future); perspectives of repeated situations and relationships in my personal and academic life; and perspectives on the ways that stories are told, identities forged, arguments made. These are but some of the things I saw as I passed through, by, on.

(Brueggemann, 1997, p. 648)

Brueggemann and Modellmog (2002) draw parallels between *coming out* as disabled with coming out by members of the LGBTQIA⁶³ community, both claiming a particular identity. They remind us of the “discredited identities” (p. 311) that are historically associated with the “silencing and shaming that often haunts gays, lesbians, and disabled people” (p. 311). Socially abjected identities of disability and sexuality complicate and challenge essentialized notions of identity, normalcy, and able-bodiedness. The simultaneous act of coming out and passing in regard to disability and sexuality challenges students and teachers to actively engage in the

⁶² Davis (1999) defines being *deaf* as a physical impairment and *Deaf* as being a self-identified member of a cultural group of individuals with deafness; *hearing* is the physical ability of being able to hear, and *Hearing* is a cultural group of individuals with hearing.

⁶³ Lesbian-Gay-Bisexual-Transgender-Queer/Questioning-Intersex-Asexual/Agender/Aromantic

performativity (Butler, 1993) of their own identities within the classroom (Brueggemann & Modellmog, p. 312).

Music educators who experience developing or preexisting hearing impairments must decide whether to openly claim their disabled identity or to hide their impairment in an attempt to pass as h/Hearing. One of the many consequences of viewing disability from a perspective of deficit and loss is that it places social pressures on the individual to either overcome the particular disability or hide the disability in an effort to pass as normative. Linton (1998a) resonates to these concerns about the possible social consequences of passing: “The loss of community, the anxiety, and the self-doubt that inevitably accompany this ambiguous social position and the ambivalent personal state are the enormous cost of declaring disability unacceptable” (p. 21). Linton also describes the personal nature of these experiences:

There are, of course, problems that are a direct result of impairment; pain, suffering, frustrations and anxiety often accompany impairment, and no amount of social change or theory will take those away. Even though pain and even less extreme kinds of discomfort are mediated by social and political contingencies, they remain intensely personal experiences. (p. 138)

Developing a hearing impairment for musicians and music educators is traumatic: not only does it threaten the individual’s effectiveness as a teacher, performer, and listener but more importantly, it also affects the hearing health of the

individual, which is vital to that individual's identity as a musician. Music educators with developing or preexisting hearing impairments are faced with negotiating the sociopolitical consequences of transitioning from currently able-bodied to disabled. Music educators who choose to use hearing protection devices in the classroom are faced with a similar stigma (Chesky, 2008, 2011; Cutietta et al., 1994). The use of hearing protection alters hearing, making it more difficult to identify musical phenomena; this also has a deleterious effect on the ability to recognize speech and makes verbal communication in the classroom between teachers and students challenging (Barlow, 2010; Miller, Stewart, & Lehman, 2007). In effect, music educators who choose to wear hearing protection while teaching are temporarily disabling themselves in order to avoid the development of a permanent hearing impairment. This creates a perpetuating cycle of embodiment shifting between able-bodied to disabled, from d/Deaf to h/Hearing.

In his interrogation of the *apotheosis of ableism* within the Western musical canon, Lubet (2009) claims that the stigma associated with performance-related injuries or disabilities is so great that college students are afraid to confide their impairments with their professors. Lubet's concern is for individuals who have been denied or hurt by music education because of their performance-related impairment. Lubet tells the story of an individual with disabilities who was denied workplace accommodations because his university employer interpreted the word *indefinite* to mean *not permanent*. Lubet further shares the well-known story of baritone singer Thomas Quasthoff who was denied admission to a German music conservatory

because his physical impairments prevented him from completing the required piano proficiency exam, even though his impairment had no effect on his ability to sing (p. 129).⁶⁴

Overcoming/Coping with Disability

The commonly used phrases of *overcoming disability* and *coping with disability* in mainstream disability discourse carry pejorative connotations toward individuals with disabilities as inferior, defective, or damaged. Linton (1998a) argues that the narratives associated with overcoming disability render those individuals who have not overcome their particular impairment as less “brave, strong, or extraordinary as the person who has *overcome* that designation” (p. 18, italics in original). The belief that individuals can overcome a disability is a “wish fulfillment generated from the outside” (p. 18) of the disability community, thus assigning responsibility to the individual to overcome the impairment rather than considering the need for social change. Garland-Thomson (2005) discusses the stigma of disability and the societal pressures placed on individuals with disabilities to overcome a physical or cognitive impairment:

Strong disincentives such as social stigma and a sense of somehow having failed to “overcome” or “beat” life’s inevitable limitations pressure us not to identify ourselves as persons with disabilities. We enact often virulent measures to deny, avoid, and eliminate disability

⁶⁴ Quasthoff, an operatic baritone-bass singer, was born with upper limb deformities presumably due to his mother’s exposure to the drug thalidomide.

and other forms of human variation we don't value. Despite the popular call for diversity, a deep and seldom-challenged project of creating bodily uniformity marches forward in practices such as genetic engineering, selective abortion, reproductive technology, so-called physician-assisted suicide, surgical normalization, aesthetic-standardization procedures, and ideologies of health and fitness. All these practices are supported by a kind of new eugenics that aims to regularize our bodies. (p. 524)

For music educators with hearing impairments, I argue that the stigma of disability creates social pressure for them to overcome their aural differences if they are to continue teaching music. In music education, exceptionally keen aural acuity is an expectation of music-making; this is evident when we consider the emphasis placed on musical exceptionalism, standards of performance practice, and traditional teaching methods within the field (Chesky, 2011; Jorgensen, 2003; Straus, 2006). The social stigma of disability and the expectations of exceptional aural acuity create disabling environments for music educators with hearing differences. Music educators with hearing loss must choose among passing as able-bodied, repairing (overcoming) their hearing impairment through medical intervention, or coping with their impairment in multiple ways to continue teaching.

Brueggemann and Kleege (2003) discuss the concepts of overcoming and coping with their respective hearing and vision impairments within the context of a mainstreamed educational setting in the 1960s. They described their experiences as

strengthening their skills in one area “to make up for what might be lacking in another” (p. 177). The concepts of coping and overcoming are both problematic and offensive to many individuals with disabilities:

Most of all, we didn’t like to think of ourselves as *coping*. We don’t like to now either. In fact, we’d like to take that word back. Please pretend we never used it. Let it pass from your memory. Let us pass. We didn’t, and don’t, cope so well with the idea of coping. We preferred, and still prefer, to think of ourselves as problem-solvers, as opportunists, and as careful strategists of social and educational spaces. (Brueggemann & Kleege, p. 179, italics in original)

The social need for individuals with disabilities to pass, overcome, or cope with their impairments bears multiple implications for musicians and music educators who experience music-related injuries or impairments. The stigma of disability is evident in the fears that musicians and music educators express regarding music-related injuries or impairments (Guptil, 2011).

Guptil’s (2011) study of playing-related injuries among musicians reveals the culture of silence that exists regarding impairment and disability within music-related fields. Guptil employs a hermeneutical phenomenological methodology based on the work of van Manen (1990), which in turn utilizes the lived experiences of research participants as embodied knowledge. Although hearing impairment is not mentioned specifically in Guptil’s study, the personal stories shared by the research participants

clearly illustrate the marginalization, stigmatization, and discrimination that exists within music-related fields toward musicians with performance-related impairments:

He just didn't want to talk about it, he didn't want people to know about it . . . people talk in the changeroom and you'd hear that he'd had the operation and stuff . . . you don't want to be going up to somebody in front of others until you really know how they feel about it [speaking to others about injury], cause a lot of people don't want people to know. (Guptil, 2011, p. 275)

Resonating with the work of Brueggemann and Modellmog (2002), another musician in Guptil's (2011) study described his decision to publicly acknowledge his injury as coming "out of the closet" (p. 275). This admission compares coming out as LGBTQIA with musicians who publicly acknowledge performance-related disabilities. Guptil's participant expressed frustration regarding the damaging effects of the culture of silence surrounding musicians' injuries: "Come on, let's spread the wealth, I mean if people have it out there, dammit I wanna know what they are [solutions], and let's get over all this craziness about just keeping it hidden" (p. 275). Another participant expressed preference for keeping injuries private:

I don't think they need to know. And I don't want to be a whiner or seem like a loafer, a crutch or something. And I don't want them to think, "oh, she can't do it, she's got arthritis," or something . . . It's not a deep dark secret, but it's like a mole [skin blemish] or something. (p. 275)

Other participants (Guptil, 2011) expressed concern over their perceived employability should their impairment become public knowledge to current or potential employers. One participant described the decision to discuss injuries with colleagues: “Some people do, you know, and some don’t, and I guess some people are afraid to talk about it ’cause they figure it might affect getting hired” (p. 275). This attitude of fear surrounding the public acknowledgment of physical difference led some of the research participants to selectively reveal such information in order to protect their employment status or future employability:

There’s some people who I don’t want them to know that I’m hurting. I’m not gonna jeopardize what somebody thinks of the way I might play and interpret it in light of “well he’s hurt,” you know. There’s a certain sports analogy there I think. I mean you’re not gonna tell the coach you’re hurting or he’s not gonna put me in. (p. 275)

Another participant expressed how her peers stigmatized her because of her injuries:

All my friends quit calling me. And I’d go and sit in an orchestra rehearsal at [university] and I’d cry, and people would just put their stuff in their case and leave—it almost felt like I was contagious, you know? And I was writing letters to people, “please call me, please be my friend, please,” and no. (p. 275)

Guptil (2011) claims that the “varied experiences of support (or lack of support) among the participants reflected the complexity of the lived social relations involved in being a musician with a playing-related injury” (p. 275). This particular

study demonstrates how music-related injuries, including hearing loss, become socially unifying experiences between musicians. Via phenomenological research methods, Guptil provided opportunities for the musicians to express their personal stories and to relate their experiences with others to foster new ways of thinking about a particular phenomenon. Guptil's findings demonstrate the need to educate healthcare professionals and music educators about the risks and prevention of music-related injuries as well as to develop specialized care for musicians with performance-related injuries.

Transcendental Phenomenology as a Theoretical Framework

The original use of the term *phenomenology* extends back to the 1760s in the work of Kant. Later, Hegel established its definition as “knowledge as it appears to consciousness, the science of describing what one perceives, senses, and knows in one’s immediate awareness and experience” (Moustakas, 1994, p. 26).

Transcendental phenomenology—employed within the present study as both a theoretical and methodological framework—is primarily rooted in the work of Edmund Husserl (1859-1938), whose method directly influenced the writings of Heidegger, Sartre, and Merleau-Ponty and more recently, van Manen and Moustakas.⁶⁵ Three philosophical assumptions central to phenomenology state that such studies: (a) examine lived human experience, (b) investigate conscious experience, and (c) develop essential descriptions of these experiences without attempting to explain or analyze (Creswell, 2007, p. 58). Transcendental

⁶⁵ The work of Heidegger, Sartre, and Merleau-Ponty is beyond the scope of the present study.

phenomenology “emphasizes subjectivity and discovery of the essences of experience and provides a systematic and disciplined methodology for derivation of knowledge” (Moustakas, 1994, p. 45).⁶⁶ Moustakas (1994) describes Husserl’s approach as *phenomenological* because of its use of data that is perceived through consciousness and *transcendental* because it “adheres to what can be discovered through reflection on subjective acts and their objective correlates” (p. 45). In other words, transcendental phenomenology is a “scientific study of the appearance of things, of phenomena just as we see them and as they appear to us in consciousness” (p. 49).

Description Rather than Interpretation of Experiences

Transcendental phenomenology focuses on describing the research participants’ experiences rather than interpreting their meaning. Moustakas (1994) defines the transcendental experience of phenomenological research as perceiving a phenomenon with a fresh perspective “as if for the first time” (p. 34). Phenomenological research “transforms the world into mere phenomenon” (p. 34) and reduces the phenomenon “to the source of the meaning and existence of the experienced world” (p. 34). Phenomenological research aims to provide a description of the “essential constituents, variations of perceptions, thoughts, feelings, sounds, colors, and shapes” (p. 34). Employing transcendental phenomenology within the present study allowed me to approach each participant’s story with a fresh perspective

⁶⁶ The use of the term *essence* in transcendental phenomenology refers to the common qualities of phenomena as observed through lived experience (Moustakas, 1994). I employ this term as an overarching concept under which falls the shared experiences, attitudes, and feelings of music-induced hearing loss among the participants within the present study.

and thereby to accurately portray the participants' experiences through a descriptive narrative.

Phenomena as Basis of Knowledge

Within the conceptual framework of transcendental phenomenology, “phenomena are the building blocks of human science and the basis for all knowledge” (Moustakas, 1994, p. 26). Transcendental phenomenology considers all knowledge to be directly connected to human experience: “Anything that *is within* us as knowledge such as joy, excitement, or sorrow, actually exists and is unquestionable evidence, in contrast to external things, such as colors, odors, and sounds that exist only in a phenomenal sense” (p. 44, italics in original). Husserl (1975) argues that knowledge can only exist through self-knowledge:

For me the world is nothing other than what I am aware of and what appears valid in such *cogitationes*. . . . I cannot live, experience, think, value, and act in any world which is not in some sense in me, and derives its meaning and truth from me. (p. 8, italics in original)

Husserl's approach to transcendental phenomenology is phenomenological because it only considers data that is perceived through consciousness; it is transcendental because it is based on knowledge discovered through self-reflection—consciousness guarantees objectivity (Moustakas, 1994, p. 45).

Further, transcendental phenomenology explores the meanings and essences of knowledge through intuition and self-reflection: “The challenge facing the human science researcher is to describe things in themselves, to permit what is before one to

enter consciousness and be understood in its meanings and essences in the light of intuition and self-reflection” (Moustakas, 1994, p. 27). The transcendental phenomenological process considers what is “really present with what is imagined as present from the vantage point of possible meanings” (p. 27). Through the phenomenological process of *ideation*, “the object that appears in consciousness mingles with the object in nature so that a meaning is created, and knowledge is extended” (p. 27). Moustakas considers phenomena appearing in consciousness as absolute reality and that appearing in the world is a “product of learning” (p. 27). Husserl (1970) describes transcendental phenomenology as a “science of pure possibilities [which] precedes the science of actualities and alone makes it possible, as a science” (p. 72).

Reflective Process as Organizing Concept

Moustakas (1994) defines the reflective process in transcendental phenomenology as an approach that “provides a logical, systematic, and coherent resource for carrying out the analysis and synthesis needed to arrive at essential descriptions of experience” (p. 47). Through this process of self-reflection, the individual provides a description of the experience that includes the “thoughts, feelings, examples, ideas, and situations that portray what comprises an experience” (p. 47). Confirming the existence of the phenomena is achieved through “repeated looking and viewing while the phenomenon as a whole remains the same” (p. 47). Moustakas asserts that transcendental phenomenology requires that the researcher employ self-reflection in an effort to better understand the phenomena being studied

(p. 47). I employed this self-reflective process in my review of each participant's stories throughout the data analysis stages of the present study. Repeatedly reviewing the data allowed me to capture the essence of the phenomenon by accurately portraying the participants' experiences in order to discover new meanings of a phenomenon with which I was already familiar.

Lifeworld

The concept of *lifeworld* in transcendental phenomenology is the “way a person lives, creates, and relates in the world” (Moustakas, 1994, p. 48); this concept creates infinite possibilities in qualitative research. Examining a phenomenon such as music-induced hearing loss from multiple lifeworld perspectives not only provides new meanings of the phenomenon but also opens individuals up to relating to others in meaningful ways. Rather than quantifying experiences, transcendental phenomenology allows individuals to relate to each other through their shared experiences.

Five central tenets comprise transcendental phenomenology: (a) it attempts to remove presuppositions; (b) it is concerned with determining meanings rather than identifying facts; (c) it acknowledges reality and possibility; (d) it defines essence through reflective description of an object or phenomena; and (e) it utilizes subjectivity, thinking, and reflecting in the formation of knowledge (Moustakas, 1994, p. 49).⁶⁷ Removing my own preconceptions, judgments, and

⁶⁷ Farber (1943) discusses each of these tenets in his examination of the techniques of transcendental phenomenology.

presuppositions prior to the data collection and analysis stages of the present study was necessary so that I could accurately portray the participants' experiences without allowing my own experiences to influence the findings.⁶⁸ Acknowledging what is real and what is possible in terms of music-induced hearing loss is particularly important when considering the subjective nature of some of the experiences associated with the phenomenon (e.g., tinnitus). The essence of music-induced hearing loss is revealed in the present study in a reflective description of the participants' experiences related to the phenomenon.

Moustakas (1994) defines transcendental phenomenology as “a scientific study of the appearance of things, of phenomena just as we see them and as they appear to us in consciousness” (p. 49). Further, any perceivable phenomenon is a suitable basis for phenomenological inquiry. Moustakas describes the challenge of transcendental phenomenology as one that demonstrates “the phenomenon in terms of its constituents and possible meanings, thus discerning the features of consciousness and arriving at an understanding of the essences of the experience” (p. 49). Hence, the essence of a phenomenon in transcendental phenomenology is discovered by examining conscious experience as perceived by the participants: any phenomenon perceived by the participant is considered in transcendental phenomenology.

⁶⁸ Although removing bias is an important consideration in phenomenological research, I argue that it is unrealistic, and perhaps impossible to completely ignore the reality and inevitability of my physical, social, cultural, and political situatedness as a currently able-bodied instrumental music educator.

Consciousness

Moustakas (1994) defines consciousness as an intentional act of perception toward an object or phenomena and distinguishes between external perception, which only includes physical phenomena, and internal perception of mental phenomena. Brentano (2014) asserts that inner perception provides “immediate, infallible self-evidence” (p. 95) that is verifiable within our consciousness. Husserl (1975) states that phenomenal experience is real within our consciousness:

An object exists for me; that is to say, it has reality for me in consciousness. But this reality is reality for me only as long as I believe I can confirm it. By this I mean that I must be able to provide useable procedures, that is, procedures which run through automatically, and other evidences, which lead me then to the object itself and through which I realize the object as being *truly there*. (p. 23, italics in original)

The participants of the present study described their external perception of music-induced hearing loss by naming various physical experiences of the phenomenon, such as loss of hearing in specific auditory ranges, tinnitus, sensitivity, and pain. The participants described their experience of music-induced hearing loss by naming various non-physical experiences of the phenomenon, such as anxiety, fear, doubt, and worry. In transcendental phenomenology, the participants' perceptions are real because the participants perceived them to be so.

Perception

Husserl (1970) defines perceiving an object or phenomena from multiple angles as horizons; all perception matters and contributes to the definition of an experience: “. . . to every perception there always belongs a horizon of the past, as a potentiality of awakenable recollections; and to every recollection there belongs, as a horizon, the continuous intervening intentionality of possible recollections . . .” (pp. 44–45). As an extension of Husserl, Moustakas (1994) defines perception as “the primary source of knowledge, the source that cannot be doubted” (p. 52). Key to perception is the reflective act of memory, which reawakens past feelings and images by bringing them into the present (Moustakas, 1994, p. 53). Moustakas likens perception to the “character of wonder as new moments of perception bring to consciousness fresh perspectives, as knowledge is born that unites past, present, and future and that increasingly expands and deepens what something is and means” (pp. 53–54).

The participants’ lived experiences comprise the primary sources of knowledge for the present study: their direct experiences verify the existence of the phenomenon. Transcendental phenomenology investigates phenomena from multiple angles or horizons; all perception is given equal value. As Husserl instructs, I considered the participants’ experiences from multiple angles to define the phenomenon of music-induced hearing loss and describe its effect on instrumental music educators. In doing so, I gave equal consideration to the physical and mental effects of the phenomenon on the participants, regardless of whether the participant

received a medical diagnosis. In transcendental phenomenology, perception provides new experiential meanings to phenomena. The present study's interview process provided the participants with opportunities to reflect on their past experiences, which provided fresh perspectives on the topic.

Intentionality

Central to transcendental phenomenology is the concept of intentionality: the intentional act of the mind's perceiving an object or the "internal experience of being conscious of something" (Moustakas, 1994, p. 28). Husserl (1970) acknowledges the possibility that perceiving an object does not necessarily prove its existence; the mind's directed attention toward a real or imagined phenomena is noted as the directedness of intentionality (§ 21).

Transcendental phenomenology defines intentionality as the relationship between the act of consciousness and the object of consciousness (Moustakas, 1994, p. 28). Moustakas draws an important distinction between the objective nature of an intentional act and the subjective nature of a feeling act, citing Smith's (1981) example of the intentionality of perceiving the night sky with a feeling-act of wonder: "The feeling-act may diminish and finally no longer be experienced, but the presentation of the night sky can still remain as a concrete and independent intentional experience" (p. 87). Applying this analogy to the experience of music-induced hearing loss, the experience of hearing loss or tinnitus may continue to be present, even after the individual grows accustomed to the phenomenon.

Noema and Noesis

In transcendental phenomenology, the distinction between the actual object and the perception of an object is referred to as *noema* and *noesis*, respectively. Ihde (1977) defines noema as “that which is experienced” (p. 44), and noesis as the “mode of experiencing” (p. 43). Moustakas (1994) describes the noema-noesis relationship as “engaging in a process of functioning intentionality: we uncover the meanings of phenomena, deliver them from the anonymity of the natural attitude, move them toward an inclusive totality of consciousness” (p. 31). Within the present study, the noema is the actual physical phenomenon of music-induced hearing loss, and the noesis is the individual’s response to this phenomenon.

The noema is the perceived textural meanings of phenomena, of what is “actually presented in consciousness” (Moustakas, 1994, p. 30). Moustakas (1994) offers the example of the tree to illustrate the noema-noesis relationship in transcendental phenomenology:

The noema is not the real object but the phenomenon, not the tree but the appearance of the tree The tree is out there present in time and space while the perception of the tree is in consciousness. Regardless of when or how, regardless of which components or what perception, memory, wish, or judgment, the synthesis of noemata (perceived meanings) enable the experiencing person to continue to see the tree as just this tree and no other. (p. 29)

In other words, “what one sees, each time one looks at something or judges something, is its noema, the perceived as such or the judged as such” (Moustakas, p. 70). The emerging meanings derived from the noema are found through the “act of perceiving, remembering, or judging, just what is *intended*, what *appears*, what is *presented*” (p. 71, italics in original). The participants of the present study expressed many descriptions of the actual experience of music-induced hearing loss, which illustrated the physical and mental effects of the phenomena.

The noesis is the “explication of the intentional processes” (Moustakas, 1994, p. 30) of the structural elements of phenomena discovered through “perceiving, feeling, thinking, remembering, or judging” (p. 69). In other words, noesis is the acquisition of our beliefs about an object or phenomena and our understanding of how and why we are experiencing it (p. 32). The noesis of the phenomenon of music-induced hearing loss is revealed in the present study through the participants’ reflections on the multiple factors contributing to the development of their music-induced hearing loss. The interview protocol of the present study provided the participants with an opportunity to reflect on their experience with music-induced hearing loss, including how they currently experience the phenomenon, and their response to this experience.

Intuition

The concept of *intuition* in transcendental phenomenology owes itself to the work of Descartes (1977) who defined intuition as the ability “toward producing solid and true judgments concerning everything that presents itself” (p. 22). Moustakas

(1994) defines intuition as the “beginning place in deriving knowledge of human experience, free of everyday sense impressions and the natural attitude” (p. 32). The intuitive-reflective process considers phenomena in their common appearance and “in the fullness and clarity of an intuitive-reflective process” (p. 32). That which is presented to the self is perceived through intuition, which in turn provides clarity of the phenomenon to the individual. Intuition in transcendental phenomenology leads researchers to consider all of the data revealed by the participants through the reflective process in order to form an unbiased description of the phenomenon being examined.

Intersubjectivity

Husserl (1970) acknowledges the influence of personal insight and subjective perception on the process of uncovering the meanings and essences of phenomena, in that one’s experience of the world is available for others to experience, and through the experience of others lies the intentional act of empathy (pp. 91–92). Husserl describes the intersubjective relationship between presence and copresence as an intentional experience of *pairing* (p. 112). Moustakas (1994) asserts that the relationship between presence and copresence provides “infinite access to other human beings” (p. 37) and expresses the importance of understanding one’s own consciousness before attempting to understand someone else’s.

The presence and copresence relationship is an “interchange of perceptions, feelings, ideas, and judgments regarding the nature of reality” (Moustakas, 1994, p. 57). Moustakas states that intersubjective communication challenges individuals to

“discover what is really true of the phenomena of interpersonal knowledge and experience” (p. 57) and concludes: “However much we may want to know things with certainty and however much we may count on others’ experience to validate our own, in the end only self-evident knowledge enables us to communicate knowingly with each other” (p. 58). Moustakas claims that the only way to discover absolute knowledge is to return to the self through “my own direct and open encounter with entities as they appear . . . I am the person who gives existence its essence, the one who returns essence to existential life” (p. 58). The combination of personal insight and an empathic openness toward the subjective experience of others is at the heart of transcendental phenomenology.

Phenomenological Research in Disability Studies

Linton (1998b) suggests that a phenomenological approach to disability studies provides rich descriptions of individuals’ experiences with specific impairments. She claims that an absence of subjectivity exists in disability scholarship, that the “voice of disabled people should be present in both Disability Studies and in applied approaches to disabled people” (p. 531). Further, she argues for the inclusion of creative narratives illustrating the active voice of individuals with disabilities in qualitative human science research (p. 531).

Linton (1998a) discusses the importance of the inclusion of significant material that relates to an individual’s experience with disability: “The material that binds us is the art of finding one another, of identifying and naming disability in a world reluctant to discuss it, and of unearthing historically and culturally significant

material that relates to our experience” (p. 5). She advocates for the collection of personal stories in order to “humanize disability, to neutralize it and make it less opaque, terrifying, and alienating” (p. 113). She calls for disability scholars to challenge the absence of disabled scholars in their institutions and to recognize the role of disabled and non-disabled scholars in disability studies by “considering how they engage disabled people within and outside the academy in their work” (Linton, 1998b, p. 538). The personal narratives appearing in Chapter 5 portray the commonalities between the experiences of music-induced hearing loss among instrumental music educators. Analyzing these narratives through the theoretical framework of transcendental phenomenology provided the participants of the present study with opportunities to share their stories to raise awareness and affect change within their field.

Lubet (2009) further advocates for qualitative research in disability studies, suggesting that shared story-telling liberates research from the oppressive qualities of quantitative work: “Only narrative gets to the heart of the large social problems revealed by the encounter of disability and music education” (p. 120). My review of the literature in Chapter 2 revealed numerous quantitative studies examining music-induced hearing loss among musicians but a striking dearth of qualitative work examining music-induced hearing loss among musicians and music educators. Lubet (2009) argues that the disability studies researcher must have a personal connection to the disability being studied, otherwise the researcher is more susceptible to

objectification, or the exoticizing of those individuals.⁶⁹ As I noted in Chapter 1, my personal connection to the topic of music-induced hearing loss is based on more than two decades of experience as a musician and more than a decade of professional experience as an instrumental music educator. My personal connection to the present study provided me with valuable insight and perspectives regarding the research participants' experiences that were shared with me during this study.

⁶⁹ Lubet (2009) is critical of participant observation in disability studies research, or as he calls it "disability simulation" (p. 124), which he suggests is "unrealistic and obscene" (pp. 124–125) to expect a researcher to understand the lived experience of impairment after a short time of simulated participation in the daily life of an individual with an impairment.

CHAPTER FOUR

METHODOLOGY

I chose transcendental phenomenology as the methodology for this study because of its capacity to vividly illustrate the experiential meanings of the phenomenon of music-induced hearing loss and its consequences for instrumental music educators. This research methodology provided the participants with opportunities to reflect upon their lived realities of hearing impairment and the disabling settings and contexts in which they experienced the phenomenon. I grounded my inquiry in my professional experience as an instrumental music educator, influenced by theoretical perspectives within humanities-based disability studies. The music educators I interviewed for this study provided descriptions of music-induced hearing loss based upon their experiences and hence, insights, into the phenomenon.

Within this chapter, I outline the research methods that I employed during the span of my investigation and present it in four sections: (a) my rationale for selecting transcendental phenomenology as my research lens; (b) a description of the participants, including participant selection criteria and process; (c) an outline of the survey and interview protocol employed throughout the data collection; and (d) a complete portrait of the procedures that I employed during the stages of transcendental phenomenological data analysis.

Rationale for Methodology

My review of the relevant literature in Chapter 2 revealed a paucity of research into the phenomenon of music-induced hearing loss among instrumental music educators. Much, if not most of the extant research regarding music-induced hearing loss utilizes quantitative research methodologies within studies of sound exposure, audiogram measurements, and acoustical analyses of classrooms and performance spaces. Over the past fifty years, multiple studies—predominantly quantitative and undertaken from medical perspectives—investigating music-induced hearing loss have produced conflicting results regarding the causal relationship between sound exposure and hearing loss among instrumental music educators (Cutietta, Klich, Royse, & Rainbolt, 1994; Holland, 2004; Owens, 2003; Pisano, 2007; Royer, 1996; Walter, 2009). However, I suggest that a more critical perspective is necessary to explore this phenomenon and its relationship to music education. Qualitative research methodologies, particularly transcendental phenomenology, provide alternative insights and perspectives into the phenomenon of music-induced hearing loss because those who experience the phenomenon are given the opportunity to define the phenomenon through their direct experience.

Participants

Twenty-three instrumental music educators in the state of Wisconsin participated in this study: 20 band directors, and three orchestra directors. All participants as of this writing continue to teach full-time in public school systems, except for one who retired due to occupational hearing loss. The participants'

teaching assignments included eight at the secondary level, 11 at the middle and elementary school level, and four educators who taught combinations of elementary, middle, and secondary levels. The participants articulated genuine interest in the topic of this study and were pleased to be able to share their experiences in an effort to protect other music educators from the harmful effects of music-induced hearing loss. The participants' responses illuminated the absence of discussion surrounding music-related injuries, impairment, and disability in music education and hence, demonstrated the need for such discussion.

Participant Selection Criteria

The participants of phenomenological studies must have prior experience with the phenomenon being studied (Creswell, 2007); therefore, I employed the use of criterion sampling⁷⁰ as a method of preliminary screening of all potential participants.⁷¹ Using this sampling method, I selected instrumental music educators with life experiences related to music-induced hearing loss. In order to be eligible for participation in the study, the participants had to meet the following preliminary screening criteria (see Appendix G): (a) have current or past full-time teaching experience as an instrumental music educator in a public school setting within the state of Wisconsin; (b) have teaching experience at either the elementary, middle, or

⁷⁰ Criterion sampling requires that "all individuals studied represent people who have experienced the phenomenon" (Creswell, 2007, p. 128).

⁷¹ During the interview process, some of the research participants identified individuals who they thought would be good candidates for this study; this method of purposeful sampling is known as the "snowball" or "chain" method (Creswell, 2007). One of the participants for this study was contacted using this sampling method.

secondary grade levels; and (c) have experienced at least one sign of hearing loss within the span of their teaching career. For the purposes of this study, the participants self-reported⁷² their experiences of hearing loss based on their personal perceptions, regardless of whether they had obtained audiological evidence from previous hearing examinations.

Participant Selection Process

I initiated the participant selection process by electronically publishing a preliminary participation flyer (see Appendix E). Between January 21–27, 2014, I sent the preliminary participation flyer via electronic mail to 811 instrumental music educators throughout the state of Wisconsin. I obtained email addresses for each educator through publicly available school websites and when this information was unavailable online, I contacted the schools' main office to request specific contact information. After obtaining email addresses for nearly all of the band and orchestra music educators from each of the 426 school districts in Wisconsin, I sent the preliminary participation flyer to each music educator individually in order to maintain confidentiality.

The preliminary participation flyer generated 53 responses from 811 Wisconsin instrumental music educators, resulting in a 6.5% response rate. Two of the respondents recommended candidates for the study, two were interested in

⁷² Moustakas (1994) defines transcendental phenomenology as “a scientific study of the appearance of things, of phenomena just as we see them and as they appear to us in consciousness” (p. 49). Any phenomena perceived by the participant are considered in transcendental phenomenology, thus making self-reporting a valid form of data collection and meaning-making for this study.

participating but exhibited no signs of hearing loss, and two were unsure if they met the criteria for the study. The remaining 47 respondents reported experiencing at least one characteristic of music-induced hearing loss, which qualified them for participation in the study. Based upon these responses, at least 5.7% of instrumental music educators in the state of Wisconsin (47 out of 811 individuals) reported music-induced hearing loss at the time of this writing.

Evaluating the response rate for my study is problematic considering the specific population investigated in the present study. Previously reported statistics by the National Institute on Deafness and Other Communication Disorders (NIDCD) (2014) found that approximately 15% of adults between the ages of 20 and 69 experience noise-induced hearing loss due to exposure at work or during recreational activities; however, these statistics do not include occupational music-induced hearing loss among instrumental music educators, which would increase the number of documented cases. Large-scale statistics reporting the prevalence of music-induced hearing loss specifically among instrumental music educators are absent from the extant literature on this phenomenon. The absence of such data makes it impossible to estimate how many music educators experience music-induced hearing loss.

After I removed the six participants who did not qualify for the study, I contacted the remaining 47 individuals via electronic mail to schedule an interview (see Appendix H). I originally intended to interview each of the 47 respondents so as to include as many voices as possible in this study; however, including this many

participants is not conducive to phenomenological inquiry, which values depth over breadth (Creswell, 2007).⁷³ In accordance with phenomenological methodology, I decided that it would not be feasible to conduct interviews with all of the respondents.

Initially, I selected 26 respondents based on their response time and availability; however, I excluded three of the interviews from my findings because I discovered during the interview process that these respondents actually did not meet the preliminary screening criteria (see Appendix G). These three individuals reported no perceptible signs of music-induced hearing loss: their participation in the study was based on either a personal concern of developing hearing loss due to work related conditions, or a general scholarly interest in the topic. Although these conversations were valuable and provided important perspectives regarding the perception and representation of music-induced hearing loss, I did not include their experiences in the present study because they reported none of the physical characteristics of music-induced hearing loss. Therefore, the data of the present study is based on my interviews with 23 participants.⁷⁴

Ultimately, the participants of the present study include 15 men ranging in age from 26–65 (mean 47) and eight women ranging in age from 40–59 (mean 49). The participants' teaching experience ranged from two to 37 years, a mean of 23 years.

⁷³ Considering the immersive nature of phenomenological research, Polkinghorne (1989) recommends that these studies include between five and 25 participants.

⁷⁴ I conducted 20 phone interviews and six interviews in-person. Five of the six in-person interviews took place in the participants' homes, and the sixth interview took place at a local restaurant in the participant's town of residence. I conducted most of the interviews by telephone to accommodate the participants' personal and professional schedules.

The mens' teaching experience ranged from two to 37 years, a mean of 21 years. The womens' teaching experience ranged from 20 to 35 years, a mean of 26 years. Table 2 provides an overview of the participants' sex, age, and teaching experience, all of which have been identified as contributing factors to music-induced hearing loss (Cutietta et al., 1994):

Table 2. Participant Sex, Age, and Teaching Experience

Participant	Sex	Age ^a	Teaching Experience (years) ^b
Andrew	M	58	35
Bill	M	45	14
Catherine	F	52	30
Curt	M	26	2
David	M	53	15
Doug	M	52	30
Erin	F	59	35
Gerald	M	54	32
Greg	M	36	11
Hank	M	51	26
Horace	M	54	27
Kevin	M	35	13
Lana	F	53	28
Larry	M	65	29
Lisa	F	46	27
Lori	F	40	20
Rachel	F	46	23
Robert	M	30	7
Sam	M	59	37
Sheldon	M	31	9
Steve	M	53	27
Viki	F	44	20
Wendy	F	49	25

Note. All of the participants' names are pseudonyms. M = male; F = female

^aThe mean age among the participants of this study was 47 years for the men and 49 years for the women.

^bThe mean teaching experience among the participants of this study was 21 years for the men and 26 years for the women.

Response Time to Study Recruitment

The response time among the respondents was prompt: 45 responded within the same week (January 21–27, 2014), mostly within one or two days of receiving the preliminary participation flyer; four responded the following week (January 28–30, 2014); two responded three weeks later (February 10, 2014); one responded on March 3, 2014, explaining that he retrieved the flyer out of his electronic mail spam filter; and one responded on May 16, 2014. It is reasonable to assume that other instrumental music educators might have been interested in participating in the study but were unwilling or unable to do so for a variety of reasons (e.g., personal circumstances, scheduling, stigma associated with hearing impairment among musicians). Another possible factor may have been the study's timeline: the preliminary participation flyer was sent out between January 21–27, 2014, which is a busy time of year for instrumental music educators as they prepare for music festivals, concerts, and other performances. It is also possible that school district electronic mail spam filters blocked some preliminary participation flyers, as one of the respondents mentioned. The timeline for my data collection is outlined below in Table 3:

Table 3. *Data Collection Timeline*

Preliminary Participation Flyers Distributed	January 21-27, 2014
Scheduled Interviews	January 27-May 23, 2014
Conducted Interviews	February 23-May 21, 2014

Teaching Specialization and Music-Induced Hearing Loss

One of the key factors in the development of music-induced hearing loss among instrumental music educators is teaching specialization (Mace, 2005). The participants' teaching assignments included instructing various combinations of concert, marching, pep, jazz, orchestra, or non-traditional performance ensembles (e.g., rock, pop, ethnic—in Wisconsin, polka bands), as well as teaching courses in general music, theory, and/or history. Table 4 provides an overview of the participants' most recent teaching assignments:

Table 4. *Participant Teaching Assignments*

Teaching Assignments	Number of Participants
Concert, Marching, Jazz, and Pep Band	12
Orchestra	3
Concert, Marching, and Jazz Band	3
Concert Band	2
Concert, Marching, and Pep Band	2
Concert and Marching Band	1

Note. Five of the participants taught music theory, history, or general music in addition to teaching performance ensembles.

Secondary level instrumental music educators in public school music programs are expected to direct concert, marching, jazz band, and pep bands; twelve of the 23 participants noted these types of teaching assignments in their current

positions. The most common teaching assignments for elementary and middle school band educators included directing concert, marching, jazz band, and pep band, although to varying degrees.⁷⁵ Table 5 provides an overview of the most recent grade levels taught by each of the participants, which includes elementary, middle or secondary grade levels:

Table 5. *Participant Teaching Grade Levels*

Teaching Grade Levels	Number of Participants	Sex of Participants
9-12	7	6M, 1W
8-12	1	1M
6-12	2	2M
5-12	2	1M, 1W
6-8	4	1M, 3W
5-8	3	3M
4-8	1	1M
6-7	1	1W
6	1	1W
5	1	1W

Note. M = men; W = women

⁷⁵ The teaching assignments for middle school instrumental music educators varied depending on the school district in which they taught. Some middle school instrumental music programs included marching, jazz, and pep band, whereas some do not offer these programs at the middle school level. In my professional experience, this is often determined by the size of the school, band enrollment numbers, student interest, and community expectations.

Twenty-one of the 23 participants taught multiple grade levels, whereas two educators taught elementary instrumental music for one grade level only.⁷⁶ Twelve of the 23 participants taught at the secondary level. This is particularly relevant for this study, given that secondary level ensembles more often produce extreme sound levels for more sustained periods of time due to larger class sizes, longer and more frequent rehearsals, and aggressive approaches to sound required in marching and pep band performance practice (Ross, 2001; Wheeler, 2001). As a result, secondary level instrumental music educators are particularly at risk to develop music-induced hearing loss because of their exposure to larger ensembles that are capable of producing excessively loud sound levels.⁷⁷

Research Method

Gadamer (1975) and Rorty (1979) claim that there is no true method within phenomenological research; however, van Manen (1990) suggests that the central element to phenomenological research is scholarship. He describes the human science researcher as:

a sensitive observer of the subtleties of everyday life, and an avid reader of relevant texts in the human science tradition of the humanities, history, philosophy, anthropology, and the social sciences as they pertain to his or her domain of interest. (p. 29)

⁷⁶ This includes the only retired participant interviewed for this study, who last taught multiple grades at the secondary level.

⁷⁷ Owens (2004) recorded maximum sound pressure levels experienced by secondary level instrumental music educators during concert and jazz band rehearsals as high as 115 dBA (decibels, A-weighted).

Van Manen (1990) outlines six elements of research activities in the methodological structure of phenomenology:

(1) turning to a phenomenon which seriously interests us and commits us to the world; (2) investigating experience as we live it rather than as we conceptualize it; (3) reflecting on the essential themes which characterize the phenomenon; (4) describing the phenomenon through the art of writing and rewriting; (5) maintaining a strong and oriented pedagogical relation to the phenomenon; and (6) balancing the research context by considering parts and whole. (p. 30)

The task of investigating lived experiences requires researchers to consider the many relationships and shared situations of the world, as well as the active exploration of lived experience “in all its modalities and aspects” (van Manen, 1990, p. 32). The act of reflecting on the essential themes of a particular phenomenon requires thoughtful meditation on the unique aspects of an experience. Van Manen describes this reflective process as “bringing into nearness that which tends to be obscure, that which tends to evade the intelligibility of our natural attitude of everyday life . . . what is it that constitutes the nature of this lived experience?” (p. 32). I argue that the absence of research on the phenomenon of music-induced hearing loss among musicians and music educators indicates a relative lack of awareness, understanding, and concern regarding the phenomenon within music education. Investigating music-induced hearing loss lifts the cloud of mystery and in some cases, shame, that surrounds the issue by sharing attitudes, beliefs, emotions,

and experiences regarding hearing impairment and disability within music education.

For van Manen (1990), the art of writing and rewriting is central to conducting phenomenological research, making “that which is being talked about be seen” (p. 33) through conversation, inquiry, and questioning. He urges researchers to maintain a strong relation to the topic in order to avoid speculation, preconceived opinions, narcissistic reflections, self-indulgent preoccupations, or abstract theories (p. 33). To maintain a strong focus to the fundamental question, van Manen urges researchers not to settle for “superficialities and falsities” (p. 33). This requires them to acknowledge and bracket out any preconceived notions or potential biases early in the data collection process; Moustakas (1994) refers to this as *epoché* within transcendental phenomenology.

Further, van Manen (1990) encourages researchers to maintain balance within the research context between the parts and the whole. Researchers who become too preoccupied with the *what* (*ti estin*) of their research may fail to reveal the power of the emerging text of the research:

In other words, one can get so involved in chasing the *ti estin* that one gets stuck in the underbrush and fails to arrive at the clearings that give the text its revealing power. It also means that one needs to constantly measure the overall design of the study/text against the significance that the parts must play in the total textual structure. It is easy to get so buried in writing that one no longer knows where to go, what to do next, and how to get out of the hole that one has dug. At

several points it is necessary to step back and look at the total, at the contextual givens and how each of the parts needs to contribute toward the total. (van Manen, p. 34, italics in original)

In order to avoid this methodological trap, I continually reviewed the transcripts and audio recordings of the interviews throughout the data collection and analysis processes to maintain a balance between parts and whole.

Data Collection

In phenomenological research, the nature of data is based on the study of the lifeworld, which is both the source as well as the object of research (van Manen, 1990). The concept of collecting qualitative data within a phenomenological research methodology is understood as ambiguous, considering the historical relationship data shares with the empirical sciences (p. 53). Van Manen encourages phenomenological researchers not to consider the experiences gathered through research as quantifiable data, but rather as valuable experiences that instantly contribute to the understanding of the research topic or question (p. 53). Gathering data in phenomenological research consists of borrowing accounts of personal experiences and reflections on these experiences “in order to better be able to come to an understanding of the deeper meaning or significance of an aspect of human experience, in the context of the whole of human experience” (van Manen, 1990, p. 62). Within phenomenology, gathering and analyzing data should be considered as the same process. Further, phenomenological methodologies transform the research participants into collaborators and co-researchers. Following this tradition, the data collection

methods that I employed consisted of two components: (a) a survey, which in turn led to (b) a one-on-one interview with each of the participants. Each participant received and signed a consent form as part of human subjects procedures (see Appendix F).⁷⁸

Survey. The participants completed a short survey to identify the contributing factors related to their experiences with music-induced hearing loss (see Appendix I).⁷⁹ The survey addressed the following individual factors related to music-induced hearing loss: teaching experience, performance history, physical symptoms, use of hearing protection, and frequency of audiological examinations. The participants indicated which physical symptoms of music-induced hearing loss they experienced (e.g., high-end loss, low-end loss, general loss, tinnitus, pain, difficulty hearing speech) and how long they have experienced these signifiers. The participants indicated how often they use hearing protection while teaching and playing, and how often they have their hearing tested. The survey addressed the following environmental factors related to music-induced hearing loss: types of ensembles directed, ensemble size, ensemble instrumentation, acoustical properties of classroom and performance space, intensity and duration of sound exposure, and exposure to amplified music. The participants rated the acoustical properties of their rehearsal space using a Likert scale (i.e., excellent, very good, adequate, poor, terrible). They also described the level of overexposure in their work environment

⁷⁸ I sent written consent forms in the mail to participants interviewed over the phone. I reviewed the information in the written consent forms with all of the participants prior to beginning the interview. This information also appeared in the preliminary participation flyer during the initial stages of recruitment (see Appendix E).

(i.e., extremely high, high, moderate, low, not at all⁸⁰) and how often they were exposed to excessive sound levels in their workplace.

The primary purpose of the survey was to identify the contributing individual and environmental factors to the participants' experiences of music-induced hearing loss. This instrument allowed the participants a means for easing into the reflection process before addressing the more comprehensive questions, which I asked during the interviews. Additionally, the nature of the survey questions allowed space for the participants to provide necessary background information that I chose not to cover in the interview. The information that I gathered using the survey created a descriptive snapshot of the participants' general background, which helped me to synthesize the experiences into a narrative that described the essence of music-induced hearing loss.

Interview. Van Manen (1990) describes two general purposes for interviews in phenomenological research: (a) to develop a deeper understanding of a phenomenon through experiential narratives, and (b) to foster conversations with participants about the meanings of their experiences (p. 66). Collecting personal stories through conversational interviews allows the interviewee to relate anecdotes and experiences to the researcher without having to participate in a reflective exercise as required in writing or journaling (p. 67). This interview method provided the

⁷⁹ For all interviews conducted over the phone, I read the survey questions to the participants and recorded their answers on the survey form (see Appendix I). The validity of the survey data was verified by the audio recordings and verbatim transcripts of the interviews. To ensure validity, I employed the method of member checking: each participant was given a copy of their interview transcript for review.

⁸⁰ The option of *not at all* does not appear on the survey; rather, I provided this option verbally to all of the participants as another answer option to this survey question.

participants in the present study with opportunities to share their experiences in a safe environment: I protected the participants, their school districts, and their identities by altering and/or omitting all identifying information. Each participant seemed at ease throughout the interview process and willing to share his or her personal experiences about sensitive issues related to music-induced hearing loss, such as their relevant medical history, emotional responses to developing a hearing impairment, and professional concerns.

I conducted one-on-one interviews with each of the 23 participants and transcribed each interview verbatim from the interview recordings. The average length of each interview was 43 minutes; I completed all interviews between February 23, 2014 and May 21, 2014. The variance in the durations of the interviews was determined by the participants' responses: some of them spoke at length and in great detail, whereas others gave more succinct responses. Another factor determining the length of the interviews was whether the participants used hearing protection while teaching or performing: I did not ask questions regarding the wearing of hearing protection to those who did not use it. Doing so resulted in some interviews that were shorter in length.

I conducted the interviews in a conversational manner using a prepared list of semi-structured⁸¹ interview questions, which I organized into three distinct sections: (a) personal experiences related to music-induced hearing loss, (b) professional

⁸¹ Larkin, Watts, and Clifton (2006) state that the "highly intensive and detailed analysis" (p. 103) within the methodology of interpretative phenomenology is "generally captured via semi-structured interviews, focus groups, or diaries, and the analysis then proceeds such that patterns of meaning are developed, and then reported in a thematic form" (p. 104).

experiences related to hearing protection, and (c) the relationship between music-induced hearing loss and notions of impairment and disability within music education (see Appendix J). I began each interview by asking the participants general questions about their teaching background (i.e., level, experience, band size). After the introductory questions, I asked the participants to describe their personal experiences related to music-induced hearing loss, which included questions about their medical history, perceptions describing the phenomenon, and descriptions of the acoustical environment of their workplace. Next, I asked the participants to discuss the effects of hearing protection on musical sound as well as the rationale behind their decisions to use (or not) hearing protection while teaching. Lastly, I asked the participants to discuss the implications of music-induced hearing loss for instrumental music educators, the visibility of this issue within the field, and to provide advice on hearing preservation for first-year music educators.

After crafting my interview questions, I categorized them according to the central research question and subquestions stated in Chapter 1 and restated earlier in this chapter, categorizing the interview questions in this way provided direction and flow to the interviews. The third subquestion, related to passing and ableism in music education, did not explicitly appear in the interview protocol because I wanted this theme to emerge naturally during the interviews and only if it related directly to the participants' lived experiences. I felt that direct questions regarding these two particular issues might influence the participants by leading them to give answers not reflective of their lived realities.

I utilized all interview questions for each interview unless the participant answered the question in a previous response, or if it became apparent that the question did not apply to the individual's experiences. In most cases where this occurred, the participants' survey responses provided this information. For example, if participants indicated on the survey that they did not wear earplugs while teaching or performing, I omitted the questions related to hearing protection during the interview. I recorded each interview via the Android Smartphone application, Smart Voice Recorder®, and transcribed them verbatim using Express Scribe®, a computer program that allows the transcriber to modify recording speed in order to ease the transcription process. I discuss the transcription process below in the data analysis section. Given that I recorded the interviews, I refrained from taking notes during the interview process because I found it distracting to the participants. My decision allowed me to focus deeply on the participant and made the process seem less like an interview and more like a conversation. So as not to influence the participants' responses, I abstained from commenting during the interviews and did not discuss my own experiences unless the participants asked me a question directly. Prior to transcribing the interviews, I took notes while listening to the recordings for each interview.

Data Analysis

A central tenet of phenomenological research is that the meaning or essence of a phenomenon is “multi-dimensional and multi-layered” (van Manen, 1990, p. 78).

Husserl (1931/2012) defines essence as that which is common or universal to a phenomenon and would not exist without it (p. 11). Further, the essence of a phenomenon is identified “at a particular time and place from the vantage point of an individual researcher following an exhaustive imaginative and reflective study of the phenomenon” (Moustakas, 1994, p. 100).

Analyzing phenomenological data such as in the present study requires researchers to reflect on lived experiences by “analyzing the structural or thematic aspects of that experience” (van Manen, 1990, p. 78). Critical of the “mechanical application” (p. 78) of thematic analysis in phenomenological research methods—computer programs such as NVivo® code transcripts and texts for researchers—van Manen instead prefers to conceptualize the process of thematic analysis as a “free act of seeing” (p. 79) through “insightful invention, discovery or disclosure” (p. 79). He sets forth four characteristics of analyzing thematic elements in phenomenological research:

- (a) The theme is the experience of focus, of meaning, of point.
- (b) Theme formulation is at best a simplification.
- (c) Themes are not objects one encounters at certain points or moments in a text.
- (d) The theme is the form of capturing the phenomenon one tries to understand. (van Manen, p. 87)

Thematic analysis of phenomenological data is not merely a single statement but rather a full “description of the structure of a lived experience” (van Manen, 1990, p. 92). For example, one of the participants within the present study described the physical experience of tinnitus: “I mean it set in . . . where it was just like, one day it wasn’t noticeable, and the next day, it was like you turned on a switch, and it hasn’t

gone away since.” This statement describes the sudden onset and persistent nature of tinnitus as experienced by several of the participants in the present study. Thematic statements do not completely or adequately describe a phenomenon but rather serve to comment on an “aspect of the phenomenon” (p. 92). Another participant described how his experience with music-induced hearing loss changed his recreational listening habits: “I used to always have music on all the time, but it’s now gotten to a point where I generally don’t.” By itself, this statement does not completely describe music-induced hearing loss, but it does however illustrate the participant’s desire for silence as a potential aspect of the phenomenon.

Transcribing the interview data. Prior to analyzing the data, I transcribed each interview using Express Scribe®, which allowed me to modify the speed of a recording while typing. The transcription process for this study generated 336 pages of text that resulted from more than 18 hours of recorded interviews. In order to determine transcribing accuracy, I listened to each interview recording at regular speed while reviewing each interview transcript, making corrections where necessary. I stored the electronic versions of the transcripts on a secure computer, and I used printed copies for note-taking during the stages of data analysis. I stored copies of the interview transcripts in secure locations per the University of Wisconsin-Madison Institutional Review Board (IRB) human subjects protocols.

Data analysis procedures. The data analysis procedures that I employed were grounded in Moustakas' (1994) systematic approach to transcendental phenomenology.⁸² Six stages comprise this procedure: (a) bracketing out personal experiences prior to data collection (*epoché*); (b) reducing the data to significant⁸³ statements or quotes (*horizontalization*); (c) combining significant statements into textural themes (*clustering*); (d) developing textural descriptions that define what the participants experienced (*phenomenological reduction*); (e) developing structural and composite descriptions of the settings and contexts of the participants' experiences (*imaginative variation*); and (f) combining the composite textural and structural descriptions to convey a universal description (essence) of a phenomenon or experience (*intuitive integration*) (pp. 180–182). These procedures guided my inquiry through each stage of data analysis for this study. Figure 5 illustrates my conceptualization of the data analysis procedures of transcendental phenomenology and my application of them within this study:

⁸² The data analysis procedures that I employed in this study are based on Moustakas' (1994) adaptation of the Stevick (1971), Colaizzi (1973), and Keen (1975) methods of phenomenological data analysis.

⁸³ Moustakas (1994) uses the term *significant* not in a statistical sense but rather to identify those statements that are most relevant to the phenomenon or experience being studied.

Figure 5: Conceptual Model of Transcendental Phenomenological Analysis

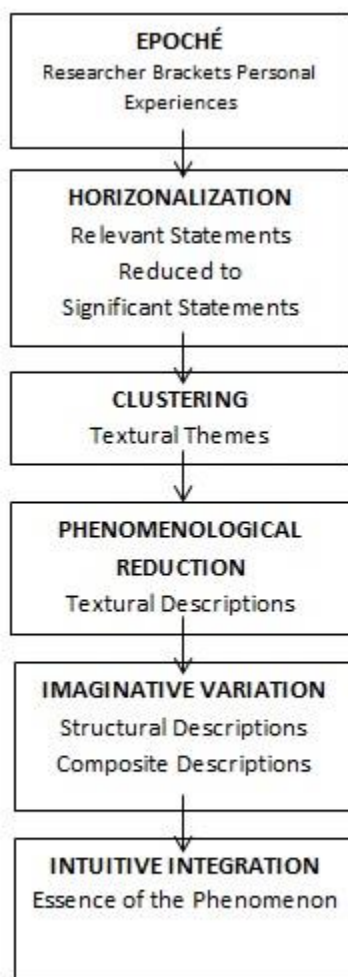


Figure 5. This figure illustrates my application of the stages in transcendental phenomenological data analysis (Moustakas, 1994) to the present study. The boxes in this figure demonstrate the progression of the data through each of these stages, beginning as relevant statements and ending as statements defining the essence of a phenomenon. A modified version of this figure also appears in Chapter 5 (see Figure 6), which further illustrates how the findings of this study fit into this conceptual model.

Epoché. The first stage of transcendental phenomenology requires researchers to set aside “prejudgments, biases, and preconceived ideas” (Moustakas, 1994, p. 85) in order to maintain a fresh state of mind toward the phenomenon being investigated. Moustakas defines the epoché process as allowing new phenomena to enter into the researcher’s consciousness “as if for the first time” (p. 85). Phenomenological researchers must maintain openness to phenomena and experiences as they appear and emerge: “Thus the epoché gives us an original vantage point, a clearing of mind, space, and time, a holding in abeyance of whatever colors the experience or directs us . . .” (p. 86). Moustakas further describes the challenges of epoché:

From the Epoché, we are challenged to create new ideas, new feelings, new awarenesses and understandings. We are challenged to come to know things with a receptiveness and a presence that lets us be and lets situations and things be, so that we can come to know them just as they appear to us. (p. 86)

Moustakas (1994) maintains that researchers in transcendental phenomenology must consider the phenomenon or experience being studied through a state of pure consciousness, via “memory, perception, judgment, feeling, whatever is actually there” (p. 87). Hence, this process requires researchers to consider phenomena and experiences with open-mindedness:

I envision a rhythm of being receptive, of being struck with the newness and wonder of just what is before me and what is in me while

also being influenced by habit, routine, expectation, and pressure to see things in a certain way until at last, with effort, will, and concentration, I am able to perceive things with an open presence.

(Moustakas, p. 89)

Through reflection and meditation, phenomenological researchers become receptive to phenomena by “letting the preconceptions and prejudgments enter consciousness and leave freely” (p. 89). Through the epoché process, the hope is for phenomenological researchers to become open to the experience being studied:

I am more readily able to meet something or someone and to listen and hear whatever is being presented, without coloring the other’s communication with my own habits of thinking, feeling, and seeing, removing the usual ways of labeling or judging, or comparing. I am ready to perceive and know a phenomenon from its appearance and presence. (Moustakas, p. 89)

Creswell (2007) suggests that researchers share their personal experiences with readers early on in the phenomenology, or to include them in a section discussing the role of the researcher; I addressed my personal connection to this study in Chapter One. During the interviews for this study however, I was mindful not to insert my own opinions and experiences into the conversation, especially when discussing the use of hearing protection.

The epoché process was particularly important for me leading up to the stages of data collection and analysis for this study: it provided a methodological framework

for me to reflect upon the relationship between my personal experiences with hearing-related issues and my research inquiry. Prior to the present study, I engaged in multiple conversations with colleagues about music-induced hearing loss and the consequences it presents to music educators. My experience with the wearing of hearing protection while teaching and performing assisted in shaping my understanding of both the benefits and drawbacks of using hearing protection for music educators. Hence, the epoché process allowed me to consider my experiences as situated in my established knowledge about the phenomenon. After bracketing out my preconceptions and biases, I maintained receptiveness toward the participants' experiences with music-induced hearing throughout the interview process.

Horizontalization. As outlined in Figure 5 above, the second stage in transcendental phenomenology is to analyze the data by recording all statements relevant to the description of the phenomenon (Moustakas, 1994). After recording all relevant statements, the investigator eliminates all repetitive and overlapping statements to arrive at a concise list of significant statements that provide textural meanings of the phenomenon. This process describes things “just as they appear and [is] a reduction to what is horizontal and thematic” (p. 91). Horizontalization is “not only a way of seeing but a way of listening with conscious and deliberate intention of opening ourselves to phenomena as phenomena, in their own right, with their own textures and meanings” (p. 92). This process allowed me to reduce the data obtained through the interviews, thereby arriving at a concise list of thematic descriptions defining music-induced hearing loss as a phenomenon.

Moustakas (1994) explains that “each angle of perception” (p. 91) adds to the knowledge of the “horizons of a phenomenon” (p. 91) and describes the process of horizontalization as another dimension of phenomenological reduction applied by the researcher in order to find the essence of a phenomenon:

Horizons are unlimited. We can never exhaust completely our experience of things no matter how many times we reconsider them or view them. A new horizon arises each time that one recedes. It is a never-ending process and, though we may reach a stopping point and discontinue our perception of something, the possibility for discovery is unlimited. (p. 95)

Each participant that I interviewed provided unique perspectives or angles of perception regarding the phenomenon of music-induced hearing loss. The transcripts of the interviews provided me with new ways of perceiving this phenomenon upon each reading.

I began the process of horizontalization by identifying what I found to be the most relevant statements appearing in the interview transcripts, such as: “It’s like I got cicadas screaming at me all the time, or someone would follow me around with a glockenspiel, doing a roll on it.” I highlighted these statements on my hard copy of the interview transcripts and recorded each relevant statement in a database that I created using Microsoft Excel®. In this database, I indicated which participant made the statement, identified the key words of the statement, and organized each statement by preliminary categories. In the example given above, I identified the key words of

this statement as *cicadas* and *glockenspiel* because they provided an experiential description of tinnitus; hence, I identified the preliminary category of the statement as *description of tinnitus*.

After identifying the relevant statements in the interview data, I reduced the list by removing repetitive and overlapping statements to arrive at a concise list of the most significant statements that provided textural meanings of the phenomenon. For instance, the following two statements share the same preliminary categories regarding the use of hearing protection while teaching: (a) “The moment you put in any kind of hearing protection, the kids would assume that you can’t hear at all, and then they would start causing problems” and (b) “Sometimes it’s like my ears are plugged, and I hear myself when I’m playing.” Therefore, I included only one of them in the list of significant statements. The participants made several relevant statements such as these describing their experience of wearing hearing protection; therefore, I reduced all of these statements down to one significant statement that best described this experience to more clearly define the phenomenon (see Appendix M). As an organizational aid, I grouped all of the relevant statements by primary and secondary categories, recording them in phenomenological reduction worksheets (see Appendix K). Utilizing this strategy allowed me to identify repetition between statements. I then removed the repetitive and overlapping statements and arrived at one significant statement for each preliminary category; I included these statements in the textural and structural descriptions of the participant narratives.⁸⁴

⁸⁴ I discuss this process at length in the subsequent sections of this chapter.

Thematic clustering. After I identified the significant statements through the horizontalization process, I grouped the data into textural themes (Moustakas, 1994). Before reducing the data through horizontalization, I grouped the significant statements using the preliminary categories that I assigned to all of the relevant statements. This procedure allowed me to identify the themes that provided the clearest textural description of the phenomenon of music-induced hearing loss. I also employed thematic clustering to identify the themes of the structural descriptions of the phenomenon.

Phenomenological reduction. The task of phenomenological reduction is to describe “in textural language just what one sees, not only in terms of the external object but also the internal act of consciousness, the experience as such, the rhythm and relationship between phenomenon and self” (p. 90).⁸⁵ Phenomenological reduction focuses on the qualities of the participants’ lived experiences and the researcher’s description of the meanings of those qualities by reducing the phenomena to the horizontal and thematic (p. 90). This act of reduction includes “perceiving, thinking, remembering, imagining, judging” (p. 91) in order to understand and define what appears in our consciousness. By employing the procedures of phenomenological reduction, I focused on the participants’ experiences as they described them without my own preconceptions and biases. Hence, I uncovered the emerging themes that defined the phenomenon based on the

⁸⁵ Textural language in phenomenological research refers to language used explicitly in the data collected for a particular study such as interview transcripts or survey responses (Moustakas, 1994).

participants' conscious experiences.

I synthesized the significant statements (horizontalization) and textural themes (clustering) to form a textural description of the phenomena and or experiences of music-induced hearing loss. Moustakas (1994) describes this step as “going through a process of returning to the thing itself, in a state of openness and freedom” (p. 96) by repeatedly reviewing the data to find “deeper layers of meaning” (p. 96). In the textural descriptions of the data, I defined the qualities of music-induced hearing loss and the participants' experiences, and I illustrated the connections between these descriptions and the unifying thematic threads. By repeatedly reviewing the data, as Moustakas suggests, I developed a complete textural description of the participants' experience with music-induced hearing loss.

The significant statements and textural themes embedded in the participants' textural descriptions created vivid depictions of the experience of music-induced hearing loss. I returned to the interview recordings and transcripts and reflected upon the participants' experiences without becoming preoccupied with my interpretation of their experiences. Through repeated analyses of the interview recordings, I remained open to the participants' experiences and discovered deeper layers of meaning and nuances of understanding each time I returned to the data.

Imaginative variation. Imaginative variation allows the researcher to create a structural description of *how* the phenomenon occurs by seeking “possible meanings through the utilization of imagination, varying the frames of reference, employing polarities and reversals, and approaching the phenomenon from divergent

perspectives, different positions, roles, or functions” (Moustakas, 1994, p. 97). The primary aim of imaginative variation is to outline the “underlying and precipitating factors” (p. 98) that define the *how* of the experience. Phenomenological researchers employ imaginative variation to reveal the underlying structures contributing to the *what* of the experience. For example, the underlying factors contributing to experiences of music-induced hearing loss among the participants in the present study included descriptions of the acoustical properties of their classrooms and performance spaces, use of hearing protection, and the size and instrumentation of the participants’ ensembles.

Imaginative variation encourages phenomenological researchers to reflect on the many possibilities that give “body, detail, and descriptive fullness to the search for essences” (Moustakas, 1994, p. 99). Moustakas lists “structures of time, space, materiality, causality, and relationship to self and to others” (p. 99) as universal structures that are connected with textural figures. Through this process, “the researcher understands that there is not a single inroad to truth, but that countless possibilities emerge that are intimately connected with the essences and meanings of an experience” (p. 99). Each participant provided a unique perspective that contributed to the development of an experiential description of the essence of music-induced hearing loss. For instance, Steve began noticing tinnitus (ringing) during his first year of teaching, whereas Lisa’s tinnitus took more than 20 years to manifest. In regard to hearing sensitivity, Greg describes his tinnitus as excruciatingly painful, whereas Lana describes her tinnitus as only annoying. The uniqueness of the

participants' stories illustrates the infinite possibilities related to the experience of this phenomenon.

Structural meanings. The first step in imaginative variation suggests that researchers consider multiple and varied “structural meanings that underlie the textural meanings” (Moustakas, 1994, p. 99). For the purposes of the present study, I began this process by separating the textural and structural statements provided by the participants while reviewing the interview recordings and transcriptions. I identified the participants' statements defining *what* it was like to experience music-induced hearing loss and included them in the textural descriptions of the phenomenon. Next I identified the participants' statements illustrating *how* they experienced music-induced hearing loss, including the settings and contexts of these experiences, which I incorporated into the structural descriptions of the phenomenon. I then created a structural description for each participant's experience with music-induced hearing loss by examining the underlying structures of the settings and contexts in which they experienced the phenomenon. For example, Erin's structural description illustrates her experience teaching in inadequate rehearsal spaces over the span of her 35-year career and her experience of being mocked by a building architect when she inquired about proper acoustical treatment for the school's new music room.

Recognizing underlying themes. The second step in imaginative variation consisted of “recognizing the underlying themes or contexts that account for the emergence of the phenomenon” (Moustakas, 1994, p. 99). After repeatedly reviewing the interview transcripts, I identified several recurring themes related to

how the participants experienced music-induced hearing loss, including the settings and contexts contributing to their experiences (also addressed in step one). The participants' statements contributing to the structural description of music-induced hearing loss centered on the following: issues surrounding the acoustical environment of classrooms; pedagogical and curricular expectations of teaching instrumental music; and administrative and school board responses to the participants' requests for accommodation, assistance, or financial compensation for hearing impairments. I discuss the textural and structural descriptions that emerged from the participants' experiences at length in Chapter Five.

Universal structures. The third step in imaginative variation consists of the “universal structures that precipitate feelings and thoughts with reference to the phenomenon” (Moustakas, 1994, p. 99). I asked the participants in the present study to address the responses that they received from their students, parents, colleagues, and administrators regarding their use of hearing protection in the classroom; the general perceptions of hearing impairment among musicians and music educators; and their personal feelings about these issues. Further, I asked the participants to discuss how this issue is represented in the field of music education.

Vivid structural descriptors. Moustakas' (1994) fourth and final step in this process requires the researcher to provide examples that “vividly illustrate” (p. 99) the structural themes in the “development of a structural description of the phenomenon” (p. 99). Lori shared her experience of filing a worker's compensation claim after she developed tinnitus during her first year of teaching. She attributed her

condition to teaching large groups of students in a confined instructional space: “I think we were about three-quarters of the way through the school year, and I started to notice that it was a constant tone in both of my ears, actually.” The stories shared with me during my interviews provide structural descriptions of music-induced hearing loss that vividly illustrate the settings and contexts that contributed to the participants’ experiences. I present the textural and structural descriptions as narratives in Chapter Five.

Intuitive integration. The final stage in analyzing the data within a transcendental phenomenological framework is creating a composite textural-structural “description of the meanings and essences of the experience, integrating all individual textural-structural descriptions into a universal description of the experience representing the group as a whole” (Moustakas, 1994, p. 122). After illustrating the textural and structural descriptions of music-induced hearing loss for each of the participants and synthesizing these descriptions into composite descriptions of the phenomenon, I reflected on the commonalities of music-induced hearing loss as experienced by instrumental music educators. The composite textural and structural descriptions appearing in this study represent the participants’ shared experiences of the phenomenon. In other words the essence of the phenomenon, by enfolding the contexts in which the phenomenon is experienced, provides a vivid portrayal of the inherent qualities of music-induced hearing loss. Based upon the composite descriptions of the participants’ lived experiences, I developed a

comprehensive description of the essence of music-induced hearing loss. I present this description in detail at the conclusion of Chapter Five.

Chapter Summary

I began this chapter by discussing the rationale behind selecting transcendental phenomenology as the research methodology for my study, based on its capacity to provide alternative insights and perspectives into the phenomenon of music-induced hearing loss, which has primarily been investigated through quantitative methodologies and medicalized perspectives. The present study features 23 instrumental music educators from the state of Wisconsin who were selected based on having experienced at least one physical symptom of hearing loss within the spans of their teaching careers. Based upon the responses to my recruitment flyer, I claim that at least 5.7% of instrumental music educators in the state of Wisconsin currently experience music-induced hearing loss.

The data collection methods that I employed in the present study included a survey and a one-on-one interview with each of the participants. The survey detailed the individual and environmental factors related to the participants' experiences regarding music-induced hearing loss. The interviews that followed provided participants with opportunities to share their experiences about sensitive issues related to music-induced hearing loss, such as medical history, emotional responses to developing a hearing impairment, and professional concerns.

I chose transcendental phenomenology for this study's method because of its capacity to provide deeper understanding and meaning of the lived human

experiences of instrumental music educators experiencing music-induced hearing loss. Employing transcendental phenomenology (Moustakas, 1994) provided a systematic approach for analyzing the experiential texts provided by the participants during the data collection process. I outlined the methods of transcendental phenomenology that I employed during data collection and analysis, which included the stages of (a) epoché, (b) horizontalization, (c) thematic clustering, (d) phenomenological reduction, (e) imaginative variation, and (f) intuitive integration.

After bracketing out my preconceptions and biases during the epoché stage, I maintained an open mind toward the participants' experiences throughout each interview. My personal experiences using hearing protection shaped my understanding of both the benefits and drawbacks of doing so for music educators. Hence, the epoché stage allowed me to take in the participants' experiences with limited bias or judgment while taking into account my social, cultural, and political situatedness.

Employing horizontalization, I analyzed the interview data by recording all relevant statements that described the phenomenon (see Figure 5). Once I accomplished this, I eliminated all repetitive and overlapping statements to arrive at a concise list of significant statements from the direct language of the interview transcripts. In the next stage of data analysis, thematic clustering, I grouped the significant statements into textural themes that described the participants' experiences of music-induced hearing loss. Through phenomenological reduction, I created textural descriptions of *what* the participants experienced: I created textural

descriptions of music-induced hearing loss after repeatedly reviewing and reflecting on the interview recordings and transcripts. By maintaining an openness to the participants' experiences, I discovered deeper layers of meaning and nuances of understanding each time I returned to the data.

Imaginative variation enabled me to create structural descriptions of *how* the participants experienced music-induced hearing loss. I separated the participants' textural and structural descriptions as reflected within the interview recordings and transcriptions and included statements that illustrated the contexts of *how* the participants experienced the phenomenon. The participants identified several contributing factors to their music-induced hearing loss: (a) the acoustical properties of their classrooms and performance spaces, (b) the use of hearing protection, (c) the size and instrumentation of their ensembles, (d) the pedagogical and curricular expectations of teaching instrumental music, and (e) administrators' and school board members' response to their requests for accommodations, assistance, or financial compensation for their hearing impairment. Employing imaginative variation as a data analysis tool opened up a discursive space that fostered the participants' vivid structural descriptions of their experiences.

Finally, I integrated the textural and structural descriptions into a composite narrative of the shared meanings of music-induced hearing loss. Employing these composite descriptions, I analyzed the essential meanings of music-induced hearing loss as experienced by this particular cohort of instrumental music educators. The composite textural and structural descriptions of music-induced hearing loss that

appear in this study provide a vivid depiction of what is inherent to the existence of the phenomenon. The participants' descriptions also illustrate the settings and contexts in which they experienced music-induced hearing loss.

CHAPTER FIVE

PRESENTATION OF FINDINGS

In this chapter, I present the survey and interview findings from my study. In the first section, I report the survey findings relative to each participant's experience regarding the symptoms of music-induced hearing loss, use of hearing protection, frequency of audiological examinations, size and instrumentation of ensembles, acoustical properties of classrooms, intensity and duration of sound exposure, performance history, and concert attendance. Next, applying a research methodology grounded in transcendental phenomenology (Moustakas, 1994), I present my interview findings in five stages of data analysis: (a) horizontalization (identifying significant statements), (b) clustering (identifying textural themes), (c) phenomenological reduction (developing textural descriptions), (d) imaginative variation (developing structural and composite descriptions), and (e) intuitive integration (synthesizing the composite descriptions). In this chapter, I illustrate the participants' lived experiences of music-induced hearing loss by providing individual and composite textural and structural descriptions of their experiences, which define the overall essence (Moustakas, 1994) of music-induced hearing loss.⁸⁶

⁸⁶ As I discussed in Chapters 1 and 3, the term *essence* in transcendental phenomenology refers to the common qualities of phenomena as observed through lived experience (Moustakas, 1994). I employ this term as an over-arching concept under which fall the shared experiences, attitudes, and feelings of music-induced hearing loss among the participants within the present study.

Survey Findings

The participants' responses to my survey (see Appendix I) illustrate the individual and environmental factors related to each participant's experiences with music-induced hearing loss. My presentation of the survey data is not an attempt to quantify the findings of this study, but instead is meant to provide background information about the participants' personal experiences regarding commonly identifiable factors associated with music-induced hearing loss, all of which I discuss in my review of the relevant literature in Chapter Two. The survey responses reported here are meant to provide a descriptive snapshot of the participants and their lived experiences related to the phenomenon of music-induced hearing loss. Another function of the survey provided the participants with a means of easing into the interview process. My survey questions addressed eight areas: (a) symptoms of music-induced hearing loss, (b) use of hearing protection while teaching and performing, (c) frequency of audiological examinations, (d) size and instrumentation of ensembles, (e) acoustical properties of classrooms, (f) sound exposure intensity and duration, (g) performance history, and (h) concert attendance.

Symptoms of Music-Induced Hearing Loss

The participants reported whether they experienced any of the six following characteristics related to music-induced hearing loss: (a) high-end hearing loss, (b) low-end hearing loss, (c) general hearing loss, (d) difficulty hearing speech, (e) physical pain in the ear(s), or (f) tinnitus. Of the 23 participants, 12 experienced high-end hearing loss (52%), five experienced low-end hearing loss (22%), eight

experienced general hearing loss (35%), 17 experienced difficulty hearing speech (74%), four experienced physical pain in at least one ear (17%), 18 experienced tinnitus (78%), and 17 reported experiencing two or more of these physical experiences (74%). Table 6 illustrates the physical symptoms reported by the participants:

Table 6. *Symptoms of Music-Induced Hearing Loss*

Participant	High-end Loss	Low-end Loss	General Loss	Speech Recognition Difficulty	Physical Pain	Tinnitus
Andrew	X	X	X	X	X	X
Bill	X		X	X		
Catherine	X	X	X	X		X
Curt						X
David	X				X	X
Doug	X		X			X
Erin	X	X		X		
Gerald				X	X	X
Greg	X			X		X
Hank		X	X	X		X
Horace	X			X		X
Kevin				X		
Lana			X	X	X	X
Larry	X	X	X	X		X
Lisa						X
Lori						X
Rachel	X			X		X
Robert						X
Sam	X		X	X		
Sheldon				X		
Steve				X		X

Participant	High-end Loss	Low-end Loss	General Loss	Speech Recognition Difficulty	Physical Pain	Tinnitus
Viki				X		X
Wendy				X		X
Totals	12	5	8	17	4	18
	52%	22%	35%	74%	17%	78%

Use of Hearing Protection

The participants described their use of hearing protection while teaching. Only one participant reported using hearing protection *most of the time* while teaching; this individual who is now retired due to hearing loss, began using earplugs only after he began experiencing hearing loss and tinnitus. Two participants (9%) reported using hearing protection *frequently*, and three participants (13%) reported using hearing protection *occasionally*. One participant reported using hearing protection *frequently to occasionally*, one *frequently to rarely*, and one *rarely to never*, depending on the situation, e.g., marching band, or pep band. Seven participants (30%) reported *rarely* using hearing protection while teaching, and seven participants (30%) stated that they *never* use hearing protection while teaching. Table 7 illustrates the frequency of the participants' use of hearing protection while teaching:

Table 7. Use of Hearing Protection as a Teacher

Participant	Most of the Time	Frequently	Occasionally	Rarely	Never
Andrew		X			

Participant	Most of the Time	Frequently	Occasionally	Rarely	Never
Bill		X			X
Catherine				X	
Curt		X			
David				X	
Doug			X		
Erin					X
Gerald					X
Greg				X	X
Hank				X	
Horace					X
Kevin					X
Lana					X
Larry	X				
Lisa				X	
Lori					X
Rachel				X	
Robert		X	X		
Sam				X	
Sheldon					X
Steve			X		
Vicki			X		
Wendy				X	
Totals^a	1 4%	4 17%	4 17%	9 39%	8 35%

^a Three participants gave a range of responses for this survey question, i.e., frequent use of earplugs while conducting pep band but never during concert band, which are included in the totals for this table.

The participants also described their use of hearing protection while performing. Only one participant reported using hearing protection as a performer *most of the time*, considering his exposure to excessive sound levels while playing drum set for several performance ensembles. Two participants (9%) reported using hearing protection *frequently*, and four (17%) reported *occasional* use of hearing protection as performers. One participant described using hearing protection as a performer *frequently to rarely*, and another participant reported *rarely to never*

depending on the situation, e.g., volume level of group, physical placement within the ensemble, acoustics of performance venue. Six participants (26%) reported that they *rarely* used hearing protection as performers, and eight (35%) stated that they *never* used hearing protection while performing. Table 8 illustrates the frequency of the participants' use of hearing protection while performing:

Table 8. Use of Hearing Protection as a Performer

Participant	Most of the Time	Frequently	Occasionally	Rarely	Never
Andrew					X
Bill		X		X	
Catherine					X
Curt			X		
David				X	
Doug				X	
Erin					X
Gerald				X	
Greg			X		
Hank					X
Horace			X		
Kevin	X				
Lana			X		
Larry					X
Lisa					X
Lori					X
Rachel				X	
Robert		X			
Sam				X	
Sheldon		X			
Steve				X	X
Vicki					X
Wendy				X	
Totals^a	1 4%	3 13%	4 17%	8 34%	9 39%

^a Two participants gave a range of responses for this survey question, i.e., frequent use of earplugs while conducting pep band but never during concert band, which are included in the totals for this table.

Frequency of Audiological Examinations

The participants reported how often they had their hearing tested by an audiologist. Three participants (13%) reported having their hearing checked on an *annual* basis, and three participants (13%) reported having their hearing checked *every other year*. One participant reported having his hearing tested *once every five years*. Ten participants (43%) reported having their hearing tested *infrequently*, one reported *infrequently to never*, and four (17%) participants reported *never* having their hearing tested. Table 9 outlines the frequency of the participants' audiological examinations:

Table 9. Frequency of Audiological Examinations

Participant	Annually	Every Other Year	Once Every Five Years	Infrequently	Never
Andrew			X		
Bill				X	
Catherine	X				
Curt					X
David				X	
Doug				X	
Erin					X
Gerald		X			
Greg		X			
Hank				X	
Horace				X	X
Kevin				X	
Lana					X
Larry	X				
Lisa				X	
Lori	X				
Rachel					X
Robert				X	
Sam		X			
Sheldon ^a					

Participant	Annually	Every Other Year	Once Every Five Years	Infrequently	Never
Steve				X	
Vicki				X	
Wendy				X	
Totals^b	3 13%	3 13%	1 4%	11 48%	5 22%

^a An answer to this question was not recorded on the survey and did not appear in the interview transcript.

^b One participant gave a range of responses for this survey question, which is included in the totals for this table.

Ensemble Size

The extent to which ensemble size contributes to music-induced hearing loss is difficult to determine due to the multiple variables that influence the sizes of the participants' performance ensembles, e.g., school size, student enrollment, class scheduling (Mace, 2005). Six participants (26%) reported the size of their largest ensemble to be between 20–40 students, two (9%) between 41–60, five (22%) between 61–80, five between 81–100 (22%), and five participants' (22%) largest ensemble is more than 100 students. Table 10 outlines the size of the largest ensemble directed by each participant:

Table 10. *Ensemble Size*

Participant	20-40	41-60	61-80	81-100	100+
Andrew	X				
Bill					X
Catherine	X				
Curt	X				
David	X				
Doug					X
Erin			X		
Gerald			X		

Participant	20-40	41-60	61-80	81-100	100+
Greg				X	
Hank		X			
Horace		X			
Kevin			X		
Lana			X		
Larry				X	
Lisa					X
Lori				X	
Rachel	X				
Robert				X	
Sam					X
Sheldon				X	
Steve					X
Vicki			X		
Wendy	X				
Totals	6 26%	2 9%	5 22%	5 22%	5 22%

Ensemble Instrumentation

The participants described the instrumentation of their largest performance ensembles from the following options: *well-balanced*,⁸⁷ *+high-range*, *+mid-range*, *+low-range*, and *poor-low* numbers.⁸⁸ Twelve participants (52%) identified their largest performance ensemble to have *well-balanced* instrumentation. Four participants (17%) identified their largest performance ensemble to have more *high-range* instruments. One participant reported *well-balanced* and *+high-range* between

⁸⁷ The standardized tonal quality of university and grade school concert bands is historically based on the instrumentation preferences established in 1927 by the Music Educators National Conference (now National Association for Music Education); these guidelines were meant to emulate the sounds created by the symphonic orchestra (Maddy, 1957) and continue to exert their influence on music educators' perceptions of what constitutes well-balanced instrumentation.

⁸⁸ + = indicates an increased number of instruments in that range within the largest performance ensemble for each participant. High-range instruments include bells, piccolos, flutes, clarinets, oboes, and trumpets; mid-range instruments include alto saxophones and French horns; and low-range instruments include bassoons, tenor and baritone saxophones, trombones, euphoniums, and tubas. Non-pitched percussion is not considered in this survey question.

two different grade levels. Another participant described the instrumentation of the largest ensemble ranging between *well-balanced* to *+high-range*. Three participants (13%) identified their ensembles as having more *mid-range* instruments, and one participant identified more *low-range* instruments in her largest ensemble. Table 11 shows the participants' range of responses regarding the instrumentation of their performance ensembles:

Table 11. Ensemble Instrumentation

Participant	Well-Balanced	+High-Range	+Mid-Range	+Low-Range	Poor/Low Numbers
Andrew			X		
Bill	X				
Catherine	X				
Curt		X			
David	X				
Doug	X				
Erin	X				
Gerald	X				
Greg	X				
Hank	X				
Horace		X			
Kevin	X				
Lana				X	
Larry	X				
Lisa	X				
Lori			X		
Rachel		X			
Robert	X	X			
Sam		X			
Sheldon ^a					
Steve	X				
Vicki			X		
Wendy	X	X			
Totals^b	14	6	3	1	0

Note. + = indicates an increased number of instruments in that range within the largest performance ensemble for each participant. High-range instruments include bells, piccolos, flutes, clarinets, oboes,

and trumpets; mid-range instruments include alto saxophones and French horns; and low-range instruments include bassoons, tenor and baritone saxophones, trombones, euphoniums, and tubas. Non-pitched percussion is not considered in this survey question. Some participants provided a range of responses.

^a An answer to this question for this participant was not recorded.

^b Three participants gave multiple answers for this question which are included in the totals for this table. Considering that some participants gave multiple answers, I chose not to include percentages in the totals for this table.

Classroom Acoustics

The participants described the acoustical properties of their current or most recent classrooms or performance spaces using the following options: *excellent*, *very good*, *adequate*, *poor*, or *terrible*.⁸⁹ The responses referred only to the acoustical properties of the participants' classrooms as detailed information regarding each participant's performance space was unavailable. Regardless, most participants simply categorized their performance spaces as "typical-sounding" sports gymnasiums. Two participants (9%) described the acoustical properties of their classroom spaces as *excellent*, four (17%) as *very good*, six (26%) as *adequate*, three (13%) as *poor*, and four (17%) as *terrible*. Two participants (9%) described the acoustical properties of their classroom space as *adequate to poor*. One participant described his classroom space as *adequate to poor* in his first ten years of teaching. Another participant described her current classroom as *very good to adequate*, but the room she used in her first 25 years of teaching as *poor to terrible*. Table 12 displays the participants' responses regarding their perceptions of the acoustical properties of their classrooms:

⁸⁹ These response options refer to the participants' subjective perceptions of the acoustical properties of their classrooms.

Table 12. Classroom Acoustics

Participant	Excellent	Very Good	Adequate	Poor	Terrible
Andrew			X	X	
Bill					X
Catherine		X	X		
Curt				X	
David				X	
Doug			X		
Erin			X		
Gerald			X	X	
Greg			X		
Hank				X	
Horace					X
Kevin	X				
Lana					X
Larry					X
Lisa			X		
Lori		X			
Rachel		X			
Robert			X	X	
Sam		X			
Sheldon			X		
Steve		X			
Vicki			X		
Wendy	X				
Totals	2 9%	5 22%	10 43%	6 26%	4 17%

Note. Four participants provided multiple answers for this survey question, which are included in the totals for this table.

Sound Exposure Intensity

The participants described the intensity (loudness) of the sound to which they were exposed in their workplaces employing the options *extremely high*, *high*, *moderate*, and *low*.⁹⁰ Five participants (22%) felt that the intensity of the sound in

⁹⁰ Although the option does not appear on the written survey, the participants were verbally provided with the option of selecting *not at all*. Similar to the responses in Table 12, the participants' responses represent their perceptions of the intensity (loudness) of their sound exposure.

their workplace was at *extremely high* levels; two participants (9%) reported *extremely high to high* levels; six participants (26%) reported *high* levels; four participants (17%) reported *high to moderate*; four participants (17%) reported *moderate* levels; one participant reported *moderate to low*; and one participant reported *low* sound intensity levels.⁹¹ Table 13 displays the participants' perceptions of the sound intensity (loudness) of their workplace:

Table 13. Sound Exposure Intensity

Participant	Extremely High	High	Moderate	Low
Andrew			X	
Bill		X	X	
Catherine			X	
Curt	X	X		
David		X		
Doug		X	X	
Erin		X	X	
Gerald	X			
Greg	X			
Hank		X		
Horace		X		
Kevin			X	
Lana		X		
Larry	X			
Lisa	X			
Lori	X	X		
Rachel			X	X
Robert		X		
Sam		X		
Sheldon				X
Steve	X			
Vicki			X	
Wendy		X	X	

⁹¹ These responses are based on the participants' perceptions, which are influenced by individual susceptibility to music-induced hearing loss (Woolford, Carterette, and Morgan, 1988).

Participant	Extremely High	High	Moderate	Low
Totals^a	7 30%	12 52%	9 39%	2 9%

Note. The response option of *not at all* did not appear on the survey but was provided verbally to each participant.

^a Seven participants provided multiple answers for this survey question, which are included in the totals for this table.

Sound Exposure Duration

The participants estimated how many hours a day they were exposed to excessive levels of sound in their workplace. The participants' responses varied, basing them upon their daily teaching schedules, class period lengths, and student enrollments. This particular question was difficult for many participants to answer, due in part to subjective interpretations of *excessive*. Quantitative sound exposure data were not gathered for this study; rather, I asked the participants to describe the durations of their exposure to excessive sound within their workplaces based upon their perceptions and experiences. Table 14 shows the responses that this question generated, many of which were outside the list of survey options:

Table 14. Sound Exposure Duration

Participant	Duration of Overexposure (hours per day)
Andrew	Less than 1
Bill	2-3
Catherine	Less than 1
Curt	2-3
David	2
Doug	Less than 1
Erin	1-4
Gerald	3-4

Participant	Duration of Overexposure (hours per day)
Greg	3-5
Hank	1-4
Horace	3-5
Kevin	1-4
Lana	2
Larry	8+
Lisa	Less than 1
Lori	3-5
Rachel	3 hours/week
Robert	1-5
Sam	1-4
Sheldon ^a	
Steve	1-2
Viki	1
Wendy	3-4

Note. Many of the participants' responses were outside of the range of choices listed on the survey for this question.

^a This participant did not provide a definitive answer to this question.

Performance History

For many participants variations in employment, family status, and other personal obligations take precedence over music performing as their teaching careers progress. Seven participants (30%) reported their current participation in musical performances outside of their school responsibilities as *rarely* or only a *few times per year*, whereas ten participants (44%) performed on a monthly basis. The findings in Table 15 represent the participants' most recent performing histories rather than older performance histories (five or more years). Table 15 provides the participants' personal performance histories expressed in the average number of rehearsals and performances per month in which they participated outside their school responsibilities:

Table 15. *Performance History*

Participant	Rehearsals/Performances (per month)
Andrew	Rarely
Bill	2-4
Catherine	1 every few months
Curt	1
David	Rarely
Doug	4-5
Erin	Rarely
Gerald	8
Greg	3-6
Hank	1 every few months
Horace	1 every other week
Kevin	2-4
Lana	10
Larry	1
Lisa	Rarely
Lori	2-4
Rachel	2-4
Robert ^a	
Sam	2-4
Sheldon	2-4
Steve	Rarely
Viki	3 per year
Wendy	3 per year

^a This participant did not answer this question definitively.

Amplified Concert Attendance

The participants described how often they attended live concerts of amplified music. Ten participants (44%) reported that they *almost never* attend live concerts of amplified music; five (22%) reported *rarely*; and eight (35%) reported *occasionally*. None of the participants reported *frequently* or *very often*. Some participants stated that they wore hearing protection while attending live concerts, whereas others did

not wear any kind of hearing protection. Table 16 displays the participants' attendance at live concerts of amplified music:

Table 16. *Amplified Concert Attendance*

Participant	Very Often	Frequently	Occasionally	Rarely	Almost Never
Andrew					X
Bill			X		
Catherine				X	
Curt			X		
David					X
Doug			X		
Erin					X
Gerald			X		
Greg					X
Hank					X
Horace					X
Kevin				X	
Lana					X
Larry					X
Lisa				X	
Lori					X
Rachel				X	
Robert			X		
Sam			X		
Sheldon			X		
Steve					X
Viki				X	
Wendy			X		
Totals	0 0%	0 0%	8 35%	5 22%	10 44%

Survey Analysis

Analyzing the participants' survey responses revealed multiple compelling findings. Previous studies indicate that performance ensemble size is a contributing factor to music-induced hearing loss among instrumental music educators (Chesky,

2010; Mace, 2005). The size of the largest performance ensemble exceeded 60 students for fifteen participants (65%) in the present study and ensembles exceeding 100 students for five participants (22%). These findings are critical: large musical ensembles produce much higher sound pressure levels, which in turn contribute to the intensity and duration of excessive sound exposure experienced by instrumental music educators (Cutietta, Klich, Royse, & Rainbolt, 1994). A primary contributing factor to instrumental music educators' music-induced hearing loss is the acoustical qualities of classroom and performance spaces (Chen & Brueck, 2012; Cutietta et al., 1994; Grayston & Alvord, 1993; Royer, 1996). Nearly half (43%) of the present study's participants described the acoustical properties of their classrooms as either *poor* or *terrible*.⁹² Specific data measuring the participants' performance spaces were not obtained due to the acoustical variances between school auditoriums and gymnasiums and the discrepancies of time spent in these instructional spaces by the participants.

One of the most disconcerting findings from the survey revealed that 17 participants (74%) described the intensity of the sound pressure levels in their classroom as either *extremely high* or *high*, and they provided a wide range of responses regarding the durations of their exposure to such excessive sound levels. Responses ranged from *less than one hour per day* to *more than 8 hours per day*. Ten participants (43%) reported the durations of their daily exposure to excessive sound levels to be *between two and five hours*, and many participants had difficulty

⁹² Three of these participants described the acoustics of their classroom ranging somewhere between *adequate* to *poor*.

estimating how many hours per day they were exposed to excessive sound levels. To determine this, multiple participants estimated the total number of hours that they typically spent leading large-group ensembles (20 or more students). As a result of such exposure, seventeen participants (74%) reported their experiencing more than one physical symptom of music-induced hearing loss: the most reported experiences among participants included tinnitus (78%) and difficulty with speech recognition (74%). Despite the participants' experiences of music-induced hearing loss and their perceived levels of sound exposure, 16 participants (70%) reported wearing hearing protection *rarely* or *never* while teaching. Further, 16 participants (70%) stated that they *rarely* or *never* wear hearing protection while performing. These findings are supported by extant research that reports low use of hearing protection among musicians despite the awareness of hearing damage or their experiencing symptoms of music-induced hearing loss (Curk & Cunningham, 2006; Miller, Stewart, & Lehman, 2007). Alarming, 15 participants (65%) reported *infrequently* or *never* having had an audiological examination.

The participants' performance histories and their attending amplified live music concerts did not appear to be a major contributing factor to their experiencing music-induced hearing loss. Ten participants (43%) rehearsed and performed with ensembles *more than two times a month*, five participants (22%) *rarely* performed, and two participants (9%) performed only *a few times a year*. Multiple participants explained that their past performance histories were far more active during their college experiences but decreased once they began teaching professionally.

Attending live musical events is well documented as a risk factor for music-induced hearing loss (Chung, DesRoches, Meunier, & Eavey, 2005). However, doing so does not appear to be a significant factor for the participants of my study: 15 participants (65%) stated that they *rarely* or *almost never* attend amplified live musical events.

Interview Findings

I employed Moustakas' (1994) adaptation of transcendental phenomenology during my analysis of interview data for this study. Applying this methodology, I organized, analyzed, and synthesized the interview findings by completing the five stages of transcendental phenomenology: (a) reducing the findings to significant statements (*horizontalization*), (b) combining the significant statements into textural themes (*clustering*), (c) developing textural descriptions of the phenomenon (*phenomenological reduction*), (d) developing structural and composite descriptions of the participants' experiences (*imaginative variation*), and (e) combining the composite descriptions to define the essence of the phenomenon (*intuitive integration*) (p. 122).⁹³ Figure 6 illustrates my conceptualization of the process of transcendental phenomenological data analysis and how the textural and structural themes emerging from the study's findings map onto this model:

⁹³ Prior to the stages of data analysis in transcendental phenomenology, Moustakas (1994) suggests that researchers examine their own preconceptions about the research topic (*epoché*) prior to collecting and analyzing data. As Creswell (2007) suggests, I shared my *epoché* in Chapter One.

Figure 6. Transcendental Phenomenological Analysis and Emergent Themes

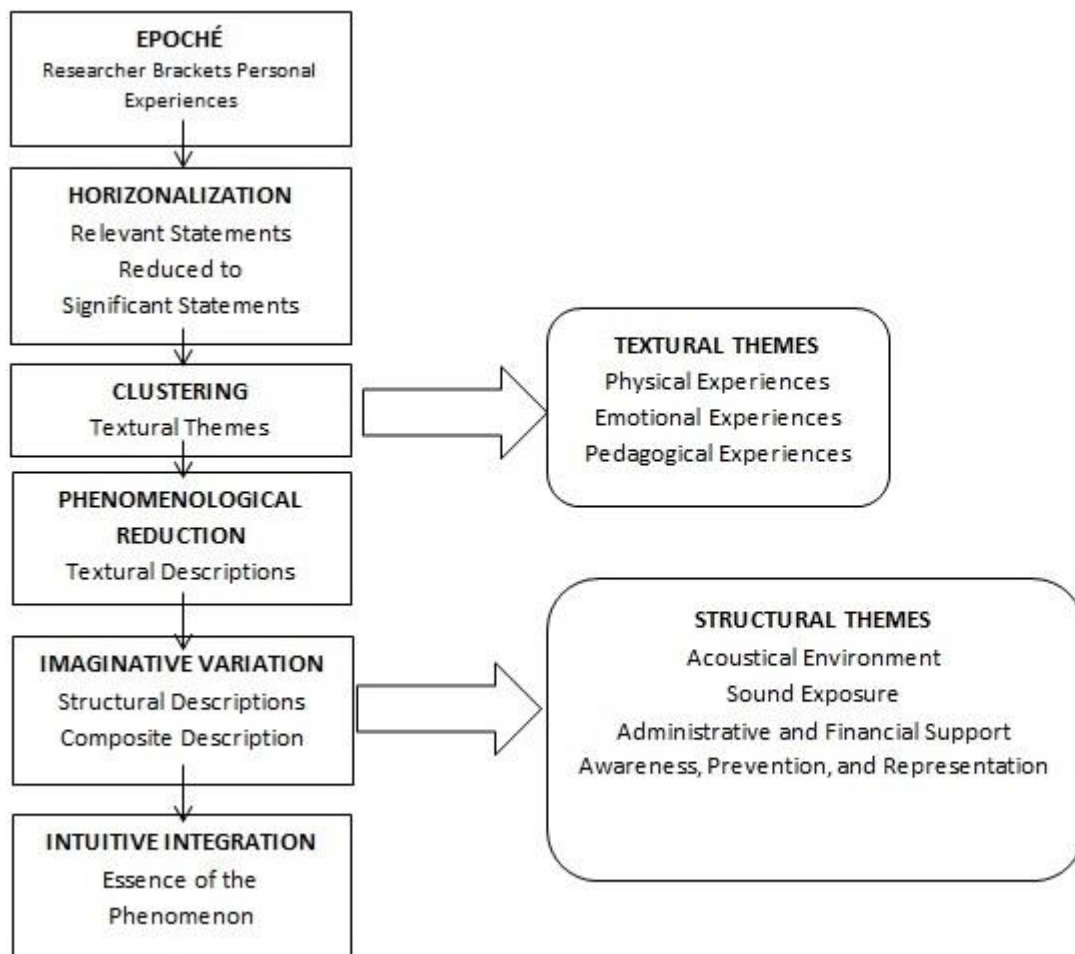


Figure 6. This figure illustrates the systematic process of transcendental phenomenological data analysis (Moustakas, 1994) and the progression of the data through each of these stages, beginning as relevant statements and ending as statements defining the essence of the phenomenon. The ovals on the right side of the figure illustrate the emergent themes I discovered throughout this process of data analysis.

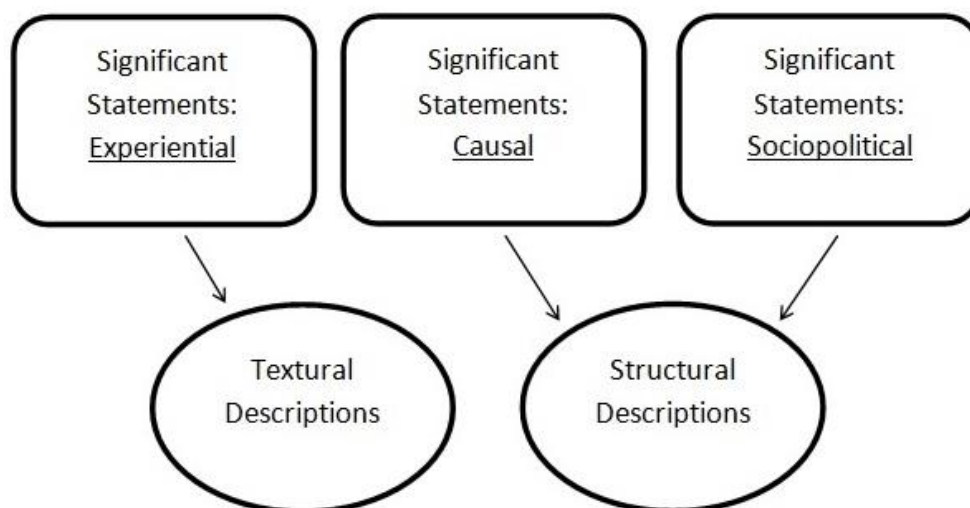
Horizontalization (Identifying Significant Statements)

The first stage of data analysis in transcendental phenomenology, horizontalization, identifies the significant statements related to a phenomenon (Moustakas, 1994). After reviewing the recorded text from each interview (a total of 23), I compiled 328 relevant statements that described the participants' experiences of music-induced hearing loss (see Appendix L). The relevant statements consisted of quotes and phrases that best illustrated "how the participants experienced the phenomenon" (Creswell, 2007, p. 61). I organized the initial list of 328 relevant statements into three statement categories: (a) experiential, (b) causal, and (c) sociopolitical.

The experiential category encompassed statements that defined the physical and emotional experiences of music-induced hearing loss and the instrumental music educators' use of hearing protection. Statements clustered within the causal category illustrated the environmental conditions that contributed to the participants' developing music-induced hearing loss. The sociopolitical category included statements denoting the contributing factors that influenced teachers', administrators', parents', and students' responses to music-induced hearing loss. This category also included political factors that either perpetuated or exacerbated the challenges experienced by these particular instrumental music educators when faced with music-induced hearing loss. The experiential statements define the participants' textural descriptions of music-induced hearing loss, whereas the causal and sociopolitical

statements illustrate the participants' structural descriptions of music-induced hearing loss (see Figure 7):

Figure 7: *Significant Statement Categories*



After I organized the initial list of relevant statements into the general statement categories described above, I was able to identify which categories contained the most responses. During this stage, I recognized that the participants' responses provided robust experiential descriptions of music-induced hearing loss and the use of hearing protection, whereas there were fewer statements specifically related to the causal and sociopolitical factors related to this phenomenon. Despite the fact that the majority of the participants' descriptions of their experiences of music-induced hearing loss consisted of experiential statements, the causal and sociopolitical statements provided important information about the underlying contexts of their experiences.

I refined the set of relevant statements by removing repetitive and overlapping statements and arrived at a more concise array of significant statements, which described the participants' experiences of music-induced hearing loss.⁹⁴ Applying the process of horizontalization (Moustakas, 1994) allowed me to further narrow this array to 48 key statements taken verbatim from the interview transcriptions. These significant statements describe *what* music-induced hearing loss consists of by providing a textural meaning of the phenomenon. The complete set of significant statements is included in Appendix M and in Table 17 below:

Table 17. *Significant Statements*

Significant Statements	
1.	"... but learning that after a particularly loud period of time to be willing to take time and find quiet, and find ways to let myself heal ... " (Greg)
2.	"I have trouble hearing people in a crowded room, and I have trouble hearing people talk." (Lana)
3.	"... at times it feels almost like blocked, almost stuffy." (Greg)
4.	"When you go to concerts, and you hear most of it, but there is still that section of the frequencies that you can't hear anymore." (Steve)
5.	"I feel like it can be ... like physically exhausting ... and like on a more personal, emotional level, it becomes really hard to deal with people when you're experiencing that." (Curt)
6.	"It's actually physical pain." (Gerald)
7.	"I noticed a little bit more, like sensitivity to it. Not so much loss, but sensitivity to sound." (Curt)
8.	"I mean it set in ... where it was just like, one day it wasn't noticeable, and the next day, it was like you turned on a switch, and it hasn't gone away since." (Andrew)
9.	"It's like I got cicadas screaming at me all the time. Or, someone would follow me around with a glockenspiel, doing a roll on it." (Andrew)

⁹⁴ Moustakas (1994) uses the term *significant* not in a statistical sense, but rather to identify those statements that are most relevant to the phenomenon or experience being studied.

Significant Statements

10. "There's never one day that I'm not thinking about my hearing because it's like someone is either using a circular saw in the basement, or there's people all around me playing the triangle . . ." (Larry)
 11. "And sometimes I'll even hear like a . . . like when you take a conch shell up to your ear, and they tell you you're hearing the ocean, but you're just hearing the air pressure inside." (Rachel)
 12. ". . . how to save your hearing so you're able to survive your teaching career, not be cursed with that terrible ringing sound that I have all the time." (Larry)
 13. "Just a constant high pitch, kind of high pitch, that doesn't stop." (Catherine)
 14. "I definitely feel less effective in rehearsal, it's distracting." (Curt)
 15. "It's almost like a piercing sensation, like somebody is sticking something in my ear." (David)
 16. ". . . they cause this rumbling sensation that I hear, and it sounds like it's rumbling inside my eardrum." (David)
 17. ". . . it's the two pitches in both ears are about the same." (Gerald)
 18. ". . . it's not pain, but there's times where it does feel almost like things are wavering in the ear." (Greg)
 19. "Every day. It rings every day. I have not heard silence in maybe twenty years." (Larry)
 20. "Sometimes it's loud and it wakes me up, like a noise." (Lisa)
 21. ". . . put the earplugs in and then they would play louder, or purposefully play wrong notes." (Andrew)
 22. ". . . the moment you put in any kind of hearing protection, the kids would assume that you can't hear at all, and then they would start causing problems." (Andrew)
 23. "Because I'm always pulling them in and out . . . because I don't realize how loud I'm talking." (Greg)
 24. "The inability to hear kids talking to me in the rehearsal." (Sam)
 25. "Sometimes they don't fit in your ears perfectly, you gotta kinda wiggle them around in there and it's kind of uncomfortable." (Wendy)
 26. "After four or five months . . . it all of a sudden shrinks a little bit, or something, and I'm getting a little seepage, and it's like, 'wait a minute, I used to have better protection than I do now.'" (Gerald)
 27. "Just taking them in and out, so that I could hear my students talk, or whatever, was a hassle." (Wendy)
 28. "I couldn't stand the way it made me sound, and the way that things sounded around me." (Wendy)
-

Significant Statements

29. "... that's probably also why I've gotten in the habit of not wearing them as much as a director, because I do feel like I really just don't hear the balance and the blending of the tone nearly as well . . ." (Greg)
 30. "Emotionally, I get curious and concerned - well, almost angry, because I'm afraid it's leading toward hearing loss." (Rachel)
 31. "When it first came on [tinnitus and hearing loss] it was very emotionally distressing because my dad was a band director for about ten years early in his career and got out of teaching for a while . . ." (Greg)
 32. "The biggest thing for me that it affects is - even with my hearing loss, I was able to teach pretty well, but - it took the joy out of my teaching." (Andrew)
 33. "In order to be a band director you gotta love the sound of the band and, very frankly, a band doesn't sound the same to me anymore." (Andrew)
 34. "I rarely listen to music in the car. I don't want that sound coming at me after having sound coming at me all day long." (Erin)
 35. "... and there are certain things you don't hear anymore, which kind of saddens you." (Steve)
 36. "I wonder if I'm hearing things the way they really are sometimes." (Lisa)
 37. "And I find it terribly ironic, that the thing that is my bread and butter and the most important to me, is what is being taken away." (Lisa)
 38. "... because I feel like at 59 it's premature . . . this shouldn't be happening for ten or fifteen more years." (Erin)
 39. "... just that I worry that I miss things in the ensemble that I could be fixing." (Horace)
 40. "I worry about it. I worry that . . . my hearing is not as good as it used to be. So I do worry that it might be declining." (Viki)
 41. "Emotionally, sometimes I wonder if it is ever going to go away, and every once in a while I get angry that I sacrificed this." (Lisa)
 42. "I'm not as good as I used to be, and I could only see this getting worse, and that's when some of my depression kicked in because of that." (Larry)
 43. "To be a really good teacher, and to really do what you want to do, it's pretty hard to avoid having your ears abused." (Wendy)
 44. "... comes with the territory." (Sam)
 45. "That I'm damaged." (Lana)
 46. "So, the moment you tell them that your hearing isn't as good anymore, you've already lost credit." (Andrew)
-

Significant Statements

47. “Oh, it’s a joke at the high school . . . ‘speak up, I’m deaf’. The kids know that I have some hearing loss.” (Sam)
48. “. . . at my age, where my hearing is now, and tinnitus and everything – I don’t see how I can have a 35-year career as a band director.” (Greg)
-

Clustering (Identifying Textural Themes)

The second stage of data analysis in transcendental phenomenology consists of clustering the significant statements into textural themes (Moustakas, 1994). Three textural themes and 14 subthemes describing music-induced hearing loss emerged from the participants’ 48 significant statements. The three textural themes described the participants’ (a) physical, (b) emotional, and (c) pedagogical experiences related to their music-induced hearing loss. The first textural theme denotes four subthemes describing the physical experiences of music-induced hearing loss: (a) tinnitus, (b) hearing loss, (c) difficulties hearing speech, and (d) sensitivity and pain to sound. The second textural theme comprises five subthemes describing the emotional effects associated with music-induced hearing loss: (a) stress, anxiety, fear, and worry, (b) depression and loss, (c) burnout, (d) uncertainty, and (e) mood changes. The final textural theme consists of five subthemes that describe the pedagogical effects of music-induced hearing loss: (a) teacher effectiveness, (b) communication, (c) classroom management, (d) musical perception, and (e) the use of hearing protection in the classroom. Table 18 illustrates the three textural themes and their respective 14 subthemes:

Table 18. Textural Themes and Respective Subthemes

SUBTHEMES	TEXTURAL THEME: Physical Experiences	TEXTURAL THEME: Emotional Experiences	TEXTURAL THEME: Pedagogical Experiences
	Symptoms of Tinnitus	Stress, Anxiety, Fear, Worry	Effectiveness
	Symptoms of Hearing Loss	Depression & Loss	Communication
	Difficulties Hearing Speech	Burnout	Classroom Management
	Sensitivity & Pain	Uncertainty	Musical Perception
		Mood Changes	Use of Hearing Protection

Next, I reviewed the reduced list of 48 significant statements and grouped each statement within the emergent textural themes and subthemes. Table 19 is an illustration of the 48 significant statements and their relationship to the three textural themes and the 14 respective subthemes:

Table 19. Significant Statements and Relationship to Textural Themes and Respective Subthemes

Significant Statements	TEXTURAL THEME Subtheme
“Just a constant high pitch, kind of high pitch, that doesn’t stop.” – Catherine	PHYSICAL Tinnitus
“It’s like I got cicadas screaming at me all the time, or someone would follow me around with a glockenspiel doing a roll on it.” – Andrew	PHYSICAL Tinnitus
“I mean it set in . . . where it was just like, one day it wasn’t noticeable, and the next day, it was like you turned on a switch, and it hasn’t gone away since.” – Andrew	PHYSICAL Tinnitus
“And sometimes I’ll even hear like a . . . like when you take a conch shell up to your ear, and they tell you you’re hearing the ocean, but you’re just hearing the air pressure inside.” –	PHYSICAL Tinnitus

Significant Statements	TEXTURAL THEME Subtheme
Rachel	
“ . . . they cause this rumbling sensation that I hear, and it sounds like it’s rumbling inside my eardrum.” – David	PHYSICAL Tinnitus
“ . . . it’s the two pitches in both ears are about the same.” – Gerald	PHYSICAL Tinnitus
“Sometimes it’s loud and it wakes me up, like a noise.” – Lisa	PHYSICAL Tinnitus
“ . . . it’s not pain, but there’s times where it does feel almost like things are wavering in the ear.” – Greg	PHYSICAL Tinnitus
“Every day. It rings every day. I have not heard silence in maybe twenty years.” – Larry	PHYSICAL Tinnitus
“When you go to concerts, and you hear most of it, but there is still that section of the frequencies that you can’t hear anymore.” – Steve	PHYSICAL Hearing Loss
“ . . . at times it feels almost like blocked, almost stuffy.” – Greg	PHYSICAL Hearing Loss
“I have trouble hearing people in a crowded room and I have trouble hearing people talk.” – Lana	PHYSICAL Difficulty Hearing Speech
“It’s actually physical pain.” – Gerald	PHYSICAL Pain
“It’s almost like a piercing sensation, like somebody is sticking something in my ear.” – David	PHYSICAL Pain
“There’s never one day that I’m not thinking about my hearing because it’s like someone is either using a circular saw in the basement, or there’s people all around me playing the triangle . . .” – Larry	PHYSICAL Pain
“I noticed a little bit more, like sensitivity to it. Not so much loss, but sensitivity to sound.” – Curt	PHYSICAL Sensitivity
“ . . . but learning that after a particularly loud period of time to be willing to take time and find quiet, and find ways to let myself heal . . .” – Greg	PHYSICAL Sensitivity
“When it first came on [tinnitus and hearing loss] it was very emotionally distressing because my dad was a band director for about ten years early in his career and got out of teaching for a while . . .” – Greg	EMOTIONAL Stress, Anxiety, Fear, Worry

Significant Statements	TEXTURAL THEME Subtheme
“I worry about it. I worry that . . . my hearing is not as good as it used to be. So I do worry that it might be declining.” – Viki	EMOTIONAL Stress, Anxiety, Fear, Worry
“Emotionally, I get curious and concerned—well, almost angry, because I’m afraid it’s leading toward hearing loss.” – Rachel	EMOTIONAL Stress, Anxiety, Fear, Worry
“I’m not as good as I used to be, and I could only see this getting worse, and that’s when some of my depression kicked in because of that.” – Larry	EMOTIONAL Depression and Loss
“The biggest thing for me that it affects is—even with my hearing loss, I was able to teach pretty well, but—it took the joy out of my teaching.” – Andrew	EMOTIONAL Depression and Loss
“And I find it terribly ironic, that the thing that is my bread and butter and the most important to me, is what is being taken away.” – Lisa	EMOTIONAL Depression and Loss
“Emotionally, sometimes I wonder if it is ever going to go away, and every once in a while I get angry that I sacrificed this.” – Lisa	EMOTIONAL Depression and Loss
“That I’m damaged.” – Lana	EMOTIONAL Depression and Loss
“I rarely listen to music in the car. I don’t want that sound coming at me after having sound coming at me all day long.” – Erin	EMOTIONAL Burnout
“I feel like it can be . . . like physically exhausting . . . and like on a more personal, emotional level, it becomes really hard to deal with people when you’re experiencing that.” – Curt	EMOTIONAL Burnout
“[noise exposure and hearing loss] . . . comes with the territory.” – Sam	EMOTIONAL Burnout
“. . . at my age, where my hearing is now, and tinnitus and everything—I don’t see how I can have a 35-year career as a band director.” – Greg	EMOTIONAL Uncertainty
“. . . because I feel like at 59 it’s premature . . . this shouldn’t be happening for ten or fifteen more years.” – Erin	EMOTIONAL Uncertainty
“. . . how to save your hearing so you’re able to survive your teaching career, not be cursed with that terrible ringing sound that I have all the time.” – Larry	EMOTIONAL Uncertainty

Significant Statements	TEXTURAL THEME Subtheme
“ . . . just that I worry that I miss things in the ensemble that I could be fixing.” – Horace	PEDAGOGICAL Effectiveness
“I definitely feel less effective in rehearsal, it’s distracting.” – Curt	PEDAGOGICAL Effectiveness
“To be a really good teacher, and to really do what you want to do, it’s pretty hard to avoid having your ears abused.” – Wendy	PEDAGOGICAL Effectiveness
“So, the moment you tell them that your hearing isn’t as good anymore, you’ve already lost credit.” – Andrew	PEDAGOGICAL Effectiveness
“The inability to hear kids talking to me in the rehearsal.” – Sam	PEDAGOGICAL Communication
“Oh, it’s a joke at the high school . . . ‘speak up, I’m deaf’. The kids know that I have some hearing loss.” – Sam	PEDAGOGICAL Communication
“ . . . put the earplugs in and then they would play louder, or purposefully play wrong notes.” – Andrew	PEDAGOGICAL Classroom Management
“ . . . the moment you put in any kind of hearing protection, the kids would assume that you can’t hear at all, and then they would start causing problems.” – Andrew	PEDAGOGICAL Classroom Management
“In order to be a band director you gotta love the sound of the band and, very frankly, a band doesn’t sound the same to me anymore.” – Andrew	PEDAGOGICAL Musical Perception
“ . . . and there are certain things you don’t hear anymore, which kind of saddens you.” – Steve	PEDAGOGICAL Musical Perception
“I wonder if I’m hearing things the way they really are sometimes.” – Lisa	PEDAGOGICAL Musical Perception
“ . . . that’s probably also why I’ve gotten in the habit of not wearing them as much as a director, because I do feel like I really just don’t hear the balance and the blending of the tone nearly as well . . .” – Greg	PEDAGOGICAL Use of Hearing Protection
“Because I’m always pulling them in and out . . . because I don’t realize how loud I’m talking.” – Greg	PEDAGOGICAL Use of Hearing Protection
“Just taking them in and out, so that I could hear my students talk, or whatever, was a hassle.” – Wendy	PEDAGOGICAL Use of Hearing Protection
“Sometimes they don’t fit in your ears perfectly, you gotta kinda wiggle them around in there and it’s kind of	PEDAGOGICAL Use of Hearing Protection

Significant Statements	TEXTURAL THEME Subtheme
uncomfortable.” – Wendy	
“I couldn’t stand the way it made me sound, and the way that things sounded around me.” – Wendy	PEDAGOGICAL Use of Hearing Protection
“After four or five months . . . it all of a sudden shrinks a little bit, or something, and I’m getting a little seepage, and it’s like, ‘wait a minute, I used to have better protection than I do now.’” – Gerald	PEDAGOGICAL Use of Hearing Protection

Phenomenological Reduction (Developing Textural Descriptions)

The third stage of analysis in transcendental phenomenology, phenomenological reduction, is developing textural descriptions of the participants’ experiences. In this stage, I synthesized the significant statements and textural themes defining *what* the participants experienced “into a description of the textures of the experience” (Moustakas, 1994, p. 122). The textural descriptions emerged from the textural themes and subthemes and are based on the verbatim examples provided by the participants during the interviews. The three textural descriptions included in this section illustrate each participant’s physical, emotional, and pedagogical experiences of music-induced hearing loss. Although I created a textural description for all of the participants, I selected the following accounts as three exemplary models of the textural experiences of music-induced hearing loss.

Textural description: Greg. Over the past two decades, Greg experienced high-end hearing loss, tinnitus, and difficulty hearing speech. He noted difficulty hearing speech in large group settings, particularly women’s voices and distinguishing consonants. He described the sensation of his hearing loss and tinnitus

as “blocked, almost stuffy . . . like things are wavering in the ear . . . like a pulsing feel in the ears.” His tinnitus was most noticeable in quiet environments and was exacerbated by exposure to loud situations. Greg described his tinnitus as a high-pitched ringing sound and clearly recalled the first time he noticed this sensation, which occurred after his participation in a college jazz ensemble rehearsal:

I remember laying in my apartment bed and all of a sudden I said, “oh, no,” and I heard the ringing . . . it hadn’t been a particularly loud day, but it was just there, and it’s been there ever since. Yeah, just laying there and hearing it for the first time, really, and then every night hearing it and going, “OK, it’s not going away, it’s there.”

Greg felt that his hearing was deteriorating, which made it more difficult for him to hear speech in situations with background noise. Greg rarely used hearing protection while teaching or performing because he felt it affected his ability to perceive intonation and musical balance. From a classroom management standpoint, he was concerned about wearing hearing protection while teaching, particularly when teaching middle school students:

I feel like the kids try to take advantage of it at the middle school level.

At the high school level, I felt like the kids could understand and empathize with it a little bit more and didn’t really try and take advantage of it as much.

He was more self-conscious about communicating with students when he used hearing protection: “Because I’m always pulling them in and out, especially when

I'm talking to the kids because otherwise, then I'm just screaming, because I don't realize how loud I'm talking." Greg was partly concerned about the condition of his hearing because his father wore hearing aids and was told by an audiologist that his career as a music teacher was a contributing factor to his hearing loss.

Textural description: Andrew. Andrew began experiencing physical indications of hearing loss and tinnitus within the past five years. The onset of tinnitus occurred suddenly: "One day it wasn't noticeable and the next day, it was like you turned on a switch, and it hasn't gone away since." Andrew compared his tinnitus to the sound of screaming cicadas or the sound of a ringing glockenspiel. His tinnitus made it difficult to focus on activities that require listening or concentration. In order to tolerate silence, he turned on the television to mask the ringing in his ears. Andrew's hearing loss affected his ability to perceive subtle sounds, such as the rustle of leaves or the crunch of snow, which he noticed while hunting. Andrew felt that wearing hearing protection while teaching limited his effectiveness and ability to manage the classroom: "The kids would assume that you can't hear at all, and then they would start causing problems . . . play louder, or purposefully play wrong notes." He drew the analogy that removing hearing protection in order to better communicate with his students is like an actor coming out of character.

Textural description: Gerald. Gerald experienced tinnitus for 20 years and described the sensation as physical pain that was exacerbated by loud or sudden sounds. The sound of putting dishes away after dinner caused him physical pain, to

the point where he wore hearing protection while engaging in this common household chore. He described his tinnitus as a ringing, buzzing sound of two similar pitches in each ear.

Once Gerald began experiencing these sensations, he started to wear hearing protection while teaching, which he felt inhibited his ability to communicate with students: “I am constantly taking them in and out to make sure I hear the kids properly.” The hearing protection he used while teaching provides adequate protection but after several months the earplugs lose their seal,⁹⁵ which allows more sound to seep into the ear canals: “It all of a sudden shrinks a little bit, or something, and I’m getting a little seepage, and it’s like, wait a minute, I used to have better protection than I do now.” Blowing a whistle while directing his marching band caused discomfort, even while wearing hearing protection.

Gerald reflected upon both the effect his tinnitus had on his hearing health and the possibility that at some point he might file for disability or be forced to leave the teaching profession. Noting the continued decline in his hearing despite his efforts to wear hearing protection on a daily basis, he had discussed the possibility of applying for a disability with one of his school board members. Gerald thought about the condition of his hearing “at least four or five times an hour, every day.”

⁹⁵ The financial cost of hearing exams and custom-made hearing protection makes replacing hearing protection devices cost-prohibitive. On average, a pair of silicone-based custom-fit ear molds cost approximately \$200, not including the cost of the audiology exam, which is typically not covered by insurance providers.

Imaginative Variation (Developing Structural and Composite Descriptions)

Imaginative variation is the penultimate step of data analysis in transcendental phenomenology, consisting of developing structural descriptions that illustrate *how* the participants experience phenomena (Moustakas, 1994). Using the process of imaginative variation (Moustakas, 1994), I created a structural description of *how* each participant experienced music-induced hearing loss: I examined the underlying structures of the settings and contexts in which participants experienced the phenomenon. The three structural descriptions that follow provide exemplary illustrations of the settings and contexts in which the participants experienced music-induced hearing loss.

Structural description: Larry. Larry taught middle and high school band at two different schools with more than 300 students in each program. Toward the end of Larry's teaching career, his marching band consisted of approximately 180 students. During a regularly scheduled parent-teacher meeting, Larry mentioned his concerns to the parents about the sound levels to which students were exposed during marching rehearsals. One of the parents at this meeting contacted the Occupational Safety and Health Administration (OSHA) to have the acoustical properties of the classroom tested. OSHA conducted sound level tests on all of the band rooms in the school district and found that the decibel levels in the rooms were very high.⁹⁶ OSHA made recommendations to the school district on how to improve the music rooms in

⁹⁶ Although Larry could no longer recall the exact sound exposure measurements recorded by OSHA during these tests, he was certain that they exceeded the 90 dB OSHA standard.

the district, which included making acoustical changes to the rooms, requiring annual hearing tests for the music teachers in the district, and to provide molded earplugs for teacher use.

Larry's school district hired a sound engineer to make acoustical improvements to his classroom, which included installing carpeting on the floors and acoustical panels on the concrete walls and ceiling. Larry believed that the school district would never have made any of these changes without the legal threat of OSHA, and he claimed that these improvements actually made the room worse, citing that the changes made to the room reduced the high frequencies produced in the room but made the middle and lower frequencies worse. Shortly after making the acoustical improvements suggested by OSHA, the school district went to a referendum to build a new high school band room. Larry explained that his school district presented the need for a new band room to the public based on an increase in student enrollment numbers in the band program, despite the fact that the enrollment was actually decreasing:

So I firmly believe that the reason why they did that is because their research showed that they were in a liability type of situation because of that band room. They already had a band director who was leaving . . . but of course, no administrator or anybody would admit to that.

Encouraged by hearing specialists to leave his profession in order to save what remained of his hearing, Larry was told: "You gotta get out of teaching, you're only going to make things worse; things are kinda exponential on this." Larry did not

pursue legal action against his school district because his lawyer estimated that establishing a direct connection between Larry's music-induced hearing loss and his workplace conditions would be difficult to prove in court.

Forced to leave the profession at the age of 51, Larry did not qualify for the standard retirement plan in his school district, which was typically offered to individuals once they turned 65 years of age. Consequently, Larry filed for two years of disability as soon as his banked sick days were depleted. Once the two-year disability policy was exhausted, Larry was forced to take what he described as a "pathetically" lower-paying job:

I lost thousands of dollars on that decision. I wouldn't have been as good of a teacher, and I know I would have been unhappy with things because I couldn't hear them as well, but I would not have gone—I would have not [*sic*] followed their directions. They said that it wouldn't get worse if I would leave right away, and it continues, always continues to get worse.

Larry spoke with his district's human relations personnel director about his situation and the impending financial consequences that were quickly becoming a reality for him. Larry and his wife requested an insurance settlement with the school district that would pay him a stipend comparable to his wife's plan, in which he was enrolled at the time. Considering that Larry never used the insurance plan provided by his school because his wife's insurance plan was better, Larry and his wife believed that the settlement the school district offered was inadequate. They felt that

the school district should have paid a cash stipend in lieu of the health insurance coverage when taking into account Larry's situation. At first the school district refused this request, but it eventually agreed to pay a monthly stipend in the amount of the health insurance premium as long as Larry signed a legal agreement not to pursue legal action for his hearing loss. Larry regretted not following through with legal action against the school district; he felt that his experience might help future directors who are in similar situations. Larry shared his perception of his school district's political position regarding his situation and its effect on the school district at the time:

They couldn't have been more cooperative . . . but, I think it was . . . they were just trying to protect themselves from liability. I honestly think they wanted to make me happy so I wouldn't push them. I mean, they were building a brand new . . . they were telling the public they were building a brand new band room for a reason that didn't exist. That just kinda shows you where people are. No one took them up on the fact that that wasn't the case. There were more things going on. I think they were building a new school, or a major addition. I don't know how much it cost to make a band room . . . but still their reason for it was because of growing numbers. . . . I know darn well that they were talking about my situation.

Larry was adamant that occupational hearing loss was not being adequately addressed in preparing future music educators: "No! Oh, Lord no!" Larry also

believed that occupational hearing loss was not adequately represented in music education literature but acknowledged that he no longer read this literature, having left the profession. Larry expressed some skepticism regarding the issues of awareness and prevention and their relationship to music educators' hearing health. He cited the excessive use of personal music listening devices among young people as an example of a lack of awareness of the hearing mechanism's susceptibility to damage: "Unless you're real smart, you're gonna have hearing problems."

Structural description: Lori. Lori's story was filled with rich descriptions of the settings and contexts that contributed to the underlying structure of her experiences with music-induced hearing loss. She was a 20-year teaching veteran who taught middle school concert, marching, and jazz band in grades six through eight. The sizes of her ensembles varied by grade level and ranged from 30 to 100 students. Lori experienced constant tinnitus: the degree of the ringing was exacerbated by the amount of sound she experienced during the school day. She was concerned about the sound levels she experienced in her workplace: "I think it's at an excessive level every time we have full band, which is every other day, three hours a day."

At her previous position, Lori filed a worker's compensation claim, but she didn't stay at the job long enough to pursue the claim:

There was no resistance to getting treated and acknowledging the issue but like I said, I didn't stay long enough to be able to fix the problem. So, there wasn't really much of an opportunity for resistance, you

know? If I had stayed, then I would have had to push to get either a better teaching space, or acoustic treatment for the room, or something. And I don't have any idea what kind of resistance I would have gotten for that.

After filing her worker's compensation claim, Lori underwent hearing testing with an audiologist. The test results demonstrated no hearing loss but confirmed her tinnitus. Lori recalled the treatment options for the tinnitus that were presented to her:

The treatment options were to get earplugs. But at that point, I mean that was quite a while ago, the earplugs, as far as options for music teachers, were pretty awful. They block sound entirely, so that you can't hear what you are supposed to be teaching.

The school district in which Lori taught required annual hearing tests for the music teachers in the district. Lori was very appreciative of this program given her previous teaching position, which—because of the inadequate acoustical environments of her teaching spaces—she felt caused the development of her tinnitus:

Well, if you could imagine a very long, narrow space . . . it was really a closet that I was teaching in. And I would have maybe 16 saxophones in there. I had group stuff, like 12 trumpets, and since there was no distance that I could put between myself and my students—because it was such a narrow space—by the end of one teaching year, I had tinnitus in my ear. And that was actually tested,

because I was complaining about it, and so it was a workman's comp claim.

Lori thought her hearing improved after she took a different position with better acoustic teaching environments; however, she reported that her tinnitus became worse. She attributed this to her teaching larger bands and the resultant louder sound levels. Lori was deeply concerned about one of her classroom spaces:

One of the schools . . . has a room that was designed for 35 students who do not play instruments. It's a tiled floor, and there are about 100 band kids in there. When the kids are in there playing, at the back end of the room there's a double-paned glass window that looks into the band office, and that will rattle like crazy, it's so loud in there. And they've had administration say "no" to any changes.

Lori claimed that her current school district was resistant to any changes to the room due to budgetary concerns; she cited the instrumental music teaching faculty's hesitation to pursue the issue. Her colleagues shared her concerns about the room's inadequate acoustics and the limited options available to protect their hearing in that teaching environment:

We have about four meetings a year, and it has come up several times already. I know that the high school teachers have stated that they typically wear earplugs for marching band but not for other things, because the quality of the earplugs just hasn't been good enough yet,

because it just blocks out too much sound, and then it's hard to do your job.

The administrators in Lori's current school district responded unfavorably when a colleague presented them with information regarding occupational noise exposure and faculty concerns about the acoustical environment of the music classrooms in their school district:

And then I think about my colleagues who have horrid spaces compared to what I have and know that theirs is far worse. And I really think hearing some of the stories in my district of colleagues trying to fight with the administrators to get them to do something. They shouldn't need to call OSHA. People should be a little bit more understanding than that. So, I mean I know specifically at that one building that she has been trying to do something. She does all this research with Wenger technology to try to improve the acoustics in the room, and got prices for everything, and when she brought that to her administrator, she was laughed at because it was so expensive.⁹⁷

Lori pointed out that many parents in her district shared their concerns with her colleague about students' hearing health. According to Lori, her colleague was proactive in trying to find a solution: "She shouldn't have to be doing all of the work for this, and if she wants anything done she's got to do everything."

⁹⁷ The Wenger Music Corporation provides acoustical equipment and surveys for school music facilities. See <https://www.wengercorp.com/>

Lori did not feel that hearing health was adequately represented in teacher education programs and did not recall any other music education colleagues who discussed it during their college experiences. As for its representation in the music education literature, Lori believed that music-induced hearing loss is “almost never talked about” and that it is “just accepted” as part of being a music educator. She believed that music-induced hearing loss could be avoided, but music educators did not have the support to gain the necessary information and accommodations:

I don't think right now that there is [sic] a whole lot of aspects to reasonable avoidance. There is [sic] way too many people that don't understand how damaging it is and frankly don't want to find out, because that would cost money. And I think that there's [sic] . . . the options that are out there are so darn expensive, and you don't get any support to purchase that stuff. It's not very reasonable.

Structural description: Erin. Erin had 35 years of teaching experience and taught at the same school for her entire career. She taught fifth grade beginning band and general music, grades four and five. Her first teaching experience consisted of teaching full band in a small classroom and lessons in a locker room before her district built a new facility. At one point, Erin requested that her superintendent bring in an OSHA representative to test the acoustics of her teaching space, a request that fell by the wayside. Erin continued to teach band lessons in locker rooms until the school passed a building referendum. After the building referendum passed, she joined a committee to provide input on the new building. The building architect

laughed at her when she requested that proper acoustical treatment be considered when designing and constructing the new music rooms. After one of her colleagues complained about the excessive sound levels coming from the music room, the school district responded by building a sound barrier without consulting the faculty or an acoustics expert:

And they went to all the expense of building this fake wall, but I don't think they ever consulted any type of expert on it. I think they just hired a carpenter and they did it, and figured it would help, and it's done nothing . . . I would say that the biggest thing is that they never all along, never bothered to hire any experts at all.

Erin had never requested financial support from her school district to pay for audiology exams or hearing protection. Due to recent changes in her health insurance, Erin was unsure whether her insurance covered hearing health-related expenses:

I think it would've a few years ago, but they've changed plans a number of times in the last few years, and it doesn't seem like we have nearly as good a [sic] coverage. Not just the co-pay factor, but the policy itself doesn't seem to pay for as much, so I highly doubt that.

Erin believed that a lack of awareness regarding music-induced hearing loss exists among instrumental music educators, and that they are generally unwilling to wear hearing protection because of its perceived effect on their ability to teach effectively:

I think most . . . at least the band directors I know, none of them are going to want to do that . . . I've got a colleague that's only like 35, and he's middle school band, and I've kind of said, "you should really kind of think about that now, rather than later," and I don't think he's comfortable with the idea of using something that might detract from his skill level. But I still don't think he fully grasps what can happen to him over time. So I think by the time most people would be willing to do it, it's too late.

Composite textural descriptions. I concluded this stage of analysis by creating composite textural and structural descriptions of the participants' experiences of music-induced hearing loss. The composite textural descriptions emerged from three textural themes related to the participants' (a) physical, (b) emotional, and (c) pedagogical experiences. The composite structural descriptions are based on four structural themes that describe the causal and sociopolitical settings and contexts of the participants' experiences of music-induced hearing loss: (a) acoustical environment; (b) sound exposure; (c) administrative and financial support; and (d) awareness, prevention, and representation.

Physical experiences of music-induced hearing loss. The participants provided vivid descriptions of music-induced hearing loss. Multiple participants recounted their experiences of tinnitus as a high-pitched ringing sensation; Lori described it as an "electrical, high-pitched tone." Others described the sensation as a

wavering, rumbling, or roaring sensation. The onset, duration, and degree of tinnitus varied. Most participants described the onset of tinnitus as appearing suddenly and remaining once it appeared. Andrew described the first time he noticed his tinnitus: “I mean it set in . . . where it was just like, one day it wasn’t noticeable, and the next day, it was like you turned on a switch, and it hasn’t gone away since.” For some, their tinnitus did not appear until after they taught for many years; however, others experienced it within their first year of teaching. This was the case for Steve who began to notice tinnitus during his first year of teaching: “Maybe after the first month I started hearing the buzzing in my ears at night.” The degree of the tinnitus varied widely between the participants: some described tinnitus as an annoyance, but others experienced it as severely affecting their abilities to teach. Two participants left music education because of the severity of their symptoms. Larry left the profession at the age of 51 and stated that he had not “heard silence in maybe 20 years.” He described his tinnitus as the sound of a “circular saw” or the constant sound of ringing triangles.

Similar to their experiences with tinnitus, the participants’ descriptions of hearing loss varied in onset, duration, and degree. A commonly reported description of hearing loss was the loss of certain frequencies in their hearing ranges. Horace considered how his hearing loss affected his perception of music: “The thing I thought about is when I’m hearing music now, is it colored by the fact that I’m not hearing certain frequencies.” Lisa questioned her ability to accurately perceive musical sounds: “I wonder if I’m hearing things the way they really are sometimes.”

Other participants described the sensation of hearing loss as a “muffled” experience: Greg described his hearing as “blocked, almost stuffy.”

The most commonly reported perception of music-induced hearing loss was difficulty in hearing speech both inside and outside the music classroom. A scenario reported repeatedly was the difficulty communicating with students while teaching instrumental music classes. Many participants shared stories about their asking students to repeat questions during class, and the misunderstandings that occurred because a participant misheard a student or did not hear the student at all. Background noise made understanding speech difficult for many participants. Horace stated: “I have a problem when there are background noises when people are talking . . . understanding what they’re saying.” David recounted his difficulty in understanding questions directed to him during rehearsal: “When I was conducting in the orchestra and we’d stop, and one of the musicians had a question for me; and I couldn’t always understand what their question was . . .”

Several participants explained that their difficulties in hearing speech was not limited to the music classroom, but also occurred in their everyday activities outside the classroom. Lana shared her experiences of such: “I have trouble hearing people in a crowded room, and I have trouble hearing people talk.” Hank described his difficulties similarly: “I have problems hearing conversation, especially baritone voices—large crowds, forget it.”

Sensitivity and pain comprised another physical aspect of music-induced hearing loss, especially when participants experienced sudden or excessively loud

sounds. For Curt, exposure to excessively loud sounds brought on headaches. Larry described sensations of pain as an “ice pick” in his ears. Andrew expressed his experience with sensitivity and pain to sudden loud sounds as: “They used to be maybe startling, now are literally painful.” For Gerald, the sound of putting dishes away at home causes him excruciating physical pain—he now wears hearing protection while engaged in this common household chore.

Emotional experiences of music-induced hearing loss. The participants’ emotions generated by music-induced hearing loss emerged from a wide range of responses, from uncertainty and anxiety to loss and depression. Many expressed a general concern about music-induced hearing loss and its very real deleterious effects on their careers. Viki expressed her concern: “I worry about it. I worry that I might be . . . that my hearing is not as good as it used to be. So I do worry that it might be declining.” Others shared their anxiety and stress regarding the physical realities of music-induced hearing loss. Catherine expressed uncertainty and anxiety: “I guess just about every day I think about . . . is it [hearing] the same as yesterday, and how many more years do I have in front of me, that I can do this?”

Loss was plainly evident in several participants’ experiences. Andrew described the effect that music-induced hearing loss had on him: “The biggest thing for me that it affects is . . . it took the joy out of my teaching.” Larry shared his experiences with depression after leaving the profession at the age of 51, when diagnosed with significant tinnitus and hearing loss: “I’m not as good as I used to be. And I could only see this getting worse, and that’s when some of my depression

kicked in because of that.” Steve expressed sadness at his loss of never again hearing what he once could hear: “There are certain things you don’t hear anymore, which kind of saddens you.” Lisa stated: “Emotionally, sometimes I wonder if it [tinnitus] is ever going to go away, and every once in a while I get angry that I sacrificed this [hearing health].”

Pedagogical experiences of music-induced hearing loss. Music-induced hearing loss’s effect on the participants’ teaching practices focused on teaching effectiveness, which included communication, classroom management, and musical perception. The primary pedagogical concern among the participants was their abilities to effectively perceive musical phenomena, such as intonation, balance, internal harmonies, and expression. Despite their physical experiences with music-induced hearing loss, some participants persisted in choosing not to wear hearing protection while teaching: they felt that it would limit their musical effectiveness. Greg explained his decision not to wear hearing protection when teaching concert band: “I feel like I really just don’t hear the balance and the blending of the tone nearly as well.” Others expressed concerns that they could not hear musical phenomena (e.g., pitch, dynamics, balance) accurately due to the physical symptoms of hearing loss and/or tinnitus. Catherine stated: “I think that there are things that I’m missing, yeah; I think I could be a better teacher if I didn’t have that [hearing loss].”

Participants expressed their concerns and frustrations with music-induced hearing loss’s impact on teacher-student pedagogical communication. Kevin detailed his difficulty communicating with students in his classroom: “Like, if the students are

warming up on their own, and someone is asking me questions, it's difficult." Sam described his challenges with communication: "The inability to being [sic] able to hear speech in a room where there's competing noises."

Wearing hearing protection generated enthusiastic discussions with each participant.⁹⁸ The primary concern expressed regarding hearing protection was its negative effects on their abilities to accurately perceive musical phenomena while teaching. Viki explains: "I thought it would affect [negatively] my ability to hear finer things, like tuning and balance, and things . . . I just couldn't function with them in." Bill expressed that he missed the "fine" qualities of the music. Andrew argued that wearing hearing protection limited the effectiveness of the teacher, thus hindering the ensemble: "You can never get the same results with the earplugs in, let's put it that way." Larry shared his doubts about the feasibility of wearing hearing protection while teaching: "I mean, if you really wanted to have your band be as good as it could be, you can't have any of that stuff in, at least for some of the time."

The participants expressed further pedagogical challenges associated with using hearing protection in the classroom, particularly classroom management problems. Some participants believed that students took advantage of teachers who wore hearing protection. Andrew shared: "The moment you put in any kind of hearing protection, the kids would assume that you can't hear at all, and then they would start causing problems . . . put the earplugs in and then they would play louder, or purposefully play wrong notes."

⁹⁸ Those who wore hearing protection either as teachers or performers are outlined in Tables 7 and 8 (see pp. 211-213).

Composite structural descriptions. The composite structural descriptions in this section illustrate the settings and contexts in which the participants experienced music-induced hearing loss. The composite structural descriptions reveal four underlying themes that contributed to *how* the participants experienced music-induced hearing loss: (a) their acoustical environments; (b) their exposure to sound; (c) the presence or lack of administrative and financial support; and (d) their awareness, prevention, and representation of music-induced hearing loss.

Acoustical environment. The acoustical environments of the participants' classrooms contributed to the settings and contexts of their experiences of music-induced hearing loss. Table 12 (see p. 219) describes the participants' responses regarding their perceptions of the in/adequacy of the acoustical properties of their classrooms, such as room size, surface material, and sound-dampening modifications. Many participants described the acoustical environments of their teaching spaces as inadequate, poor, or terrible. Lori developed tinnitus after one year of teaching full band in a small classroom and small group lessons in a "closet," where it was common for there to be as many as 16 saxophones playing in the room at one time. Erin described teaching lessons in a locker room, and Rachel called her teaching space an "echo chamber." Doug split his high school band into two sections because the number of students in the band was more than what the fire code legally allowed.

Alarmed by the physical designs of their rooms and the lack of proper acoustical treatments (i.e., sound volume levels, reverb, directionality), 13 of 23 participants (57%) requested acoustical evaluations of their classroom. OSHA

ordered two of the participants' school districts to make acoustical improvements to their band rooms, required annual hearing exams of their districts' music teachers, and provided hearing protection based on the excessive sound levels recorded in their classrooms. Erin shared how her school district attempted to solve a "sound transference" issue between music classrooms without consulting either the faculty or an acoustics expert.

Sound exposure. Aspects related to the participants' sound exposure included the size of their performance ensembles and the intensity and duration of their sound exposure. Five participants (22%) instruct ensembles consisting of more than 100 students, and three participants (13%) taught ensembles between 80 and 100 students. Six participants (26%) estimated that they were exposed to at least three hours of excessive sound levels on a daily basis. As Lori expressed: "I think it's at an excessive level every time we have full band, which is every other day, for three hours a day." Regarding her experience directing pep bands consisting of more than 150 students, Lisa questioned the appropriateness of subjecting teachers to the sound levels produced by these ensembles: "It's just wrong, it's just wrong to have that level of volume."

Administrative and financial support. The administrative and financial support the participants either received or did not receive when requesting accommodation, assistance, or compensation from their school districts recurred throughout my interviews. I asked the participants the following questions regarding

administrative and financial support: (a) have you ever requested financial support from your school district in order to pay for audiological examinations or hearing protection; (b) does your health insurance cover hearing health-related expenses; (c) have you requested an acoustical evaluation of your classroom or performance space; and (d) have you ever requested any accommodations for a hearing disability?

Six participants (26%) reported their requesting some kind of financial support from their school district to pay for audiological exams or hearing protection. Five participants (22%) received compensation from their school district to purchase hearing protection. One participant filed a worker's compensation claim but did not follow through: she changed jobs shortly after filing the paperwork.

Twelve participants (52%) stated that their current health insurance plan would cover hearing health-related medical expenses, such as audiological examinations and hearing protection. Four participants (17%) stated that their current health insurance plan would not cover these expenses, and seven participants (30%) were unsure what would be covered under their current health insurance plan.

Thirteen participants (57%) requested that their school district conduct an acoustical evaluation of their classroom or performance space.⁹⁹ Nine of the 13 requests (69% of 13) for an acoustical evaluation of classroom or performance space were approved, which resulted in some type of acoustical improvement; however, four of the 13 requests (31%) were reported as being either denied or ignored by the

⁹⁹ Two of these requests were made by outside parties, e.g., parent or a facilities manager rather than the participants.

school administrators. Four participants (31%) commented that either administrators or school board members responded to their requests with negative comments that communicated skepticism, sarcasm, or indifference. Nine participants (39%) did not at any time file a request for an acoustical evaluation of their classrooms.

None of the participants interviewed requested specific accommodations for a hearing disability. Gerald considered doing so but was unsure how to file such a request. He questioned what accommodations could be made for instrumental music educators who experienced the effects of music-induced hearing loss. Larry spoke with his district's human relations director about filing for disability and early retirement after being told by his audiologist that he needed to leave the profession due to hearing loss and tinnitus. Lori filed a worker's compensation claim for tinnitus due to the effects of poor working conditions but never collected on this claim because she took another position shortly after filing the paperwork.

Awareness, prevention, and representation. None of the participants felt that the issue of music-induced hearing loss was adequately represented in their university teacher education and general musicianship curricula. Multiple participants acknowledged the amount of time that passed since they graduated college, and that discussions of hearing health might now be addressed. However, the participants in the earlier stages of their careers also communicated their beliefs that this issue was not covered well, if at all, during their higher education study.

Only eight participants (35%) reported that music-induced hearing loss was adequately represented in professional organizations and music education literature.

Moreover, two participants (9%) were unsure about the representation of this topic in professional music education organizations and the associated professional literature. The participants expressed either a lack of familiarity with the current professional literature or noted their perceptions that articles addressing hearing health only appear in certain genres of music education or trade literature, e.g., that which focus on marching bands and drum and bugle corps.

Intuitive Integration: The Essence of Music-Induced Hearing Loss

Experiencing music-induced hearing loss includes the loss of specific frequencies of hearing, tinnitus, difficulties in hearing speech, and experiences of sound sensitivity and pain. The onset, duration, and degree of any of these experiences vary among individuals; some individuals appear to be more susceptible to the effects of music-induced hearing loss than others. Hearing loss affects any frequency within an individual's hearing range and troublingly for music educators, can cause them to question their abilities to accurately perceive musical sounds. This in turn directly affects their confidence to teach and perform. The sensation of hearing loss is often described as a muffled, blocked, or stuffy experience. Tinnitus is commonly described as a high-pitched, ringing tone, which is often perceived as a wavering, rumbling, or roaring sensation. For some music educators, tinnitus is a persistent annoyance, whereas others describe it as a significant detriment to their teaching, causing anxiety, depression, mood changes, and sleep deprivation.

Music-induced hearing loss affects individuals' capability to distinguish speech. For music educators, this is apparent while communicating with students in a

loud instrumental classroom setting. Individuals who experience music-induced hearing loss often have to ask others to repeat themselves, and they might have difficulty participating in social situations outside the music classroom.

The physical experience of music-induced hearing loss includes one's developing hearing sensitivity, which may manifest itself as pain, particularly when exposed to sudden or excessively loud sounds. Physical symptoms such as these may cause headaches, anxiety, stress, nausea, or excruciating pain in the ear. Some individuals experience sound sensitivity when engaged in everyday household chores such as washing the dishes or mowing the lawn. Music educators may experience an increased desire for silence in their personal time because of the sound exposure they experience on a daily basis.

Experiencing music-induced hearing loss generates multiple emotional responses among individuals: those participating in this study often experienced anxiety and stress related to career uncertainty when faced with hearing impairment. Individuals who experience declining musical effectiveness caused by music-induced hearing loss may also experience feelings of loss and depression. Experiencing music-induced hearing loss sometimes generates feelings of resentment toward music teaching, particularly when music educators reflect upon the sacrificing of their hearing health to teach music.

The effects of music-induced hearing loss on instrumental music educators' perceived pedagogical effectiveness relate to their constructs of and beliefs regarding communication, classroom management, musical perception, and hearing protection.

Music educators who experience music-induced hearing loss sometimes perceive or fear a diminishing of their abilities to effectively identify musical phenomena, including intonation, balance, and subtle internal harmonies. Although wearing hearing protection can either prevent or alleviate music-induced hearing loss, many music educators choose not to use hearing protection because of the perceived negative effects it has on their abilities to communicate with students and properly identify musical phenomena. Some music educators wear hearing protection selectively depending upon which ensemble they are teaching.

The settings and contexts that contributed to the participants' experiences of music-induced hearing loss were influenced by four composite structural themes: (a) the acoustical environment, (b) the participants' exposure to sound, (c) administrative and financial support, and (d) awareness, prevention, and representation. Many instrumental music educators have no choice but to teach in inadequate acoustical environments where they are subjected to excessive levels of sound on a daily basis for the entirety of their careers. Instrumental music educators' requests for acoustical evaluations of their classrooms are all too often met with negative reactions and no results from administrators. Too many decisions to address hearing health are held hostage to budgetary concerns regarding the high cost of acoustical modifications to music performance classrooms. The financial support music educators receive to pay for hearing health-related medical expenses varies widely between school districts and personal health insurance plans. Many music educators appear to be unsure whether their insurance plans cover these expenses. Further, too many music

educators are unfamiliar with the process of making a worker's compensation claim or request for disability assistance. Despite the serious consequences it poses to music educators, music-induced hearing loss is not adequately represented in music teacher education programs, general musicianship curricula in higher education, or in professional music education literature.

Music-induced hearing loss is a serious medical condition with potentially devastating consequences to both a music educator's hearing health and career. The potential threat of music-induced hearing loss forces too many instrumental music educators to choose between their hearing and their careers. Instrumental music educators who choose not to use hearing protection are faced with the possibility of developing music-induced hearing loss. Conversely, instrumental music educators who choose to take precautions face the possibility that they might not be as musically effective because hearing protection negatively affects aural perception. The social stigma surrounding hearing impairment deters many music educators from coming out as hearing impaired, d/Deaf, or disabled. Unfortunately, many music educators consider music-induced hearing loss as an inevitable consequence of teaching instrumental music.

The underlying expectations of ablebodiedness embedded in the institutional structures of music education create a stigma against hearing impairments among musicians and music educators. Instrumental music educators with music-induced hearing loss fear that they are perceived or constructed as damaged and hence, ineffective. The underrepresentation of music-induced hearing loss in the extant

literature perpetuates a culture of silence toward hearing impairment in the music education profession. Unfortunately, too many music educators consider exposure to excessive sound levels and teaching in inadequate acoustical environments to be expected consequences of their employment as music educators.

CHAPTER SIX

DISCUSSION, IMPLICATIONS, AND CONCLUSIONS

Epilogue

So, it was during the rehearsal of the *Gandalf* movement that best illustrates my hearing. There's of course the opening sound, the presentation of the *Gandalf* motive. And then it goes on, and there's a part in the piece . . . where he's on *Shadowfax* and they are galloping. So the sound of the music is of this galloping horse and the *Gandalf* theme . . . the powerful *Gandalf* theme was to be portrayed. And the way it was slowing down was that the chimes were to be played—and I can't remember now exactly which note it was; it was an A, or I don't know— but the chimes was supposed to play on the offbeat.

We were rehearsing this with my band . . . and I stopped the band, and I said, "Are you playing those chimes?" The kid said, "Yeah." I said, "Well, I don't hear it." So, we did it again, and I said how important this chime part was to the effect of it. . . . So, we did it again, and I said, "No, I can't hear that; that's not loud enough." And by this time, looking back at it now, I think I can see that whole deal. You're starting to see some kids kind of look at me. So, then I went back there myself, and I showed him how to hit it with the rattan mallet . . . "You have to hit this just right."

So, then after I showed this person how to do it . . . it was a good player, and it still wasn't good enough for me! So then I got—believe it or not, I went into my office and got—an actual hammer, and I said, "You know, I have to hear that sound; that sound has to penetrate everybody, and this whole audience will be looking at you when this happens." So, I can't remember if the kid was playing with the regular hammer or not, but he hit that thing so loud, so hard, that it broke that chime piece, the wire, the cable that was holding it to its frame—broke it, it came right off.

And when I reflect upon that, that's when I realize that was my hearing. I could not hear that sound. I couldn't hear. Many times I would stop the band and tell the percussionists they missed a suspended cymbal sound, or they missed a triangle sound. It was at that time that I was realizing, "I'm not as good as I used to be." And I could only see this getting worse, and that's when some of my depression kicked in because of that. (Larry, interview, February 23, 2014)

Introduction

This vignette distills the lived experience of music-induced hearing loss among the instrumental music educators who took part in my study and represents just one of the many troubling personal accounts shared with me during my investigation of this phenomenon. Early in my teaching career, I heard many similar stories from my colleagues regarding the decline of their hearing health due to the occupational sound exposure they experienced while teaching and performing. During my undergraduate studies, I began to experience sensitivity to sound in classroom and performance situations, which prompted me to wear hearing protection while teaching and performing. This study sheds light on a critical problem that is avoided and for the most part, ignored within music education.

Presented in four sections, the final chapter of this study includes: (a) a discussion of the findings, including how they relate to the research questions and extant literature; (b) the procedures that I employed to ensure credibility and trustworthiness of the study; (c) the implications of the study for future research and teaching; and (d) finally, my conclusions describing how this study influences my scholarship and teaching praxis.

Discussion

In this section, I discuss the findings of the present study in relationship to each of my research questions and previous studies investigating music-induced hearing loss among instrumental music educators. The central research question examines the overall experience of music-induced hearing loss, including the

physical, emotional, and pedagogical consequences of this phenomenon for the specific group of instrumental music educators who participated in this study. I extended this investigation into music-induced hearing loss via three subquestions exploring the phenomenon's relationship to: (a) hearing impairment and disability within music education; (b) using hearing protection while teaching and performing; and (c) experiencing ableism and passing as ablebodied at the expense of one's hearing and emotional health. I conclude with the presentation of answers to three procedural subquestions grounded in the methodological process of transcendental phenomenology (Moustakas, 1994); the procedural subquestions identify the (a) significant statements, (b) textural themes, and (c) inherent qualities of music-induced hearing loss for the instrumental music educators who participated in the present study.

Central Question: (1) How does music-induced hearing loss affect the experience of being an instrumental music educator?

My central research question examined the overall experience of music-induced hearing loss for a specific group of instrumental music educators. My investigation uncovered the physical, emotional, and pedagogical consequences of this phenomenon particular to these instrumental music educators. This question sought to uncover how the phenomenon of music-induced hearing loss affects music educators' ability to perform the everyday expectations of their profession, such as identifying musical phenomena and communicating verbally with students in a classroom setting.

Music-induced hearing loss profoundly affects how musicians and music educators physically perceive musical phenomena, such as pitch, intonation, and dynamics (Phillips & Mace, 2008). The participants' survey responses coincided with the findings of several previous studies that I reviewed in Chapter Two. Seventeen participants (74%) reported their experiencing more than one physical symptom of music-induced hearing loss: the most reported experiences among the participants included tinnitus (78%) and difficulty understanding speech (74%). This finding is congruent with the work of Hill (2003), Sataloff (1997), and Zeigler and Taylor (2001), who identified tinnitus and one's difficulty in understanding speech as common indicators of music-induced hearing loss.

Consonant with previous studies undertaken by Hill (2003), McBride and Williams (2001), and Phillips and Mace (2008), multiple participants in the present study expressed concerns that their hearing loss affected their abilities to accurately identify musical phenomena while teaching. Horace questioned whether his hearing loss affected his ability to accurately identify musical pitches: "When I'm hearing music now, is it colored by the fact that I'm not hearing certain frequencies?" Lisa shared, "I wonder if I'm hearing things the way they really are sometimes." From the opening vignette of this chapter, Larry commented that he could no longer hear certain pitches produced by percussion instruments, which led him to believe that students were not playing their parts accurately during class: "Many times I would stop the band and tell the percussionists they missed a suspended cymbal sound, or they missed a triangle sound."

Based upon the data, five subthemes emerged that best described the emotional experience of music-induced hearing loss: (a) stress, anxiety, fear, and worry; (b) depression and loss; (c) burnout; (d) uncertainty; and (e) mood changes (see Table 18, p. 234). Multiple participants expressed feelings of stress, anxiety, fear, and worry regarding their hearing health. Rachel reported that she felt “higher elevated levels of stress” when her tinnitus was present. Lori experienced anxiety: “It’s annoying, so my nerves are usually a little on edge; I think the only thing it [tinnitus] interferes with is my ability to calm down.” Viki contemplated her professional future: “I worry about it; I worry that I might be . . . that my hearing is not as good as it used to be.” Kevin considered whether or not he took enough precautions to protect his hearing: “I worry that maybe I wasn’t careful enough, and that [hearing loss] will manifest in the future, later in my life.”

Multiple participants expressed feelings of depression and loss. Larry became depressed as his hearing continued to deteriorate, which eventually led him to leave the profession: “I’m not as good as I used to be; and I could only see this getting worse, and that’s when some of my depression kicked in because of that.” Andrew made the heartbreaking admission that his hearing loss “took the joy out of [his] teaching” and “in order to be a band director, you gotta love the sound of the band and, very frankly, a band just doesn’t sound the same to me anymore.” Steve expressed sadness at his loss of never again hearing what he once could hear: “There are certain things you don’t hear anymore, which kind of saddens you.” Lisa stated: “Emotionally, sometimes I wonder if it [tinnitus] is ever going to go away, and every

once in a while I get angry that I sacrificed this” [her hearing health].

One of the most disconcerting findings identified the participants’ musical burnout, which they expressed as an increased need for silence, particularly during their personal time out of the classroom. Several participants cited their daily sound exposure and the state of their hearing as contributing factors to their musical burnout. Lori described the persistent nature of the sound exposure that she experiences as an instrumental music educator: “We don’t have quiet time, ever. We’re always supposed to be helping somebody; in order to help somebody, they have to make noise.” David remarked, “I used to always have music on all the time, but it’s now gotten to a point where I generally don’t.” Erin also exhibited signs of musical burnout: “I rarely listen to music in the car. I don’t want that sound coming at me after having sound coming at me all day long; when I get home from work, I just want it quiet.” The thought of a music educator no longer listening to music for enjoyment because of occupational sound exposure is a disturbing irony.

Multiple participants expressed uncertainty regarding their professional futures. For musicians and music educators, the impending threat of a career shortened by music-induced hearing loss can cause a wide range of emotional responses (Sataloff, 1997; Solomon, 1986; Zeigler & Taylor, 2001). As mentioned above, Viki expressed uncertainty about her effectiveness as a music educator because of her declining hearing: “I worry that . . . my hearing is not as good as it used to be.” Also mentioned above, Kevin questioned whether he took enough precautions to protect his hearing early in his career: “I worry that maybe I wasn’t

careful enough, and that [hearing loss] will manifest in the future, later in my life.”

Considering that his hearing loss began during his undergraduate studies, Greg wondered “how am I going to do this, how am I going to have a career in music, when I’m not even out of college yet?”

The participants also reported mood changes as a byproduct of their music-induced hearing loss. Samelli, Matas, Carvallo, Gomes, and de Beija (2012) reported that noise-induced hearing loss could lead to an increase in aggressive behavior. Curt reported hearing sensitivity, tinnitus, and headaches, which he described as physically and emotionally exhausting. These symptoms negatively affected his interactions with students because his hearing loss could make him “a little bit shorter with people.” He described this further, stating that “it becomes really hard to deal with people when you’re experiencing [hearing loss symptoms].” David described how his tinnitus could alter his mood: “If I get annoyed because of it, I might act a little short-tempered.” Similarly, Lana stated that she can get “really aggravated” because of her tinnitus. Lori also described her tinnitus as irritating, which could alter her mood by putting her “a little on edge.”

Difficulty hearing speech is commonly cited as a consequence of music-induced hearing loss (American Medical Association, 1990; Chesky, 2008; Hill, 2003, Sataloff, 1997) and poses pedagogical problems for instrumental music educators while communicating with their students in an often noisy classroom environment. Several educators in the present study expressed how their hearing loss negatively affected their ability to communicate with their students. Sam described

this as the “inability [of] being able to hear speech in a room where there [are] competing noises.” Sheldon identified how his loss of speech recognition deleteriously affected his ability to teach: “I would say it’s sometimes harder for me to hear people, I need to ask people to repeat things, where as in the past I never had that.” Frustrated with his inability to communicate with his students in a noisy classroom, Bill explained that he would often have to take the students out of the classroom and into the hallway in order to hear them. Similarly, Catherine told me that she is “getting better at reading lips.”

Considering the physical, emotional, and pedagogical effects of music-induced hearing loss, multiple participants expressed an urgent concern that this phenomenon may eventually shorten their careers (Ross, 2001; Solomon, 1986). Catherine stated the possibility of her music-induced hearing loss ending her career: “I guess just about every day I think about . . . how many more years do I have in front of me, that I can do this?” Catherine’s experience illustrates the uncertainty surrounding a career in music education for music educators with hearing impairments.

Subquestion: (1) How might examining the lived experiences of music educators who experience the phenomenon of music-induced hearing loss contribute to our understanding of hearing impairment and disability within music education?

This research subquestion uncovered the following themes: (a) the general lack of awareness of music-induced hearing loss among the participants’ students,

colleagues, administrators, and school board members; (b) how music-induced hearing loss was represented (or not represented) in the participants' teacher education programs; (c) the workplace accommodations, financial assistance, or compensation the participants received for audiological examinations, hearing protection, or acoustical evaluations of their classroom; and (d) the participants' feelings of resignation regarding occupational hearing loss in instrumental music education.

Previous studies suggest that pre-service music teachers are generally unaware that music can cause irreparable damage to hearing; further, music educators in the field are often uninformed and unprepared to protect students and themselves from excessive sound exposure and are unlikely to recognize hazardous conditions, address safety concerns, or promote hearing loss prevention (Chesky, 2011, pp. S32–S33). The present study's findings resonate with the extant literature: Andrew felt that music-induced hearing loss “tends to get swept under the rug,” whereas Lana stated that music educators ignore the issue at their own expense because they are “always focused on the kids.” Kevin sums it up: “It’s our profession and we need to be looking out for our people [music educators].”

None of the participants felt that music-induced hearing loss was adequately represented in their teacher education and music programs. This finding is supported by Chesky, Dawson, and Manchester (2006) who maintain that music-induced hearing loss is a “widespread and serious public health issue” that receives “little or no recognition in schools of music” (p. 143). Many of the participants placed

responsibility on university teacher education and music curricula for educating future music teachers about music-induced hearing loss. Multiple participants acknowledged the amount of time that has passed since they attended college, and that this issue may be covered now more than when they were in school; however, the younger participants also felt that this issue was not covered well, if at all, during their college experiences. These findings coincide with those expressed by Chesky (2011), which suggest that music schools and music educators should develop a “culture of responsibility” (p. S33) toward education and advocacy regarding occupational hearing loss. Unfortunately, as previously stated by Manchester (2010), postsecondary music education programs are failing to raise awareness of this issue among future music educators. All participants within this study reported that music-induced hearing loss was not a topic of discussion in their university music education programs. In regard to preparing future music educators, this is certainly an area where our universities and music organizations must improve.¹⁰⁰

I asked the participants if they ever requested: (a) acoustical evaluations of their classroom, (b) financial support for hearing protection, or (c) workplace accommodations from their school district. Thirteen participants (57%) requested

¹⁰⁰ The National Association of Schools of Music ([NASM], 2015) states that general topics for music majors and music faculty and staff should include “basic information regarding the maintenance of hearing, vocal, and musculoskeletal health and injury prevention” (p. 65). Non-music majors enrolled in music classes or performance ensembles should also receive the “maintenance of hearing health” (p. 65) as topics related to their area of study. Finally, music programs must “reflect attention to maintenance of health and injury prevention” related to “the acoustic and other conditions associated with health and safety in practice, rehearsal, performance, and facilities” (p. 65). In addition to these standards, the NASM adds that “health and safety depend in large part on the personal decisions of informed individuals” and that “institutions have health and safety responsibilities” but this does not “relieve the individual from personal responsibility” (p. 65).

that their school district conduct an acoustical evaluation of their classroom or performance space. Encouragingly, nine of the 13 requests (69%) resulted in some type of acoustical modification to the participants' classrooms; however, in some of these instances, modifications actually made the acoustics worse.

In the present study, only five participants (22%) received financial support from their school district to purchase hearing protection, and one participant filed a worker's compensation claim but took another position before her claim was fully processed through the system. Twelve participants (52%) stated that their current health insurance plan would cover hearing health-related medical expenses such as audiological exams and hearing protection. Four participants (17%) stated that their current health insurance plan would not cover these expenses, and seven participants (30%) were unsure what would be covered under their health plan. None of the participants requested specific accommodations (i.e., change in schedule, workload, class size, performance requirements) from their school district for a hearing disability. These findings demonstrate that almost half of the participants were either uncovered or unaware of the financial support available to them through their insurance or school district for hearing health-related expenses.

Another finding identified the participants' unawareness of the legal protections available for individuals with occupational hearing loss. Gerald openly considered, "maybe I should be applying for disability of some sort" but was unsure of the process and never heard of any precedent of a music educator filing a disability claim for occupational hearing loss. These findings represent a gap in the literature:

in my review of the relevant literature, I did not locate extant studies that provide specific data regarding the number of music educators who left the profession, requested acoustical modifications to their classrooms, or pursued workplace accommodations for a hearing impairment.

Music educators face many difficulties when requesting acoustical evaluations of their classrooms, financial compensation for medical expenses, and workers' compensation or disability claims (Lubet, 2009). In the present study, many of the participants felt an adversarial relationship with their administrators and school board members when they expressed concerns about matters related to occupational hearing loss. Multiple participants expressed resignation to music-induced hearing loss as an inevitable consequence of being an instrumental music educator (Cunningham et al., 2006; Miller, Stewart, & Lehman, 2007; Zeigler & Taylor, 2001); others voiced support for an approach that no longer considers music-induced hearing loss as an acceptable work related injury (Guptil, 2011).

Subquestion: (2) How does the use of hearing protection affect the experience of teaching within the music classroom?

The second subquestion sought to understand the participants' experiences with using hearing protection while teaching and performing. This topic generated enthusiastic discussion among all participants: they discussed how using hearing protection affected their hearing acuity while teaching and playing an instrument, as well as the effects on their classroom management. I found that many of the participants used hearing protection selectively, their decisions based upon which

ensemble they were instructing. The participants identified five specific factors that influenced their decision to use or not use hearing protection while teaching: (a) intensity and duration of sound exposure; (b) classroom acoustics; (c) ensemble size; (d) musical perception; and (e) classroom management.

Applying sound exposure standards to teaching instrumental music illustrates the precarious nature of occupational hearing loss for music educators. Alarming, 17 participants (74%) described the intensity of the sound pressure levels in their classroom as either *extremely high* or *high*; 10 participants (43%) reported their duration of daily exposure to excessive sound levels to be *between two and five hours*. This finding is problematic due to the vagueness of the term *excessive* and the nature of self-reporting; however, Owens (2004) demonstrated that instrumental music ensembles at the elementary, middle, and secondary levels are capable of producing sound pressure levels which far surpass recommended levels established by the Occupational Safety and Health Administration (OSHA) and the National Institute of Occupational Safety and Health (NIOSH).

Under the OSHA (2008) and NIOSH (1998) standards, individuals who report experiencing excessive sound exposure of more than two hours per day are at risk for permanent hearing damage if the sound pressure levels produced by their ensembles surpassed respective levels of 90 and 85 dBA. Taking into account the exponential relationship between sound intensity and sound exposure, OSHA (2008) requires reducing daily sound exposure by half for every 5-dB increase in sound intensity, while NIOSH (1998) suggests reducing exposure by half for every 3-dB increase.

The more stringent NIOSH standards state that individuals exposed to sound pressure levels of 100 dBA are at risk for developing music-induced hearing loss after 15 minutes; this is particularly troubling for participants of this study, 43% of whom reported receiving *between two and five hours* of daily overexposure. Considering the cumulative nature of sound exposure and its relationship to hearing loss, this finding is cause for alarm. Ten participants (43%) within the present study described the acoustics of their classroom as *poor* or *terrible* and identified poor acoustics as one of the causes of their hearing loss. These findings concur with previous studies (Grayston & Alvord, 1993; Owens, 2003; Royer, 1996), which investigated causal relationships between teaching instrumental music in poor acoustical environments and the developing of music-induced hearing loss.

Studies by Chesky (2010), Cutietta, Klich, Royse, and Rainbolt (1994), and Mace (2005) point to ensemble size as another contributing factor to music-induced hearing loss, claiming that larger ensembles are capable of producing much higher sound pressure levels. Fifteen participants (65%) within the present study taught ensembles that exceeded 60 students, and five of the 15 participants (22%) taught ensembles that exceeded 100 students. Doug split his high school band into two sections because the number of students in the band was more than what the fire code legally allowed. Lisa directed pep band ensembles exceeding 150 students.

Individuals perceive musical phenomena differently while wearing hearing protection because of the way sound transmits through the body (Hart, Geltman, Schupbach, & Santucci, 1987; Nodar, 1993). Likewise, many of the participants of

this study expressed their dissatisfaction with using hearing protection because of its negative effect on the ability to accurately perceive musical characteristics, such as pitch, balance, and intonation. Hank explained, “I tend to feel like I lose the mid-tones. It’s like listening through a closed door.” Larry further illustrated this point: “But when I was working with my best groups, I wanted to hear balance the way it was, not the way my earplugs let me hear it.” Many of the participants felt that using hearing protection while teaching interfered with the musical process and their ability to educate their students.

Another finding that emerged was how the participants’ use of hearing protection affected their perceptions of classroom management. Andrew observed that when he used hearing protection while teaching, the students “would play louder, or purposefully play wrong notes.” Greg also commented that “the kids try to take advantage of it at the middle school level.” Based on my review of the relevant literature, the effects of wearing hearing protection on classroom management deserve further attention.

The participants discussed the rationale behind their decisions to wear or not wear hearing protection, how using hearing protection affected their musical perceptions, and their abilities to teach (or perform) effectively. Several participants commented that they employed hearing protection selectively, depending on which ensemble they were instructing (Walter, 2009). Many participants stated that they wore hearing protection during pep band rehearsals or performances but not while instructing their concert bands. The participants’ decisions to selectively wear

hearing protection based on the musical quality of the ensemble reinforces the misconception that concert bands are unlikely to cause hearing loss because they are meant to produce a pleasing musical product (Hill, 2003; Santucci, 2009).

Subquestion: (3) How might notions of ableism encourage music educators to pass as h/Hearing at the expense of their hearing health and overall well-being?

This subquestion explores how occupational pressures may lead music educators to conceal their impairment from their students, colleagues, or administrators. Many of this study's participants choose not to wear hearing protection because of the perceived stigma that connects hearing impairment with the use of hearing protection among musicians. Although many of the participants reported openly acknowledging their hearing impairment to their students and in some cases their administrators, a large majority of the participants chose not to use hearing protection because of the perceived negative impact it had on their teaching effectiveness. The participants' decisions not to wear hearing protection because of this perception imply a greater concern for teaching effectiveness rather than hearing health. I claim that choosing teaching effectiveness over hearing health is an intentional act of passing as h/Hearing (Linton, 1998a). The desire to hear things the *way they are supposed to sound* is based on ableist conceptions related to culturally normative (Davis, 1995, 1999) performance practices embedded within traditions of Western art music (Chesky, 2010; Guptil, 2011; Jorgenson, 2003).

Despite the urgent threat music-induced hearing loss poses to instrumental

music educators, many choose not to use hearing protection while teaching or performing because of the perceived effect such devices have on their musical abilities (Curk & Cunningham, 2006; Zeigler & Taylor, 2001). Participants appeared to be more concerned about their teaching effectiveness and their ability to help their students than with their personal hearing health. Lana expressed the altruism that exists among music educators: “I think that’s just one layer that we really don’t pay attention to ourselves—we’re always focused on the kids.”

Some participants referred to the existing stigma surrounding hearing impairment and the use of earplugs among musicians. Gerald commented on the audience response to his use of earplugs while conducting school concerts: “And then the audience sees you [wearing hearing protection] . . . well, whatever, I really don’t care about you guys [audience]; I need to protect myself here.” Andrew claimed that musicians who use hearing aids “have absolutely no credibility, whatsoever.” These comments and others illustrate the stigma associated with music-induced hearing loss and music performance-related injuries (Guptil, 2011). I maintain that the participants’ decisions to conceal their hearing impairment demonstrate their desire to pass as h/Hearing within the present study.

Encouragingly, most participants openly acknowledged their experiences of music-induced hearing loss with their students and used their experience as an educational platform to discuss hearing health-related issues (Chesky, 2011). Some participants urged percussionists to wear hearing protection while practicing, and other music educators required their percussionists to use hearing protection during

class (Curk & Cunningham, 2006). Many participants who wore hearing protection while teaching turned their decisions to do so into teachable moments, initiating discussions with students about their experiencing music-induced hearing loss. Each participant within the present study reported at least one characteristic of music-induced hearing loss: i.e., tinnitus, loss of certain frequencies, difficulty hearing speech, sensitivity, pain, yet none of them openly identified as disabled.

Answering this subquestion through the theoretical lens of humanities-based disability studies suggests that the culturally normative standardization of the body and the attendant devaluing of bodily difference created social pressures on these individuals to perform the ablebodied demands/expectations of their chosen profession. The normative demands of music education— in this case, highly sensitive hearing acuity and musical exceptionalism—disable the music educators within the present study, marking them as damaged and ineffective. Garland-Thomson (2005a) claims that society's need to eliminate disability creates feelings of “silence, denial, shame, or determined and desperate vows . . .” (p. 525) to resist or refute disability. Although it would not eliminate the physical realities associated with music-induced hearing loss, a more accepting social response within music education might alleviate some of the social pressures placed on individuals to maintain the illusionary status of the “hypothetical ‘normal’ person” (Lubet, 2010, p. 27).

Procedural Subquestion: (1) What statements best define the experiences of music-induced hearing loss among instrumental music educators?

After I transcribed the interview data, I reviewed the transcripts and identified the participants' statements that best described their experiences of music-induced hearing loss *vis à vis* the research questions. Initially, I identified 328 relevant statements from the interview data, which I coded into preliminary statement categories (see Appendix L) that described the phenomenon. Next, I reduced the initial list of relevant statements to 48 significant statements (see Appendix M) by removing the repetitive and overlapping statements. Finally, I connected each of the significant statements to the three textural themes and their respective subthemes (see Table 19, p. 235).

Procedural Subquestion: (2) What unifying themes emerge from the shared stories and experiences of instrumental music educators that illustrate the experience of music-induced hearing loss?

In my analysis of the data, I identified three textural themes that illustrated the participants' (a) physical, (b) emotional, and (c) pedagogical experiences of music-induced hearing loss, including 14 respective subthemes (see Table 18, p. 234).¹⁰¹ The participants' descriptions of their physical experiences of music-induced hearing loss identified four subthemes: (a) symptoms of hearing loss, (b) symptoms of tinnitus, (c) difficulties hearing speech, and (d) sensitivity and pain. The participants'

¹⁰¹ I discussed each of the three textural themes and 14 subthemes above in my answer of the central research question.

emotional experiences revealed five subthemes: (a) stress, anxiety, fear, and worry; (b) depression and loss; (c) burnout; (d) uncertainty; and (e) mood changes. The participants' pedagogical experiences related to five subthemes: (a) teaching effectiveness, (b) difficulties with communication, (c) classroom management, (d) musical perception, and (e) the negative effects of using hearing protection while teaching.

Four structural themes emerged from my data analysis, which illustrated *how* the participants experienced music-induced hearing loss: (a) acoustical environment, (b) the participants' sound exposure, (c) administrative and financial support, and (d) awareness, prevention, and representation (see Figure 6, p. 228). The first structural theme revealed the inadequate acoustical environments of the participants' classroom, which many of the participants identified as a key contributing factor to their music-induced hearing loss.¹⁰² Thirteen participants (57%) requested that their school districts provide an acoustical evaluation of their classrooms, and OSHA ordered two of the participants' school districts into making acoustical improvements to their band rooms, required annual hearing examinations of their districts' music teachers, and recommended hearing protection.

The second structural theme uncovered the participants' level of sound exposure from their descriptions of the intensity and duration of the sounds produced in their classroom. Sound exposure consisted of the size of their performance

¹⁰² Table 12 (see p. 219) outlines the participants' responses concerning the in/adequacy of the acoustical properties of their classrooms, such as room size, surface material, and sound-dampening modifications.

ensembles and the intensity and duration of their sound exposure. I asked the participants to estimate how many hours a day they were exposed to their perceived excessive levels of sound in their workplace as determined by their daily teaching schedules, class period lengths, and student enrollment. They estimated the intensity and duration of their exposure to sound within their workplaces based on their perceptions and experiences: six participants (26%) estimated that they were exposed to at least three hours of excessive sound levels on a daily basis.

The third structural theme disclosed the level of administrative and financial support that the participants received from their school districts and insurance companies when requesting accommodations or assistance related to occupational sound exposure and hearing loss.¹⁰³ Similar to the findings from the first research subquestion, many participants perceived an adversarial relationship with their administrators and school board members when they reported concerns related to occupational hearing loss. This theme also addressed the participants' requests for acoustical evaluations of their classrooms. Thirteen participants (57%) requested that their school districts conduct acoustical evaluations of their classrooms or performance spaces; nine of these requests (69%) were approved, resulting in some

¹⁰³ A few of the participants alluded to the uncertainty surrounding their current health insurance plan based on the aftermath of the Wisconsin Act 10 Bill (2011), which effectively ended collective bargaining for public union workers: one participant stated that the passage of this bill created an “anti-teaching” climate for teachers in Wisconsin.

type of acoustical improvement.¹⁰⁴ None of the participants requested specific accommodations for a hearing disability.

The fourth and final structural theme explored the level of awareness regarding music-induced hearing loss among students, musicians, music educators, and administrators, as well as the representation of this issue in teacher education programs and music education organizations.¹⁰⁵ None of the 23 participants interviewed for this study felt that the issue of music-induced hearing loss was adequately represented in their music teacher education preparation or the professional literature.

Procedural Subquestion: (3) What are the inherent qualities of the phenomenon of music-induced hearing loss as experienced by instrumental music educators?

Experiencing music-induced hearing loss includes multiple experiences: the loss of specific frequencies of hearing, tinnitus, difficulty hearing speech, sound sensitivity, and pain. The onset, duration, and degree of any of these experiences vary among individuals; some individuals appear to be more susceptible to the effects of music-induced hearing loss than others. For example, hearing loss affects any frequency within an individual's hearing range and key to this study, can cause music educators to question their abilities to accurately perceive musical sounds, which in

¹⁰⁴ As stated in Chapter 5, two of these requests were made by outside parties, e.g., parent, facilities manager, rather than the participant.

¹⁰⁵ This structural theme was also discussed at length above in the section related to the first research subquestion.

turn directly affects their confidence to teach and perform. Experiencing music-induced hearing loss generates multiple different emotional responses among individuals: those in this study experienced anxiety and stress related to career uncertainty when faced with hearing impairment or potential hearing loss. Music educators who perceive declining musical effectiveness caused by music-induced hearing loss may experience feelings that include loss and depression. Music-induced hearing loss also has the potential to generate feelings of resentment toward music teaching, particularly when music educators consider that they sacrificed their hearing health for their profession.

The physical experience of music-induced hearing loss includes one's developing hearing sensitivity, which may manifest itself as pain, particularly when exposed to sudden or excessively loud sounds. The physical symptoms can cause headaches, anxiety, stress, nausea, or excruciating pain in the ears. Music educators may experience an increased desire for silence in their personal time because of the sound exposure they experience on a daily basis.

The effects of music-induced hearing loss on instrumental music educators' perceived pedagogical effectiveness relate to their constructs of communication, classroom management, musical perception, and hearing protection. Music-induced hearing loss affects individuals' capability to accurately distinguish speech. For music educators, this is crucial when communicating with students in a loud instrumental classroom setting.

Music educators who experience music-induced hearing loss sometimes

perceive a diminishing in their ability to effectively identify musical phenomena: distinguishing intonation, balance, and internal harmonies. Finely tuned aural skills are necessary to teach instrumental music education, and a perceived diminished aural capacity has real ramifications for remaining in a music teaching position and earning one's livelihood.

It is abundantly clear that far too many instrumental music educators teach in inadequate acoustical environments and thus are subjected to excessive levels of sound on a daily basis over the course of their careers. Music-induced hearing loss is a serious medical condition with potentially devastating consequences to both a music educator's hearing health and career. Instrumental music educators with music-induced hearing loss fear that they are viewed as damaged and thus, ineffective in their profession. The underrepresentation of music-induced hearing loss in the literature perpetuates a culture of silence toward bodily difference in the music education profession. Unfortunately, all too many music educators consider exposure to excessive sound levels and teaching in inadequate acoustical environments to be implicit consequences of their employment as music educators.

Credibility and Trustworthiness

I employed two validation strategies to ensure the trustworthiness of this study: (a) epoché and (b) member checks. Through the process of epoché (Moustakas, 1994), which I outlined in Chapters 1 and 4, I clarified my background, biases, assumptions, and situatedness that might have influenced my analysis and interpretation of this study's findings. The second strategy, member checks, consists

of sharing “data, analyses, interpretations, and conclusions back to the participants so that they can judge the accuracy and credibility of the account” (Creswell, 2007, p. 208). I provided each participant an opportunity to participate in member checks of this study’s findings; eight participants (35%) chose to participate in this process. The participants reviewed the verbatim transcript of their recorded interview, the textural and structural descriptions of their experiences based on their interview responses, the composite textural and structural descriptions of the participants’ experiences, and my final presentation of the findings.

Implications for Research and Teaching

Previous studies investigating music-induced hearing loss predominantly consist of quantitative noise exposure studies; in contrast to these studies, I employed a qualitative research methodology of transcendental phenomenology to delve deeper into the complexities of this phenomenon and its implications for music educators. In this section, I identify and discuss three areas for further research: (a) conducting a national music-induced hearing loss survey for musicians and music educators; (b) initiating additional research studies on disability and music-induced hearing loss; and (c) redefining occupational noise exposure standards for music-related fields. I address four broad implications for teaching: (a) music educators’ pedagogical practices related to hearing loss prevention; (b) the role of university and college level music curricula to change music students’ awareness, attitudes, and behaviors regarding music-induced hearing loss; (c) the causal relationships between excessive sound exposure and inadequate teaching environments and developing music-induced

hearing loss; and (d) the connection between the disabling effects of music-induced hearing loss and music education as a site of cultural repression.

Research Implications

Taking into account the initial 47 responses to the present study's survey, extrapolating the responses suggest that at least 5.7% of instrumental music educators within the state of Wisconsin experienced music-induced hearing loss at the time of this writing.¹⁰⁶ Projecting the response rate of this study nationally suggests that a staggering number of music educators experience this phenomenon.¹⁰⁷ These numbers might be all the more shocking if I were to include professional musicians and college music students in such a survey. Future research that I envision undertaking includes my conducting a national survey of instrumental music educators that will provide detailed information regarding music-induced hearing loss. The process would identify how many music educators experience music-induced hearing loss and include the onset, duration, and severity of their physical experiences. Further data analysis would investigate thoroughly the workplace conditions of those music educators who experience such hearing loss. These conditions might include but would not be limited to investigating the: (a) acoustical evaluations of classrooms, (b) intensity and duration of sound exposure, and (c) size of performance ensembles. Future research studies I will pursue include investigating

¹⁰⁶ This number is extrapolated from the 811 individual recruitment emails that I sent to instrumental music educators within the state of Wisconsin.

¹⁰⁷ Based upon the varying degrees of individual susceptibility to music-induced hearing loss (Kirchner et al., 2012), it is difficult to project just how many music educators experience this phenomenon.

music educators' use of hearing protection while teaching and performing as well as interrogating the rationales that determine their decisions not to wear hearing protection. Additionally, I recognize a need for creating assessment plans and tools that will enable public schools and music curricula in higher education to provide not only prospective music educators but all music students with education regarding music-induced hearing loss.

In my review of the extant literature in music education, I found a striking paucity of studies that investigate music-induced hearing loss, specifically among instrumental music educators.¹⁰⁸ Future studies that I undertake will raise awareness of the phenomenon among instrumental music educators, musicians, music students, and researchers. Such studies might include hearing loss prevention methods and strategies which would benefit music educators and their students: modifying classroom set-up to include risers and protective sound shields, selecting literature with softer dynamic ranges, and requiring students to use hearing protection during marching and pep band.

Bringing music-induced hearing loss to the attention of school principals, superintendents, and school board members will illuminate the serious consequences that face music educators. In order to increase awareness among these school officials, such studies would be distributed to the following organizations and their

¹⁰⁸ At the time of this writing, one article (Fulford, Ginsborg & Goldbart, 2011) has appeared in *Music Education Research (MER)* since 1999; one article (Cutietta et al., 1994) has appeared in the *Journal of Research in Music Education (JRME)* in the past sixty years; two articles (Chesky, 2008; Palac, 2008) have been published in the entire history of the *Music Education Journal (MEJ)*; and four articles (Meyerdierks, 2005; Ross, 2001; Solomon, 1986; Wheeler, 2001) have appeared in *The Instrumentalist* since 1946.

trade journals: the National Association of Elementary School Principals (NAESP), the National Association of Middle School Principals (NAMSP), National Association of Secondary School Principals (NASSP), National Association of School Superintendents (NASS), and the National School Boards Association (NSBA). Increased awareness and understanding of music-induced hearing loss as an occupational disability might well encourage school administrators and school board members to act more quickly and appropriately to music educators' requests for accommodation, assistance, and compensation for hearing health-related issues.

I propose that future investigations of music-induced hearing loss situate the phenomenon within the legal contexts of the occupational protections required by organizations such as the Occupational Safety and Health Administration (OSHA) and National Institute of Occupational Safety and Health (NIOSH), including the guidelines established by worker's compensation and disability law, particularly the Americans with Disabilities Act (2008). Numerous studies have identified the inadequacies of current occupational noise exposure standards for music-related fields, particularly those required by OSHA (Chesky, 2011; Owens, 2004; Walter, 2009).¹⁰⁹ Therefore, I suggest that in undertaking future studies that investigate music-induced hearing loss, I will seek to establish collaborative relationships with policymakers to create occupational noise exposure standards that will offer more protections for music educators and musicians.

¹⁰⁹ OSHA's (2008) and NIOSH's (1998) noise exposure standards were reviewed in Chapter Two.

Teaching Implications

The present study has broad physical, emotional, and pedagogical implications for music educators, particularly for those who teach instrumental music. First, music educators must decide whether or not to wear hearing protection in teaching and performance situations. For music educators who choose to wear hearing protection, they must decide which musical situations warrant such precautions; conversely, music educators who choose not to wear hearing protection must consider the consequences. Second, music educators must also consider the effects of music-induced hearing loss on their students and the implications it has on classroom management, literature selection, and rehearsal techniques. Based upon the extant literature that investigates excessive sound exposure and the inadequate acoustical properties of instrumental music classrooms (Holland 2004, 2008; Owens 2003, 2004; Royer, 1996), music students are also at risk for developing music-induced hearing loss. Music educators can reduce the sound pressure levels produced in the music classroom by encouraging students to warm-up quietly (or not at all) before class, limiting the number of concert selections with loud dynamics, and instructing students to play quieter during rehearsals. I will engage in future studies that investigate music educators' pedagogical practices related to hearing loss prevention through direct classroom observations. Such studies will offer important contributions to music education praxis, including how teachers should discuss hearing loss and hearing loss prevention with their students, and how the use of hearing protection can be incorporated into an instrumental music program.

None of the participants felt that music-induced hearing loss was adequately represented in their undergraduate music studies curricula or professional music organizations. This finding suggests the need for further investigation into the inclusion of hearing health topics in music teacher education programs and indeed, for all music students in higher education. Manchester (2010) argued for the implementation of a formal survey to investigate university and college music programs' awarenesses of occupational hearing loss among music educators; he claimed that such curricula lack exemplary models of hearing protection programs (p. 2).¹¹⁰ Heeding Manchester's proposal, I will advocate for the inclusion of occupational hearing loss as a topic of study in all university and college musicianship and music education curricula by undertaking a comprehensive survey of these programs. Further, there is a need for comprehensive reviews of hearing loss prevention programs in higher education and the efficacy of such programs. Doing so is imperative to heighten student and faculty awareness of hearing health issues and to effect change in music students' attitudes and behaviors, especially those of preservice music educators. Initiatives such as these might serve to break down the culture of silence that enshrouds music-induced hearing loss, not only within the field of music education per se but also within music learning and teaching broadly in higher education.

This study demonstrates the need for future investigations that link excessive

¹¹⁰ The University of North Texas (Chesky, 2011) provides such a model by raising awareness and making substantive changes to their music curriculum to protect the professional health of their students.

sound exposure to inadequate teaching environments. Too many instrumental music educators work in such environments on a daily basis, sometimes for the entirety of their careers. Quantitative studies have examined sound exposure among musicians, and more recently, these studies have investigated music educators' exposure to sound (Chesky, 2008; Cutietta et al., 1994; Owens, 2003; Pisano, 2007); however, these studies have produced limited and somewhat contradictory findings. Future studies will benefit from mixed research methodologies that combine quantitative measurements of sound exposure and acoustical environments with qualitative investigations of factors that include music educators' teaching practices, use of hearing protection, workload, literature selection, ensemble size, and current and past performance histories. Such studies will go a long way toward providing a much more thorough understanding of the multitude of contributing factors to music-induced hearing loss.

Importantly, studies are needed to investigate music education as a site of cultural repression: cultural factors at work within the profession communicate messages that music educators are expected to teach in inadequate instructional spaces and within crowded schedules that lead to hearing impairments. Taking into account the ableist (and exceptionalist) expectations of music education's Western conservatory model, music educators who experience music-induced hearing loss must give serious consideration to the occupational consequences of revealing hearing impairments to students, colleagues, and administrators. The danger to music educators' livelihoods when revealing music-induced hearing loss is real: in the

aftermath of Wisconsin's Act 10 which effectively stripped professional educators' collective bargaining rights, school districts are no longer required to negotiate with their teaching staff in regard to salary, benefits, workplace conditions, grievance procedures, career advancement, or job security. Under this repressive labor statute, music educators who have hearing impairments become expendable members of the workforce. Future case studies that investigate how music educators with music-induced hearing loss continue to navigate within the profession will provide vivid accounts of the disabling social, cultural, and political effects of this phenomenon.

Conclusions

Music-induced hearing loss is a threat to the hearing health and career longevity of instrumental music educators. The understanding of it is clouded by its underrepresentation in undergraduate music curricula, professional music organizations, and music education literature. Supported by extant literature, the participants' experiences analyzed in this study reveal that this issue affects music educators in different ways and to different degrees. Several participants expressed the need for school districts, school board members, and administrators to understand music-induced hearing loss and how it directly affects music teachers and students. School districts have the responsibility and are indeed obligated to provide adequate and safe teaching environments for music teachers and support for those teachers who require accommodation, assistance, or compensation for hearing impairments. Rather than disabling music educators, safe working conditions must be created that enable them to thrive in their chosen profession.

Raising awareness of music-induced hearing loss is an important first step in preventing it; however, doing so does not completely solve the problem. Once musicians and music educators are aware of music-induced hearing loss, they face an unavoidable dilemma: use hearing protection to safeguard their hearing or sacrifice their hearing to maintain their musical effectiveness. Fourteen participants (61%) within this study reported wearing hearing protection *rarely* or *never* while teaching and performing, the main reason being the perceived negative effects hearing protection had on their musical perception. Taking into account the varying degrees of individual susceptibility to music-induced hearing loss, music educators who choose not to use hearing protection because it limits their teaching effectiveness are rolling the dice when it comes to their hearing health. They may teach for the entirety of their career without any adverse effects, or music-induced hearing loss may strike at any moment over the course of a career.

Music-induced hearing loss is a serious medical condition with potentially devastating consequences to an individual's hearing health, as well as the deleterious effects it has on the teaching effectiveness and career longevity of instrumental music educators. The participants' experiences outlined in Chapter 5 revealed their lived realities of music-induced hearing loss due to excessive sound exposure and inadequate teaching environments. Their experiences become profoundly troubling when we consider that government agencies, healthcare personnel, insurance providers, and school districts deny too many music educators' requests for accommodations, assistance, or compensation. The perception that music does not

qualify as a major life activity (ADA, 2008, §12102) implies that music-related disabilities do not carry the same weight as other legally recognized disabilities (Guptil, 2011; Lubet, 2002, 2009, 2010).

Most participants expressed concerns regarding their wearing of hearing protection while teaching. Of primary importance was the belief that using hearing protection alters the sensation of hearing itself, thus making it more difficult to identify musical phenomena (e.g., volume, balance, intonation). Wearing hearing protection appears to hinder music educators' abilities to recognize speech, which complicates verbal communication in the classroom between teachers and students. Music educators who wear hearing protection temporarily disable themselves to avoid their developing a permanent hearing impairment. Their choice places them in a precarious position: a space embodying cultural norms and of musical ableism, while concomitantly performing dis/abledness within the classroom.

Examining music-induced hearing loss through the theoretical lens of disability studies provides unique perspectives in relationship to the curriculum, pedagogy, and policies that perpetuate the culture of silence surrounding music-induced hearing in music education. Musicians' and music educators' skills are judged according to 19th century musical traditions of Western art music, which consider physical and mental impairments as detrimental deficiencies (Straus, 2006). Many of today's accepted pedagogical and performance practices are rooted in the European conservatory model of music education, a model steeped in its own set of beliefs, values, and biases regarding impairment and disability (Jorgensen, 1997,

2003). Further, music educators face multiple difficulties when requesting acoustical evaluations of their classrooms, financial compensation for medical expenses, and workers' compensation or disability claims (Lubet, 2009). Disability studies and transcendental phenomenology provide much-needed theoretical and methodological frameworks that bring to light participants' unique perspectives of the complexities that surround music-induced hearing loss, impairment, and disability in music education.

The phenomenological researcher “understands that there is not a single inroad to truth, but that countless possibilities emerge that are intimately connected with the essences and meanings of an experience” (Moustakas, 1994, p. 99). As Garland-Thomson (2005a) suggests, if we re-imagine disability within the context of music education, it will provide us with deeper understanding about the potentially ironic disabling nature of music teaching, together with the ableist expectations that are placed on those who teach music. I argue that for real change to occur in music education, we must re-imagine and re-position it within disability's multiple contexts. The persistent nature of music-induced hearing loss is a real occupational hazard, and the lack of protections and accommodations provided to music educators—in addition to constructions of what constitutes the so-called musically able body—make it reasonable to connote the music classroom as a cultural location of disability (Dobbs, 2012; Snyder & Mitchell, 2006). Hence, the challenges enfolding music-induced hearing loss demand further attention from all corners of music education research.

The participants within this study claimed that music educators are subjected to the disabling effects of music-induced hearing loss every day within their classrooms. Scholars and advocates alike must speak out about music-related hearing injuries, promote health awareness advocacy throughout the music education profession, form support groups for music educators and music performers, and educate school administrators, school board officials, and government policy-makers about disability rights issues for everyone's well-being. Music-induced hearing loss deserves deep and thoughtful investigation, through which will provide meaningful knowledge to existing disability studies discourses. To conclude, individuals who experience music-induced hearing loss must be given opportunities to share their stories so that positive change can occur within music education:

“Once we start talking in the classroom about the body and about how we live in our bodies, we’re automatically challenging the way power has orchestrated itself in that particular institutionalized space” (bell hooks, 1994, pp. 136–137).

BIBLIOGRAPHY

- American Medical Association. (1990). Noise and hearing loss [consensus conference]. *Journal of American Medical Association*, 263(23), 3185–3190.
- Americans with Disabilities Act of 1990, 42 U.S.C.A. § 12101 et seq. (1990). Pub. Law No. 101–336, 104 Stat. 327. Retrieved from <http://www.ada.gov/archive/adastatut91.htm>
- Americans with Disabilities Amendments Act of 2008, 42 U.S.C.A. § 12101 et seq. (2008). Pub. Law No. 110–325, 122 Stat. 3553. Retrieved from <http://www.ada.gov/pubs/adastatute08.htm>
- American Speech-Language-Hearing Association. (2014a). Auditory brainstem response (ABR) [website]. Retrieved from www.asha.org/public/hearing/Auditory-Brainstem-Response
- American Speech-Language-Hearing Association. (2014b). Otoacoustic emissions (OAEs) [website]. Retrieved from www.asha.org/public/hearing/Otoacoustic-Emissions/
- American Speech-Language-Hearing Association. (2014c). Pure-tone testing [website]. Retrieved from www.asha.org/public/hearing/Pure-Tone-Testing/
- American Tinnitus Association. (2014). About tinnitus. Retrieved from www.ata.org/for-patients/about-tinnitus#whatistinnitus
- Axelsson, A., Eliasson, A., Israelsson, B. (1995). Hearing in pop/rock musicians: A follow-up study. *Ear and Hearing*, 16(3), pp. 245–253. Retrieved from Web of Science Database.
- Axelsson, A., & Lindgren, F. (1978). Hearing in pop musicians. *Acta Otolaryngologica*, 85(1–6), 225–231. doi: 10.3109/00016487809121444
- Axelsson, A., & Lindgren, F. (1981). Hearing in classical musicians. *Acta Otolaryngologica*, 91(S377), 1-100. doi: 10.3109/00016488109108191
- Babin, A. (1999, December). Orchestra pit sound level measurements in Broadway shows. *Medical Problems of Performing Artists*, 14(4), 204–209.
- Baker, B. (2002). The new eugenics and the normalization of school children. *Teachers College Record*, 104(4), 663–703.

- Barlow, C. (2010). Potential hazard of hearing damage to students in undergraduate popular music courses. *Medical Problems of Performing Artists*, 25(4), 175–182.
- Barlow, C. (2011). Evidence of noise-induced hearing loss in young people studying popular music. *Medical Problems of Performing Artists*, 26(2), 96–101.
- Behar, A., Wong, W., & Kunov, H. (2006). Risk of hearing loss in orchestral musicians: Review of the literature. *Medical Problems of Performing Artists*, 21(4), 164–168.
- Borg, E., Canlon, B., & Engstrom, B. (1992). Individual variability of noise-induced hearing loss. In A. L. Dancer, D. H. Henderson, R. J. Salvi, & R. P. Hamernik (Eds.), *Noise-induced hearing loss* (pp. 467–475). St. Louis, MO: Mosby Yearbook.
- Brentano, F. (2014). *Psychology from an empirical standpoint*. London and New York: Routledge.
- Brown, L. C. (2013). Stigma: An enigma demystified. In L. Davis (Ed.), *The disability studies reader* (4th ed., pp. 147–160). New York: Routledge.
- Brueggemann, B. (1997). On (almost) passing. *College English*, 59(6), 647–660. Retrieved from <http://www.jstor.org/stable/378278>
- Brueggemann, B., Chrisman, W. L., & Lupo, M. E. (2005). A monstrous emerge-agency: Crippling the ‘whole left.’ In *Radical relevance: Toward a scholarship of the whole left*: (pp. 103–121).
- Brueggemann, B., & Kleege, G. (2003). Gently down the stream: Reflections on mainstreaming. *Rhetoric Review*, 22 (2): 174–184. Retrieved from <http://www.jstor.org/stable/3093038>
- Brueggemann, B., & Modellmog, D. A. (2002). Coming-out pedagogy: Risking identity in language and literature classrooms. *Pedagogy*, 2(3), 311–335. doi: 10.1215/15314200-2-3-311
- Butler, J. (1993). *Bodies that matter: On the discursive limits of sex*. New York: Routledge.
- Camp, J. E., & Horstman, S. W. (1992). Musician sound exposure during performance of Wagner’s Ring cycle. *Medical Problems of Performing Artists*, 7(2), 37–39.

- Campbell, K., & Meyers, A. D. (2014). Otoacoustic emissions. *Medscape* [website]. Retrieved from emedicine.medscape.com/article/835943-overview
- Centers for Disease Control and Prevention. (2004). *National health and nutrition examination survey (NHANES): Audiometry procedures manual*. Retrieved from http://www.cdc.gov/nchs/data/nhanes/nhanes_03_04/AU.pdf
- Chen, L. & Brueck, S. E. (2012). *Noise evaluation of elementary and high school music classes and indoor marching band rehearsals – Alabama: Health hazard evaluation report*. Department of Health and Human Services: Centers for Disease Control and Prevention. Retrieved from <http://www.cdc.gov/niosh/hhe/reports/pdfs/2011-0129-3160.pdf>
- Cherney, J. L. (1999). Deaf culture and the cochlear implant debate: Cyborg politics and the identity of people with disabilities. *Augmentation and Advocacy*, 36(1), 22–34. Retrieved from EBSCO Host Database (2278577).
- Chesky, K. (2008). Preventing music-induced hearing loss. *Music Educators Journal* 94(3), 36–41. Retrieved from <http://www.jstor.org/stable/4623689>
- Chesky, K. (2010, March). Measurement and prediction of sound exposure levels by university wind bands. *Medical Problems of Performing Artists* 25(1), 29–34. Retrieved from <http://search.proquest.com>
- Chesky, K. (2011). Schools of music and conservatories and hearing loss prevention. *International Journal of Audiology* 50(S1), 32–37. doi: 10.3109/14992027.2010.540583
- Chesky, K., Dawson, W. J., & Manchester, R. (2006, September). Health promotion in schools of music: Initial recommendations for schools of music. *Medical Problems of Performing Artists*, 21(3), 142–144.
- Chesky, K., & Henoeh, M. A. (2000). Instrument-specific reports of hearing loss: Differences between classical and nonclassical musicians. *Medical Problems of Performing Artists*, 15(1), 35–38.
- Chung, J. H., DesRoches, C. M., Meunier, J., & Eavey, R. D. (2005). Evaluation of noise-induced hearing loss in young people using a web-based survey technique. *Pediatrics*, 115(4), 861–867. doi: 10.1542/peds.2004-0173
- Cochlea. (2015). In *Gale Encyclopedia of Medicine*. Retrieved from <http://medical-dictionary.thefreedictionary.com/Cochlea>
- Colaizzi, P. F. (1973). *Reflection and research in psychology*. Dubuque, IA: Kendall/Hunt.

- Creswell, J. W. (2007). *Qualitative inquiry & research design: Choosing among five approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Cunningham, D., Curk, A., Hoffman, J., & Pride, J. (2006). Despite high risk of hearing loss, many percussionists play unprotected. *The Hearing Journal*, 59(6), 58. doi: 10.1097/01.HJ.0000287052.63651.57
- Curk, A. E., & Cunningham, D. R. (2006). A profile of percussionists' behaviors and attitudes toward hearing conservation. *Medical Problems of Performing Artists*, 21(2), 59–64.
- Cutietta, R. A. (1981). Hearing loss due to aging. *The American Music Teacher*, 31(2), 30–32.
- Cutietta, R. A., Klich, R. J., Royse, D., & Rainbolt, H. (1994). The incidence of noise-induced hearing loss among music teachers. *Journal of Research in Music Education*, 42(4), 318–330. Retrieved from <http://www.jstor.org/stable/3345739>
- Cutietta, R. A., Millin, J., & Royse, D. (1989). Noise-induced hearing loss among school band directors. *Bulletin of the Council for Research in Music Education*, 101, 41–49. Retrieved from <http://www.jstor.org/stable/40318373>
- Darrow, A. (1993, Summer). The role of music in Deaf culture: Implications for music educators. *Journal of Research in Music Education*, 41(2), 93–110. Retrieved from <http://www.jstor.org/stable/3345402>
- Davis, L. J. (1995). *Enforcing normalcy: Disability, deafness, and the body*. New York: Verso.
- Davis, L. J. (1999, Autumn). Crips strike back: The rise of disability studies. *American Literary History*, 500–512. Retrieved from <http://www.jstor.org/stable/490130>
- Davis, L. J. (2005). Disability: The next wave or twilight of the gods? *PMLA*, 120(2), 527–532. Retrieved from <http://www.jstor.org/stable/25486179>
- Davis, L. J. (2006a). Constructing normalcy: The bell curve, the novel, and the invention of the disabled body in the nineteenth century. In L. J. Davis, *The disability studies reader* (2nd ed., pp. 3–16). New York: Routledge.
- Davis, L. J. (2006b). Preface to the second edition: Introduction. In L. J. Davis, *The disability studies reader* (2nd ed., pp. xiii–xviii). New York: Routledge.

- Davis, L. J. (2013). Introduction: Normality, power, and culture. In L. J. Davis, *The disability studies reader* (4th ed., pp. 1–14). New York: Routledge.
- Descartes, R. (1977). *The essential writings* (J. J. Blom, Trans.). New York: Harper & Row.
- Dobbs, T. (2012, Fall). A critical analysis of disabilities discourse in the Journal of Research in Music Education, 1990–2011. *Bulletin of the Council for Research in Music Education*, 194, 7–30.
- Emens, E. F. (2013). Disabling attitudes: U.S. disability law and the ADA Amendments Act. In L. J. Davis, *The disability studies reader* (4th ed., pp. 42–57). New York: Routledge.
- Ericsson, K. A., Krampe, R. T., & Tesch-Römer, C. (1993). The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100, 363–406.
- Farber, M. (1943). *The foundation of phenomenology*. Albany: State University of New York Press.
- Fishbein, M., Middlestadt, S. E., Ottai, V., Straus, S., & Ellis, A. (1988, March). Medical problems among ICSOM musicians: Overview of a national survey. *Medical Problems of Performing Artists*, 3(1), 1–8.
- Folmer, R. L., Griest, S. E. & Martin, W. H. (2002). Hearing conservation education programs for children: A review. *Journal of School Health*, 72(2), 51–57. doi: 10.1111/j.1746-1561.2002.tb06514.x
- Foucault, M. (1990). *The use of pleasure (Vol. 1)* (R. Hurley, Trans.). New York: Pantheon Books.
- Freire, P. (1985). *The politics of education: Culture, power, and liberation*. Greenwood Publishing Group.
- Fulford, R., Ginsborg, J., & Goldbart, J. (2011). Learning not to listen: The experiences of musicians with hearing impairments. *Music Education Research*, 13(4), 447–464.
- Gadamer, H.G. (1975). *Truth and method*. New York: Seabury.
- Garland-Thomson, R. (2005). Disability and representation. *PMLA*, 120(2), 522–527. Retrieved from <http://www.jstor.org/stable/25486178>
- Goffman, E. (1963). *Stigma: Notes on the management of spoiled identity*. Harmondsworth, Middlesex, UK: Penguin Books, Ltd.

- Grayston, P. D., & Alvord, L. S. (1993). Noise levels in secondary school bandrooms. *Rocky Mountain Journal of Communication Disorders*, pp. 5–6.
- Guptil, C. (2011). The lived experience of working as a musician with an injury. *Work: A Journal of Prevention Assessment & Rehabilitation*, 40(3), 269–280. doi: 10.3233/WOR-2011-1230
- Hammel, A. & Hourigan, R. (2011). The fundamentals of special education policy: Implications for music teachers and music teacher education. *Arts Education Policy Review*, 112(4), 174–179. doi: 10.1080/10632913.2011.592463
- Harman, S. E. (1993). Medical problems of marching musicians. *Medical Problems of Performing Artists*, 8(4), 132–135.
- Hart, C. W., Geltman, C. L., Schupbach, J., & Santucci, M. (1987). The musician and occupational sound hazards. *Medical Problems of Performing Artists*, 2(1), 22–26.
- Health and Safety Executive. (2008). *Control of noise at work regulations to come into force for music and entertainment sectors*. Retrieved from www.hse.gov.uk/press/2008/e08020.htm
- Health Promotion in Schools of Music. (2004). *Declarations*. Retrieved from <http://www.unt.edu/hpsm/declarations.htm>
- Hearing Education and Awareness for Rockers. (2014). *H.E.A.R. story*. Retrieved from www.hearnet.com/index.shtml
- Hehir, T. (2002). Eliminating ableism in education. *Harvard Educational Review*, 72(1), 1–33. Retrieved from <http://www.metapress.com>.
- Henoch, M. A., & Chesky, K. (1999). Hearing loss and aging: Implications for the professional musician. *Medical Problems of Performing Artists*, 14(2), 76–79.
- Henoch, M. A., & Chesky, K. (2000, March). Sound exposure levels experienced by a college jazz band ensemble: Comparison with OSHA risk criteria. *Medical Problems of Performing Artists*, 15(1), 17–22.
- Hill, D. (2003). Occupational hazard: Is your job damaging your hearing? *Teaching Music*, 10(4), 36–40. Retrieved from <http://search.proquest.com>
- Hoffman, J. S., Cunningham, D. R., & Lorenz, D. J. (2006). Auditory thresholds and factors contributing to hearing loss in a large sample of percussionists. *Medical Problems of Performing Artists*, 21(2), 47–58.

- Holland, N. V., III. (2004). *Mapping sound intensities by seating position in a university concert band: A risk of hearing loss, temporary threshold shifts, and comparisons with standards of OSHA and NIOSH* (Doctoral dissertation, University of North Carolina, Greensboro). Retrieved from ProQuest (3126784).
- Holland, N. V., III. (2008). Sound pressure levels measured in a university concert band a risk of noise-induced hearing loss? *Update: Applications of Research in Music Education*, 27(1), 3–8. doi: 10.1177/8755123308322274
- hooks, bell. (1994). *Teaching to Transgress: Education as the Practice of Freedom*. New York: Routledge.
- Husserl, E. (1931/2012). *Ideas: General introduction to pure phenomenology*. (W. R. Boyce Gibson, Trans.). London and New York: Routledge.
- Husserl, E. (1970). *Cartesian meditations: An introduction to phenomenology* (D. Cairns, Trans.). The Hague: Martinus Nijhoff.
- Husserl, E. (1975). *The Paris lectures* (2nd ed.) (P. Koestenbaum, Trans.). The Hague: Martinus Nijhoff.
- Ihde, D. (1977). *Experimental phenomenology*. New York: G. P. Putnam.
- Incus. (2009). In Mosby's Medical Dictionary (8th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/incus>
- Jansen, E. J., Helleman, H. W., Dreschler, W. A., & de Laat, J. A. (2009). Noise induced hearing loss and other hearing complaints among musicians of symphony orchestras. *International Archives of Occupational and Environmental Health*, 82(2), 153–164. doi: 10.1007/s00420-008-0317-1
- Jansson, E., & Karlsson, K. (1983). Sound levels recorded within the symphony orchestra and risk criteria for hearing loss. *Scandinavian Audiology*, 12(3), 215–221. doi: 10.3109/01050398309076249
- Jerger, J., & Jerger, S. (1970, March). Temporary threshold shift in rock-and-roll musicians. *Journal of Speech and Hearing Research*, 13, 221–224. Retrieved from <http://dx.doi.org/10.1044/jshr.1301.221>
- Johnson, D. W., Sherman, R. E., Aldridge, J. H. & Lorraine, A. (1985). Effects of instrument type and orchestral position on hearing sensitivity for 0.25 to 20 kHz in the orchestral musician. *Scandinavian Audiology*, 14(4), 215–221. doi: 10.3109/01050398509045944

- Johnson, D. W., Sherman, R. E., Aldridge, J. H., Lorraine, A. (1986). Extended high frequency hearing sensitivity: A normative threshold study in musicians. *The Annals of Otology, Rhinology, and Laryngology*, 95 (2, pt. 1), 196–202.
- Jorgensen, E. R. (1997). *In search of music education*. Urbana: University of Illinois Press.
- Jorgensen, E. R. (2003). *Transforming music education*. Bloomington: Indiana University Press.
- Kähäri, K., Axelsson, A., Hellström, P.-A., & Zachau, G. (2001). Hearing assessment of classical orchestral musicians. *Scandinavian Audiology*, 30(1), 13–23. doi: 10.1080/010503901750069536
- Kähäri, K., Eklöf, M., Sandsjö, L., Zachau, G., & Möller, C. (2003). Associations between hearing and psychosocial working conditions in rock/jazz musicians. *Medical Problems of Performing Artists*, 18(3), 98–105.
- Kähäri, K., Zachau, G., Eklöf, M., Sandsjö, L., & Möller, C. (2003). Assessment of hearing and hearing disorders in rock/jazz musicians. *International Journal of Audiology*, 42(5), 279–288. Retrieved from EBSCOHost (2004047052).
- Karlsson, K., Lundquist, P. G., & Olaussen, T. (1983). The hearing of symphony orchestra musicians. *Scandinavian Audiology*, 12(4), 257–264. doi: 10.3109/01050398309044429
- Keen, E. (1975). *Doing research phenomenologically* [Unpublished manuscript]. Bucknell University, Lewisburg, PA.
- Kilohertz. (2011). In *American Heritage Dictionary of the English Language* (5th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/kilohertz>
- Kirchner, D. B., Evenson, E., Dobie, R. A., Rabinowitz, P., Crawford, J., Kopke, R., & Hudson, T. W. (2012). Occupational noise-induced hearing loss [ACOEM guidance statement]. *Journal of Occupational and Environmental Medicine*, 54(1), 106–108. doi: 10.1097/JOM.0b013e318242677d
- Koza, J. E. (2007). In sounds and silences: Acknowledging political engagement. *Philosophy of Music Education Review*, 15(2), 168–176. Retrieved from <http://www.jstor.org/stable/40327282>
- Kutz, J. W., & Meyers, A. D. (2014). Audiology pure-tone testing. *Medscape* [website]. Retrieved from emedicine.medscape.com/article/1822962-overview

- Larkin, M., Watts, S., & Clifton, E. (2006). Giving voice and making sense in interpretative phenomenological analysis. *Qualitative Research in Psychology*, 3, 102–120. doi: 10.1191/1478088706qp062oa
- Limb, C. J. (2004, May). Ears to you! *Electronic Musician*, 20(6), 30–41. Retrieved from EBSCOHost (13269152).
- Lindgren, F., & Axelsson, A. (1983). Temporary threshold shift after exposure to noise and music of equal energy. *Ear and Hearing*, 4, 197–201.
- Linton, S. (1998a). *Claiming disability: Knowledge and identity*. New York: New York University Press.
- Linton, S. (1998b). Disability studies/not disability studies. *Disability & Society*, 13(4), 525–539. Retrieved from <http://search.proquest.com>.
- Linton, S. (2005). What is disability studies? *PMLA*, 120(2), 518–522. Retrieved from <http://www.jstor.org/stable/25486177>
- Linton, S., Mello, S., & O'Neill, J. (1995, Fall). Disability studies: Expanding the parameters of diversity. *The Radical Teacher*, 47, 4–10. Retrieved from <http://www.jstor.org/stable/20709848>
- Listening and Spoken Language Knowledge Center. (2015). *The speech banana*. Retrieved from www.agbell.org/SpeechBanana/
- Longmore, P. K. (2003). *Why I burned my book*. Philadelphia: Temple University Press.
- Lubet, A. (2002, June). Disability studies and performing arts medicine. *Medical Problems of Performing Artists*, 17(2), 59–62.
- Lubet, A. (2009). Disability, music education and the epistemology of interdisciplinarity. *International Journal of Qualitative Studies in Education*, 22(1), 119–132. doi: 10.1080/09518390802581935
- Lubet, A. (2010). *Music, disability, and society*. Philadelphia: Temple University Press.
- Mace, S. T. (2005). *A descriptive analysis of university music performance teachers' sound level exposures during a typical day of teaching, performing, and rehearsing* (Doctoral dissertation). Retrieved from ProQuest, UMI Dissertations Publishing. (3182834)

- Maddy, J. E. (1957, September – October). The battle of band instrumentation. *Music Educators' Journal* 44(1), 30, 32, 35. Retrieved from <http://www.jstor.org.ezproxy.library.wisc.edu/stable/3388785>
- Malleus. (2007). In *The American Heritage Medical Dictionary*. Retrieved from <http://medical-dictionary.thefreedictionary.com/malleus>
- Manchester, R. A. (2010). Protecting the hearing of performing artists. *Medical Problems of Performing Artists*, 25(1), 1–2. Retrieved from <http://search.proquest.com>.
- McBride, D. I., & Williams, S. (2001). Audiometric notch as a sign of noise induced hearing loss. *Occupational Environmental Medicine*, 58, 46–51. Retrieved from <http://oem.bmj.com.ezproxy.library.wisc.edu/content/58/1/46.full.pdf+html>
- McCormick, J., & Matusitz, J. (2010). The impact on US society of noise-induced and music-induced hearing loss caused by personal media players. *The International Journal of Listening*, 24(2), 125–140. doi. 10.1080/10904011003744565
- McLain, B. P. (2005, Spring). Environmental support and music teacher burnout. *Bulletin of the Council for Research in Music Education*, 164, 71–84.
- Mead, J. (2013). Fundamentals of federal disability law. In M. Gooden, S. Eckes, J. Mead, L. McNeal, & M. Torres (Eds.), *The Principal's Legal Handbook* (5th ed., pp. 203–214). Dayton, Ohio: Education Law Association.
- Meyerdierks, B. (2005). The dangers of loud music. *The Instrumentalist*, 60(4), 17–23.
- Middlestadt, S. E., & Fishbein, M. (1988). Health and occupational correlates of perceived occupational stress in symphony orchestra musicians. *Journal of Occupational Medicine*, 30(9), 687–692. PMID: 3183784
- Miller, V. L., Stewart, M., & Lehman, M. (2007). Noise exposure levels for student musicians. *Medical Problems of Performing Artists*, 22(4), 160–165.
- Millin, J. (1981). *Band room sound levels*. Unpublished report, Kent State University.
- Mills, J. H. (1992). Noise-induced hearing loss: Effects of age and existing hearing loss. In A. L. Dance, D. H. Henderson, R. J. Salvi, & R. P. Hamernik (Eds.), *Noise-induced hearing loss* (pp. 237–245). St. Louis, MO: Mosby Yearbook.

- Mitchell, D. T., & Snyder, S. L. (1997). Introduction: Disability studies and the double bind of representation. In D. Mitchell & S. L. Snyder (Eds.), *The body and physical difference: Discourses of disability* (pp. 1–31). Ann Arbor, MI: University of Michigan Press.
- Mitchell, D. T., & Snyder, S. L. (2000). *Narrative prosthesis: Disability and the dependencies of discourse*. Ann Arbor, MI: University of Michigan Press.
- Moustakas, C. (1994). *Phenomenological research methods*. Thousand Oaks, CA: Sage.
- Namba, K. (2014). Molecular modelling-based investigations of a mutant protein in patients with hearing loss. In Sivahumar Joghi Thatha (Ed.), *Pharmacology and Therapeutics*. Retrieved from <http://dx.doi.org/10.5772/58398>.
- National Association for Music Education. (2015). *Quick facts*. Retrieved from <http://www.nafme.org/about/mission-and-goals/quick-facts/>
- National Association of Schools of Music. *Handbook 2015–16*. Retrieved from nasm.arts-accredit.org/site/docs/Handbook/NASM_HANDBOOK_2015-15.pdf
- National Institute for Occupational Safety and Health. (1972). *Criteria for a recommended standard: Occupational exposure to noise* (Pub. No. HSM 73–1001). Cincinnati, OH: U.S. Department of Health, Education, and Welfare, Health Services and Mental Health Administration. Retrieved from <http://www.cdc.gov/niosh/docs/1970/73-11001.html>
- National Institute for Occupational Safety and Health. (1998). *Criteria for a recommended standard: Occupational noise exposure* (Pub. No. 98–126). Cincinnati, OH: U.S. Department of Health and Human Services. Retrieved from <http://www.cdc.gov/niosh/docs/98-126/pdfs/98-126.pdf>
- National Institute for Occupational Safety and Health. (2014). *Noise and hearing loss prevention*. Retrieved from <http://www.cdc.gov/niosh/topics/noise/>
- National Institute on Deafness and Other Communication Disorders. (2014). Noise-induced hearing loss. Retrieved from <http://www.nidcd.nih.gov/health/hearing/pages/noise.aspx>
- Nodar, R. H. (1993). Hearing loss in a professional organist: A case study. *Medical Problems of Performing Artists*, 8(1), 23–24.
- Occupational Safety and Health Act of 1970, Pub. Law No. 91–596, § 2193 et seq. (2004). Retrieved from

https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHA CT&p_id=2743

- Occupational Safety and Health Administration. (2008). *Occupational Noise Exposure*, 29 C.F. R. §1910.95 et seq. Retrieved from http://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=standards&p_id=9735
- Occupational Safety and Health Administration. (2014a). *About OSHA*. Retrieved from <http://www.osha.gov/about.html>
- Occupational Safety and Health Administration. (2014b). *OSH Act of 1970*, 29 U.S.C. 671 §22. Retrieved from https://www.osha.gov/pls/oshaweb/owadisp.show_document?p_table=OSHA CT&p_id=3376
- Occupational Safety and Health Administration. (2014c). *Safety and health topics: Occupational noise exposure*. Retrieved from <http://www.osha.gov/SLTC/noisehearingconservation/>
- Office of Worker's Compensation Programs. (2014). *Worker's compensation*. Retrieved from www.dol.gov/dol/topic/workcomp/index.htm
- Organ of Corti. (2007). In *The American Heritage Medical Dictionary*. Retrieved from <http://medical-dictionary.thefreedictionary.com/organ+of+corti>
- Ostri, B., Eller, N., Dahlin, E., & Skylv, G. (1989). Hearing impairment in orchestral musicians. *Scandinavian Audiology*, 18(4), 243–249. doi: 10.3109/01050398909042202
- Owens, D. T. (2003). *An analysis of the high school band director's exposure to sound pressure levels* (Doctoral dissertation, University of Northern Colorado). Retrieved from ProQuest (3085859).
- Owens, D. T. (2004). Sound pressure levels experienced by the high school band director. *Medical Problems of Performing Artists*, 19(3), 109–115.
- Owens, D. T. (2008). Hearing loss: A primer for the performing arts. *Medical Problems of Performing Artists*, 23(4), 147–154.
- Palac, J. (2008). Promoting musical health, enhancing, musical performance: Wellness for music students. *Music Educators Journal*, 94(3), 18–22. Retrieved from <http://www.jstor.org/stable/4623686>

- Pang-Ching, G. K. (1982). Hearing levels of secondary school band directors. *The Journal of Auditory Research*, 22(4), 284. PMID: 7188211
- Phillips, S. L., & Mace, S. T. (2008). Sound level measurements in music practice rooms. *Music Performance Research*, 2(1), 36–47.
- Pinna. (2003). In *Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health* (7th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/pinna>
- Pisano, J. M. (2007). *A description of high school band directors' hearing functions and exposure to sound pressure levels* (Doctoral dissertation, Kent State University). Retrieved from <http://etd.ohiolink.edu/send-df.cgi/Pisano%20Joseph.pdf?kent1197327790>
- Polkinghorne, D. E. (1989). Phenomenological research methods. In R. S. Valle & S. Halling (Eds.), *Existential-phenomenological perspectives in psychology* (pp. 41–60). New York: Plenum Press.
- Rabinowitz, P. M. (2000, May). Noise-induced hearing loss. *American Family Physician*, 61(9), 2749–2756. Retrieved from www.aafp.org/afp/2000/0501/p2749.html
- Rabinowitz, J., Hausler, R., Bristow, G., & Rey, P. (1982). Study of the effects of very loud music on musicians in the Orchestra de la Suisse Romande. *Medicine et Hygiene: Journal Suisse d'Informations Medicales*, 19, 1909–1921.
- Reddell, R. C., & Lebo, C. P. (1972, January). Ototraumatic effects of hard rock music. *California Medicine*, 116(1), 1–4. PMC 1518133
- Rintelman, W. F., & Borus, J. F. (1968). Noise induced hearing loss and rock and roll music. *Archives of Otolaryngologica – Head & Neck Surgery*, 88(4), 377–385. doi: 10.1001/archotol.1968.00770010379010
- Rohwer, D. (2008, June). Health and wellness issues for adult band musicians. *Medical Problems of Performing Artists*, 23(2), 54–58.
- Rorty, R. (1979). *Philosophy and the mirror of nature*. Princeton, New Jersey: Princeton University Press.
- Ross, S. L. (2001). When the music has been too loud for too long. *The Instrumentalist*, 56(1), 52–75.

- Royer, R. D. (1996). Sound pressure levels and frequencies generated in secondary public school band rooms (Doctoral dissertation). University of Utah. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/304299182?accountid=465>
- Royster, J. D., Royster, L. H., & Killion, M. C. (1991). Sound exposures and hearing thresholds of symphony orchestra musicians. *The Journal of the Acoustical Society of America*, 89(6), 2793–2803. Retrieved from <http://dx.doi.org.ezproxy.library.wisc.edu/10.1121/1.400719>
- Sabesky, I. J., & Korczynski, R. E. (1995). Noise exposure of symphony orchestra musicians. *Applied Occupational and Environmental Hygiene*, 10(2), 131–135. doi: 10.1080/1047322X.1995.10389295
- Samelli, A., Matas, C., Carvallo, R., Gomes, R., de Beija, C. (2012). Audiological and electrophysiological assessment of professional pop/rock musicians. *Noise & Health*, 14(56), 6–12. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/1009160604?>
- Santucci, M. (2009). Protecting musicians from damage: A review of evidence-based research. *Medical Problems of Performing Artists*, 24(3), 103–107. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/1404677?accountid=465>
- Sataloff, R. T. (1997, June). Hearing loss in singers and other musicians. *Medical Problems of Performing Artists*, 12(2), 51–56.
- Schmidt, J. M., Verschuure, J., & Brocaar, M. P. (1994, July–August). Hearing loss in students at a conservatory. *International Journal of Audiology*, 33(4), 185–194. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/76666404?accountid=465>
- Section 504 Rehabilitation Act of 1973, 29 U.S.C. § 794, 34 C.F.R. 104 *et seq.* (1973). Pub. Law No. 93–112. Retrieved from <https://www2.ed.gov/policy/rights/reg/ocr/edlite-34cfr104.html#S1>
- Shakespeare, T. (2013). The social model of disability. In L. Davis (Ed.), *The disability studies reader* (4th ed., 214–221). New York: Routledge.
- Siebers, T. (2001, Winter). Disability in theory: From social constructionism to the new realism of the body. *American Literary History*, 13(4), 737–754. Retrieved from <http://www.jstor.org/stable/3054594>
- Siebers, T. (2008). *Disability theory*. Ann Arbor, MI: University of Michigan Press.

- Siebers, T. (2013). Disability and the theory of complex embodiment: For identity politics in a new register. In L. J. Davis (Ed.), *The disability studies reader* (4th ed., 278–297). New York: Routledge.
- Smart, J. F. (2009). The power of models of disability. *Journal of Rehabilitation*, 75(2), 3–11. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/2362964941?accountid=465>
- Smith, Q. (1981, Spring). Husserl's early conception of the triadic structure of the intentional act. *Philosophy Today*, 81–89.
- Smith, S. (2009). *Metallica drummer struggles with ringing in ears*. Retrieved from <http://www.cnn.com/2009/HEALTH/12/28/tinnitus.metallica.drummer/index.html>
- Snyder, S. L., & Mitchell, D. (2006). *Cultural locations of disability*. Chicago: The University of Chicago Press.
- Solomon, E. (1986). The not-so-silent menace. *The Instrumentalist*, 41(3), 24–33.
- Speaks, C., Nelson, D., & Ward, W. D. (1970). Hearing loss in rock-and-roll musicians. *Journal of Occupational Medicine*, 12(6), 216–219. PMID: 5432846
- Stapedius. (2009). In *Mosby's Medical Dictionary* (8th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/stapedius>
- Stapes. (2009). In *Mosby's Medical Dictionary* (8th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/stapes>
- Straus, J. N. (2006, Spring). Normalizing the abnormal: Disability in music and music theory. *Journal of the American Musicological Society*, 59(1), 113–184. Retrieved from <http://www.jstor.org/stable/10/1525/jams.2006.59.1.113>
- Stevick, E. L. (1971). An empirical investigation of the experience of anger. In A. Giorgi, W. Fisher, & R. Von Eckartsberg (Eds.), *Duquesne studies in phenomenological psychology* (Vol. 1, 132–148). Pittsburgh: Duquesne University Press.
- Sutton v. United Air Lines, Inc., 527 U.S. 471 (1999).
- Toyota Motor Mfg., Ky., Inc. v. Williams, 534 U.S. 184 (2002).
- Tympanic Membrane. (2009). In *Mosby's Medical Dictionary* (8th ed.). Retrieved from <http://medical-dictionary.thefreedictionary.com/tympanic+membrane>

- United States Census Bureau. (2015). *Full-time, year-round workers and median earnings in the past 12 months by sex and detailed occupation – 2013*. Retrieved from <http://www.census.gov/people/io/>
- University of North Texas. (2015). Mission statement of the UNT College of Music. Retrieved from <http://music.unt.edu/our-mission>
- van Manen, M. (1990). *Researching lived experience: Human science for an action sensitive pedagogy*. London, Ontario: Althouse Press.
- Vogel, I., Brug, J., Hosli, E. J., van der Ploeg, C. P. B., & Raat, H. (2008). MP3 players and hearing loss: Adolescents' perceptions of loud music and hearing conservation. *The Journal of Pediatrics*, 152(30), 400–404. Retrieved from <http://dx.doi.org.ezproxy.library.wisc.edu/10.1016/j.peds.2007.07.009>
- Walter, J. S. (2009, June). Sound exposure levels experienced by university wind band members. *Medical Problems of Performing Artists*, 24(2), 63–70. Retrieved from <http://search.proquest.com.ezproxy.library.wisc.edu/docview/1403819?accountid=465>
- Westmore, G. A., & Eversden, I. D. (1981). Noise-induced hearing loss and orchestral musicians. *Archives of Otolaryngology – Head & Neck Surgery*, 107(12), 761–764. doi: 10.1001/archotol.1981.00790480037010
- Wheeler, C. (2001). Custom earplugs for musicians. *The Instrumentalist*, 56(4), 18–24.
- Willott, J. F. (1991). *Aging and the auditory system: Anatomy, physiology, and psychophysics*. San Diego: Thompson.
- Winfield, A. G. (2007). *Eugenics and education in America: Institutionalized racism and the implications of history, ideology, and memory*. New York: Peter Lang.
- Wisconsin Act 10 of 2011. January 2011 Special Session: Assembly Bill 11. (2011). Retrieved from <http://docs.legis.wisconsin.gov/2011/related/acts/10.pdf>
- Woolford, D. H., Carterette, E. C., & Morgan, D. E. (1988). Hearing impairment among orchestral musicians. *Music Perception: An Interdisciplinary Journal*, 5(3), 261–284. Retrieved from <http://www.jstor.org/stable/40285400>

Zeigler, M. C., & Taylor, J. A. (2001). The effects of a tinnitus awareness survey on college music majors' hearing conservation behaviors. *Medical Problems of Performing Artists*, 16(4), 136–143.

APPENDIX A

ABBREVIATIONS AND ACRONYMS

ABR	Auditory Brainstem Response
ACGIH	American Conference of Governmental and Industrial Hygienists
ACOEM	American College of Occupational and Environmental Medicine
ADA	Americans with Disabilities Act
ADAAA	Americans with Disabilities Amendments Act
AEC	Association of European Conservatories
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
ASLHA	American Speech-Language-Hearing Association
ASTA	American String Teachers Association
ATA	American Tinnitus Association
dB	decibels
dBA	decibels, A-weighted
DPOAE	Distortion Product Otoacoustic Emission
EU	European Union
<i>H.E.A.R.</i>	<i>Hearing Education and Awareness for Rockers</i>
HL	hearing level

HLPP	hearing loss prevention program
HPSM	Health Promotion in Schools of Music
HSE	Health and Safety Executive (UK)
HTL	hearing threshold level
Hz	Hertz
ICSOM	International Conference of Symphony and Opera Musicians
ISME	International Association of Music Education
ISO	International Standards Organization
<i>JACH</i>	<i>Journal of American College Health</i>
<i>JRME</i>	<i>Journal of Research in Music Education</i>
kHz	Kilohertz
LA _{eq}	Equivalent Continuous Sound, A-Weighted
L _{eq}	Equivalent Sound Level
L _{ex}	Daily Noise exposure Level, 8-hour
<i>MEJ</i>	<i>Music Educators Journal</i>
MENC	National Association of Music Education
<i>MER</i>	<i>Music Education Research</i>
MIHL	Music-Induced Hearing Loss
<i>MPPA</i>	<i>Medical Problems of Performing Artists</i>
MSHA	Mine Safety and Health Administration
MTNA	Music Teacher National Association
NAESP	National Association of Elementary School Principals

NAfME	National Association for Music Education
NAMSP	National Association of Middle School Principals
NASSP	National Association of Secondary School Principals
NASM	National Association of Schools of Music
NASS	National Association of School Superintendents
NHANES	National Health and Nutrition Examination Survey
NHIS	National Health Interview Survey
NIDCD	National Institute on Deafness and Communication Disorders
NIHL	noise-induced hearing loss
NIOSH	National Institute for Occupational Safety and Health
NIPTS	Noise-Induced Permanent Threshold Shift
NOES	National Occupational Exposure Survey
NOHSM	National Occupational Health Survey of Mining
NSBA	National School Boards Association
OAE	Otoacoustic Emissions
OHC	Outer Hair Cells
OSHA	Occupational Safety and Health Administration
OWCP	Office of Worker's Compensation Programs
PAMA	Performing Arts Medicine Association
PEL	Permissible Exposure Limit
PMPs	Personal Media Players
PTS	Permanent Threshold Shift

REL	Recommended Exposure Limit
SLM	Sound Level Meter
SPL	Sound Pressure Level
STS	Significant Threshold Shift
TEOAEs	Transient Evoked Otoacoustic Emissions
TTS	Temporary Threshold Shift
TWA	Time-Weighted Average
UNT	University of North Texas
UNT-MHS	University of North Texas Musician Health Survey

APPENDIX B

DEFINITION OF TECHNICAL TERMS

The following technical terms appearing in this study address the hearing mechanism, hearing loss, acoustics, and audiology.

3-dB Exchange Rate. Safety guideline for occupational noise exposure established by NIOSH (1998) which states that for every 3-dB increase in sound pressure intensity the duration of daily exposure should be reduced by half.

5-dB Exchange Rate. Safety guideline for occupational noise exposure established by OSHA (2008) which states that for every 5-dB increase in sound pressure levels the duration of daily exposure should be reduced by half.

Air Conduction. See *pure-tone air conduction*.

Attenuation. The reduction of intensity to sound.

Audiogram. “A graph showing hearing (threshold) level as a function of frequency” (Owens, 2008, p. 152).

Audiometric Notch. A graphic indication of a decline in hearing in the 3 to 6 kHz frequency range on an audiometric exam (Barlow, 2010; Jansen, Helleman, Dreschler, & de Laat, 2008; Ostri, Eller, Dahlin, & Skyly, 1989; Royster, Royster, & Killion, 1991).

Auditory Brainstem Response. This test “gives information about the inner ear (cochlea) and brain pathways for hearing” (American Speech-Language-Hearing

Association [ASLHA], 2014, “Auditory Brainstem Response [ABR],” para. 1), and is “performed by pasting electrodes on the head . . . and recording brain wave activity in response to sound” (ASLHA, 2014, para. 2).

A-weighted. “Unit representing the sound level measured with the A-weighting network on a sound level meter” (NIOSH, 1998, p. xii). The A-weighted scale is commonly used to determine occupational noise standards based on measuring the “ear’s response to moderate-level sounds” (NIOSH, 1998, p. 33). See *weighted measurements*.

Baseline Audiogram. “The audiogram obtained from an audiometric examination administered before employment or within the first 30 days of employment that is preceded by a period of at least 12 hr of quiet” (NIOSH, 1998, p. xii). Baseline audiograms are used to compare with subsequent audiograms in order to calculate significant threshold shift (Owens, 2008).

Bone Conduction. Pure-tone bone conduction testing is used when there is a blockage in the outer or middle ear. This technique bypasses the blockage “by sending a tone through a small vibrator placed behind the ear (or on the forehead). The signal reaches the inner ear (or cochlea) directly through gentle vibrations of the skull” (ASLHA, 2014, “Conditioned play audiometry” section, para. 2). This test measures the inner ear’s response to sound independent of the outer and middle ears.

Cochlea. “The hearing part of the inner ear. This snail-shaped structure contains fluid and thousands of microscopic hair cells tuned to various frequencies, in

addition to the organ of Corti (the receptor for hearing)” (Cochlea, Gale Encyclopedia of Medicine, 2008).

Decibel (dB). “The unit used to express the intensity of sound” (Owens, 2008, p. 152). “Unit of level when the base of the logarithm is the 10th root of 10 and the quantities concerned are proportional to power” (NIOSH, 1998, p. xii).

Decibel, A-weighted (dBA). “Unit representing the sound level measured with the A-weighting network on a sound level meter” (NIOSH, 1998, p. xii). The dBA measures sound intensity in the mid-frequencies of human hearing “with less sensitivity to very high and very low frequencies” (Owens, 2008, p. 152).

Diplacusis. A condition in which perception of a single pitch is perceived as two separate sounds (Jansen et al, 2008).

Distortion. Damage to the hearing mechanism that leads to changes in how the individual perceives pitch and timbre (Woolford et al., 1988).

Dose. The “percentage of time that a person is exposed to noise that is potentially damaging to hearing. It is calculated by dividing the actual time of exposure by the allowed time of exposure, where 0 represents no exposure and 100 or more represents complete exposure” (Chesky, 2010, p. 30). Using OSHA standards, “a 100% dose would equal an 8-hr exposure to a continuous 90-dBA noise; a 50% dose would equal an 8-hr exposure to an 85-dBA noise or a 4-hr exposure to a 90-dBA noise” (Owens, 2008, p. 152). NIOSH standards consider a 100% dose to include an 8-hr exposure to a continuous 85-dBA noise; a 50% dose would equal an 8-hr exposure to 82-dBA, or a 4-hr exposure to a 85-dBA.

Dosimeter. An instrument used to “measure sound levels over a specified interval, stores the measures, and calculates the sound as a function of sound level and sound duration” (Owens, 2008, p. 152). The results of dosimeter measurements are given in terms of dose, time-weighted average, peak level, equivalent sound level, and sound exposure level (Owens, 2008).

Equal-Energy Rule. “The relationship between sound level and sound duration based upon a 3 dB exchange rate, i.e., the sound energy resulting from doubling or halving a noise exposure’s duration is equivalent to increasing or decreasing the sound level by 3 dB, respectively (as cited in Owens, 2003, p. 88).

Frequency. “The rate of repetition of a periodic event” (Owens, 2008, p. 152). “The frequency of a sound wave is determined by the number of times per second a given molecule of air vibrates about its neutral position” (p. 152). The number of complete vibrations (cycles) determines the level of the frequency, with greater numbers of complete vibrations producing higher frequencies (Owens, 2008). Units of frequency are measured in hertz (Hz).

Hearing Impairment. A general “malfunction of the auditory system” which may involve “sensitivity, frequency range, loudness or pitch” (Woolford et al., 1988, p. 266).

Hearing Threshold Level. See *threshold of hearing*.

Hertz. “The unit of measurement for audio frequencies” (Owens, 2008, p. 152). The standard range of human hearing is considered to include the range of 20

Hz to 20,000 Hz (p. 152). The human ear loses sensitivity below 500 Hz and above 4,000 Hz (p. 152).

Hyperacusis. Hypersensitivity to low or moderate sound levels (Woolford, et al, 1988).

Incus. “One of three ossicles in the middle ear, resembling an anvil. It transmits sound vibrations from the malleus to the stapes” (Incus, Mosby’s Medical Dictionary, 2009).

Kilohertz. “A unit of frequency equal to 1,000 hertz” (American Heritage Dictionary of the English Language, 2011).

L_{Aeq}. Equivalent continuous sound (NIOSH, 2007).

L_{eq}. The equivalent-continuous sound pressure level (Owens, 2003). “Leq is the level of a constant sound, expressed in dB, that in a given time period has the same energy as does a time varying sound” (Chesky, 2010, p. 30).

L_{ex}. Normalized noise exposure levels (Behar, Wong, and Kunov, 2006).

Loudness. The subjective perception of sound intensity from *soft* to *loud*, related more to sound pressure levels than frequency or duration (Owens, 2008, 152).

Malleus. “The hammer-shaped bone that is the outermost of the three auditory ossicles, articulating with the body of the incus” (American Heritage Medical Dictionary, 2007).

Noise. Noise can be defined as: (1) “Any disagreeable or undesired sound or other disturbance; an unwanted sound” (Owens, 2008, p. 152); (2) “Sound of a

general random nature, the spectrum of which does not exhibit clearly defined frequency components” (p. 152).

Noise Dose. See *dose*.

Noise-Induced Hearing Loss (NIHL). “A sensorineural hearing loss that is attributed to noise and for which no other etiology can be determined” (Owens, 2008, p. 153).

Organ of Corti. “A specialized structure located on the inner surface of the basilar membrane of the cochlea containing hair cells that transmit sound vibrations to the nerve fibers” (American Heritage Medical Dictionary, 2007).

Otosclerosis. A common cause of conductive hearing loss in the middle ear caused by a hereditary disease which prevents the stapes of the ear from functioning properly (Sataloff, 1997).

Otoacoustic Emissions. “sounds produced by the healthy ear, by the outer hair cells in the cochlea” . . . the absence of otoacoustic emissions is “associated with poorly functioning outer hair cells resulting in reduced selectivity and a decreased sensitivity” (Jansen et al., 2008, p. 154).

Otolaryngology. The study of ear, nose, and throat conditions.

Permanent Threshold Shift (PTS). “Permanent increase in the threshold of audibility for an ear (NIOSH, 1998, p. xiv).

Pinna. “The projecting part of the ear lying outside the head” (Miller-Keane Encyclopedia and Dictionary of Medicine, Nursing, and Allied Health, 2003).

Presbycusis. Natural hearing loss due to the advancement of age (Mills, 1992; Owens, 2008; Willott, 1991).

Pure-Tone. The sound of a tone without overtones.

Pure-Tone Air Conduction. “A pure-tone air conduction hearing test determines the faintest tones a person can hear at selected pitches (frequencies), from low to high. During this test, earphones are worn so that information can be obtained for each ear” (ASLHA, 2014, “Pure-Tone Testing,” para. 1).

Pure-Tone Audiometry. An audiological behavioral test used to measure hearing sensitivity in the peripheral and central auditory systems (Kutz & Meyers, 2014, “Audiology Pure-Tone Testing,” para. 1)

Pure-Tone Threshold (PTT). The “softest sound audible to an individual at least 50% of the time” (Kutz & Meyers, 2014, “Audiology Pure-Tone Testing,” para. 1).

Recommended Exposure Limit. The recommended exposure limit for occupational noise exposure according to NIOSH (1998) is 85 decibels A-weighted, based on an 8-hour time-weighted average. OSHA (2008) recommends not to exceed 90 decibels A-weighted, based on an 8-hour time-weighted average.

Sensorineural Hearing Loss. “A hearing loss resulting from damage to the inner ear, from any source” (Owens, 2008, p. 153).

Sensorineural Trauma. Damage to the hair-cells in the ear leading to hearing loss or permanent internal noise (Woolford et al., 1988).

Significant Threshold Shift. “A shift in hearing threshold, outside the range of audiometric testing variability (± 5 dB), that warrants followup action to prevent further hearing loss. NIOSH defines significant threshold shift as an increase in the HTL of 15 dB or more at any frequency (500, 1000, 2000, 3000, 4000, or 6000 Hz) in either ear that is confirmed for the same ear and frequency by a second test within 30 days of the first test” (NIOSH, 1998, p. xiv).

Sound. “(1) Oscillation in pressure, stress, particle displacement, particle velocity, etc. in a medium with internal forces (e.g., elastic or viscous), or the superposition of such propagated oscillations. (2) Auditory sensation evoked by the oscillation described above” (NIOSH, 1998, p. xiv).

Sound Intensity. “Average rate of sound energy transmitted in a specified direction at a point through a unit area normal to this direction at the point considered. Unit, watt per square meter (W/m^2); symbol, I ” (NIOSH, 1998, p. xiv).

Sound Intensity Level: “Ten times the logarithm to the base ten of the ratio of the intensity of a given sound in a stated direction to the reference sound intensity of 1 picoWatt per square meter (pW/m^2). Unit, dB; symbol, L .” (NIOSH, 1998, p. xiv).

Sound Level Meter. “A device that measures sound and provides a readout of the resulting measurement” (Owens, 2008, p. 153). These devices can provide time-weighted, linear, and octave band measurements.

Sound Pressure. “Root-mean-square instantaneous sound pressure at a point during a given time interval. Unit, Pascal (Pa)” (NIOSH, 1998, p. xiv).

Sound Pressure Level (SPL). The decibel level of acoustic pressure waves which is measured in force per unit area (Owens, 2008). Using a logarithmic amplitude scale, sound pressure levels are calculated by considering: “Ten times the logarithm to the base ten of the ratio of the time-mean-square pressure of a sound, in a stated frequency band, to the square of the reference sound pressure in gases of 20 micropascals” (NIOSH, 1998, p. xv). Sound pressure levels are measured in decibels (dB).

Spectral Content. Measuring the sound pressure levels of various frequencies within a sound (Royer, 1996).

Stapedius. “A small muscle on the wall of the tympanic cavity of the middle ear. It acts reflexively in response to loud sounds to reduce excessive vibrations that could injure the internal ear by pulling the head of the stapes posteriorly out of the oval window” (Mosby’s Medical Dictionary, 2009).

Stapes. “One of the three ossicles in the middle ear, resembling a tiny stirrup . . . which “transmits sound vibrations from the incus to the internal ear” (Mosby’s Medical Dictionary, 2009).

Temporary Threshold Shift (TTS). “Temporary increase in the threshold of audibility for an ear caused by exposure to high-intensity acoustic stimuli” (NIOSH, 1998, p. xv). In audiometric tests, TTS often appears as a temporary change in hearing acuity between 4000 and 6000 Hz (Woolford et al, 1988).

Threshold of Hearing. The “amount in decibels by which the hearing threshold for a listener, for one or both ears, exceeds a specified reference equivalent

threshold level” (NIOSH, 1998, p. xiii). In other words, the “minimum SPL [sound pressure level] of a specified sound that is capable of evoking an auditory sensation for a given listener” (Owens, 2008, p. 153).

Threshold of Pain. The “minimum SPL [sound pressure level] of a specified sound that will produce a sensation of definite pain in the ear of a given listener – typically 120 to 140 dB SPL” (Owens, 2008, p. 153).

Threshold Shift. Any temporary or permanent shift in hearing sensitivity (Owens, 2008).

Tinnitus. The subjective auditory perception of a high-pitched tone, manifested as ringing, hissing, or whooshing sounds, which may appear in one or both ears; the condition can be temporary or permanent (Zeigler & Taylor, 2001, p. 136).

Time-Weighted Average (TWA). “A value, expressed in dB(A), that is computed so that the resulting average is equivalent to an exposure resulting from a constant noise level over an 8-hr period” (Owens, 2008, p. 153). Using an 85-dBA exposure limit and a 3-dB exchange rate, the time-weighted average is calculated according to the following formula: $TWA = 10.0 \times \log(D/100) + 85$. The D in this formula = dose. (NIOSH 1998, p. xv).

Transient Otoacoustic Emissions. “Sounds emitted in response to an acoustic stimuli of very short duration; usually clicks but can be tone-bursts” (Campbell & Meyers, 2014, para. 2, second bullet point).

Tympanic Membrane. “A thin, semitransparent membrane in the middle ear that transmits sound vibrations to the internal ear by means of the auditory ossicles” (Mosby’s Medical Dictionary, 2009).

Tympanometry. Measures the “function of the structures and presence of fluids in the middle ear. Tympanometry is an objective assessment of middle ear function . . .” (Pisano, 2007, p. 92).

Weighted Measurements. Measuring sound levels to “account for the way the ear perceives the ‘loudness’ of sounds” (Owens, 2008, p. 153). The most common weighted systems used to measure sound levels include the *A-weighted* and *C-weighted* systems. The A-weighting system determines loudness based on a scale of 40-dB SPL, 1-kHz reference tone. This scale is the most useful in measuring the mid-frequencies of hearing between .5 to 4 kHz. The C-weighting system operates on a scale of 90-dB SPL, 1 kHz reference tone. This measurement system includes lower frequencies. (Owens, 2008).

APPENDIX C

DEFINITION OF THEORETICAL TERMS

The following terms appearing in this dissertation relate to the theoretical framework of humanities-based disability studies and transcendental phenomenology.

Ableism. Ableism is discrimination or prejudice against individuals based on medicalized notions of bodily difference, which view and treat impairment and disability as a personal deficit (Garland-Thomson, 2005; Hehir, 2002).

Clustering. The third step in the process of phenomenological reduction: researchers group the significant statements revealed through the process of horizontalization into thematic groups (Moustakas, 1994).

Composite Description. The composite description is a synthesis of the textural and structural descriptions of a phenomenological study that describes the shared experiences of the research participants in an effort to convey the essence of a phenomenon (Moustakas, 1994).

d/Deaf. *deaf* refers to the physical impairment of not being able to hear; *d/Deaf* refers to individuals who self-identify as being part of a cultural group of individuals who are hearing impaired (Brueggemann, 1997; Darrow, 1993).

Disabled. The use of the term *disabled* throughout this study refers to the discriminatory and oppressive consequences that are a direct result of society's

negative perception of bodily difference (Davis, 1995; Dobbs, 2012; Garland-Thomson, 2005).

Epoché. Moustakas (1994) describes the self-reflective process of *epoché* as “setting aside predilections, prejudices, predispositions, and allowing things, events, and people to enter anew into consciousness, and to look and see them again, as if for the first time” (p. 85). This process allows phenomenological researchers to share their personal experiences including the contexts and situations that influenced their experiences with the phenomenon being studied.

Essence. The essence of a phenomenon is a synthesis of meanings discovered through the phenomenological research method. Moustakas (1994) defines essence as: “The final step in the phenomenological research process is the intuitive integration of the fundamental textural and structural descriptions into a unified statement of the essences of the experience of the phenomenon as a whole” (p. 100). Husserl defines essence as “that which is common or universal, the condition or quality without which a thing would not be what it is” (as cited in Moustakas, p. 100). The essence of a phenomenon is represented by the textural-structural synthesis developed by the researcher and participant after an “exhaustive imaginative and reflective study” (p. 100).

h/Hearing. In relationship to d/Deaf, Brueggemann and Modellmog (2002) distinguish between *hearing* as the physical capability of an individual’s hearing mechanism and *h/Hearing* as a cultural group that is considered to possess normal

hearing based on the historical conditions and medicalized practices of a given society (Brueggemann, Chrisman, & Lupo, 2005).

Hearing Impairment. Any malfunction of the auditory system, which may include changes to hearing sensitivity, frequency range, loudness, or pitch (Woolford, Carterette, & Morgan, 1988).

Hermeneutic Phenomenology. Hermeneutic phenomenology focuses on the study of experience as defined through consciousness and the “reading of a text so that the intention and meaning behind appearances are fully understood” (Moustakas, 1994, p. 9). The basic structure of an experience is discovered through description and reflective interpretation of a phenomenon.

Horizonalization. This is the second step in the process of phenomenological reduction, which requires researchers to reduce all relevant data to significant statements, sentences, or quotes that describe how the research participants experienced a particular phenomenon (Moustakas, 1994).

Imaginative Variation. Also known as the structural description of a phenomenological study, imaginative variation is the written description of the context or setting in which the research participant experienced the phenomenon (Moustakas, 1994).

Intentionality. The intentional act of consciousness toward an object; the relationship between the act of consciousness and the object of consciousness (Moustakas, 1994, p. 28).

Intuitive Integration. Intuitive integration is the final step in the phenomenological research process, which is a synthesis of the textural and structural descriptions into a “unified statement of the essences of the experience of the phenomenon as a whole” (Moustakas, 1994, p. 100).

Invariant Structure. The underlying structure of the common experiences shared by the research participants, which reveal the essence of a phenomenon. The invariant structure, or essence of a phenomenon, gives the reader a better understanding of what it is like to experience a particular phenomenon (Creswell, 2007).

Noema. Moustakas (1994) defines noema as “not the real object but the phenomenon, not the tree but the appearance of the tree” (p. 29) and “the clearing of what is actually presented in consciousness” (p. 30).

Noesis. Miller defines noesis as the explication of our beliefs about phenomena and how we experience such phenomena (as cited in Moustakas, 1994, p. 32).

Normal/Normalcy/Normativity. The concept of *normal* in the English language has a relatively brief history, coming into usage between 1840-1860. Davis (2010) explains that the concept of normal implies that the majority of a given population should be part of the norm, rendering those who do not meet the established criteria to the peripheries of social acceptance.

Phenomenological Reduction. The task of phenomenological reduction consists of “describing in textural language just what one sees, not only in terms of

the external object but also the internal act of consciousness, the experience as such, the rhythm and relationship between phenomenon and self” (Moustakas, 1994, p. 90). Phenomenological reduction is an ongoing process of reviewing and describing the textural qualities of the research data. Moustakas (1994) describes this as the process of transcendental phenomenological reduction: *transcendental* refers to the “uncovering of the ego for which everything has meaning” (p. 91); *phenomenological* is the examination of objects and experiences in the world as phenomena; and *reduction* leads the researcher and the research participants to consider their experience as the way things are in the world (p. 91).

Phenomenology. The study of a concept or phenomenon as experienced by several individuals. Phenomenological studies identify experiences that are common to a particular phenomenon in order to reduce those experiences to a “description of the universal essence” (Creswell, 2007, p. 58) of the phenomenon. The data gathered in a phenomenological study is reduced to a composite description of the phenomenon as it is experienced by the research participants; this description provides a detailed account of what the research participants experienced and how the phenomenon was experienced (Creswell, 2007; Moustakas, 1994).

Stigma. Goffman (1963) defines *stigma* as a “deeply discrediting” (p. 3) attribute based on a socially undesirable characteristic of bodily difference. Straus (2006) defines disability as any “culturally stigmatized bodily difference,” (p. 119) which may be desirable or disabling, depending on context. Brown (2010) calls stigma “a response to the dilemma of difference” (p. 147) and points out that the

degree of stigma is determined by how undesired the difference is by a particular social group or within a specific social context.

Structural Description. The structural description in a phenomenological study is a “written description of the context or setting that influenced how the participants experienced the phenomenon” (Creswell, 2007, p. 61). This is also referred to as imaginative variation.

Textural Description. The textural description in a phenomenological study is a written description of what the participants experienced as it is related to the phenomenon being studied. These descriptions are comprised of the significant statements and themes derived from the reductive process of horizontalization (Moustakas, 1994).

Transcendental Phenomenology. The research methodology of transcendental phenomenology is a rational path of seeking “universal self-knowledge” (Moustakas, 1994, p. 40) through a methodological approach that attempts to eliminate prejudgments and presuppositions towards a state of reflection on the everyday experience of the individual. This phenomenological method is considered transcendental because it investigates through reflection on subjective action as objective reality.

APPENDIX D: IRB APPROVAL LETTER



Education and Social/Behavioral Science IRB 12/16/2013

Submission ID number: 2013-1652

Title: Instrumental Music Educators' Lived Experiences of Music-Induced Hearing Loss: A Phenomenological Study

Principal Investigator: TERYL DOBBS

Point-of-contact: TERYL DOBBS, DAN STEWARD

IRB Staff Reviewer: LILLIAN LARSON

A designated ED/SBS IRB member conducted an expedited review of the above-referenced initial application. The study was approved by the IRB member for the period of 12 months with the expiration date of 12/15/2014. The study qualified for expedited review pursuant to 45 CFR 46.110 and, if applicable, 21 CFR 56.110 and 38 CFR 16.110 in that the study presents no more than minimal risk and involves:

Category 7: Research on individual or group characteristics or behavior (including, but not limited to, research on perception, cognition, motivation, identity, language, communication, cultural beliefs or practices, and social behavior) or research employing survey, interview, oral history, focus group, program evaluation, or quality assurance methodologies

To access the materials approved by the IRB, including any stamped consent forms, recruitment materials and the approved protocol, if applicable, please log in to your ARROW account and view the documents tab in the submission's workspace.

If you requested a HIPAA waiver of authorization, altered authorization and/or partial authorization, please log in to your ARROW account and view the history tab in the submission's workspace for approval details.

Prior to starting research activities, please review the Investigator Responsibilities guidance (<http://go.wisc.edu/m0lovn>), which includes a description of IRB requirements for submitting continuing review progress reports, changes of protocol and reportable events.

Please contact the appropriate IRB office with general questions: Health Sciences IRBs at 608-263-2362 or Education and Social/Behavioral Science IRB at 608-263-2320. For questions related to this submission, contact the assigned staff reviewer.

APPENDIX E

PRELIMINARY PARTICIPATION FLYER

RESEARCH STUDY on HEARING LOSS in MUSIC EDUCATION

Doctoral Research Study

UW-Madison

Looking for instrumental music educators willing to share their experiences with occupational hearing loss and/or tinnitus. The central purpose of this study is to examine the phenomenon of music-induced hearing loss as an occupational hazard for instrumental music educators.

Participants in this research study will be asked to **fill out a brief survey** concerning their teaching and performing background, including their experience with hearing impairment. Individuals may be asked to share elements of their medical history that directly relates to their hearing health. Participants will also be asked to share their stories in a **conversational one-on-one interview** about their experiences with hearing health as it relates to their profession as a music teacher and/or performer.

Participant names and places of employment will be kept confidential.

If you are interested in participating in this research study, please contact

Dan Steward, A.B.D.

UW-Madison, Curriculum and Instruction

dgsteward@wisc.edu

APPENDIX F
WRITTEN CONSENT FORM

Research Participant Consent Form

UW-Madison

Curriculum & Instruction: Music Education

Researcher: Dan Steward, A.B.D.
608-296-2141 ext. 1063; stewardd@westfield.k12.wi.us

Principal Investigator: Teryl Dobbs, Ph.D.
608-890-1490; tdobbs@wisc.edu

Educational/Social Behavioral Sciences IRB
Lil Larson, IRB Director, 608-263-2320
lm Larson@ls.wisc.edu

To the Participant,

This consent form is being provided to you based on your expressed interest in participating in the following research study: Instrumental Music Educators' Lived Experiences of Music-Induced Hearing Loss: A Phenomenological Study.

The data from this study will be included in a dissertation in fulfillment of a doctoral requirement for the Ph.D. degree. The central purpose of this study is to examine the phenomenon of music-induced hearing loss as a *disabling* occupational hazard for instrumental music educators.

This phenomenological study will describe the experiences of music-induced hearing loss among middle and secondary instrumental music teachers. The phenomenon of music-induced hearing loss will be defined through the participants' personal and professional experiences in order to illustrate to the reader the nature of the problem in the field of music education and the implications the phenomenon has for music teachers.

Participants will be asked to fill out a brief survey concerning their teaching and performing background. Individuals may be asked to share elements of their medical history that directly relate to their hearing health. Participants will also be interviewed about their experiences with hearing health as it relates to their profession as a music teacher and/or performer. All interviews will last approximately forty minutes. The location of the interview will be a mutually-agreed upon location suggested by the participant.

The identity of the research participants in this study will be confidential. All names and professional identifiers will be changed in the dissertation and any future publications. Only the researcher will have access to the audio recordings of the interviews. The researcher will protect the identity of the participants and will not reveal any identifiable information about them in the study. Confidentiality may be broken if evidence of neglect or abuse is observed by the researcher while in the home of the research participant.

If you have any questions about the research, its purpose, data collection strategies, or its findings please ask the researcher at any time.

There are no direct benefits for participation in this study. There are no known risks or discomforts associated with this study, and participants may withdraw at any time.

Please sign your consent if you fully understand the nature and purpose of this study.

Signature of Research Participant

Date

APPENDIX G
PRELIMINARY SCREENING CRITERIA

Individuals responding to the preliminary participation flyer will be asked the following screening questions to determine eligibility in the research study.

1. How long have you been teaching?
2. What grade levels do you teach?
3. What subject areas do you teach?
4. Have you experienced hearing loss and/or tinnitus since becoming a music teacher?
5. Describe the severity and frequency of your hearing-related symptoms.

APPENDIX H

RESEARCH PARTICIPATION SAMPLE RESPONSE

Below is a sample of my response (via electronic mail) to individuals who responded to my preliminary participation flyer.

Thanks for your willingness to participate in my research study.

The study will consist of a short survey and an interview.

What number should I use to contact you to set up a meeting time, and when is the best time for you to be reached?

I look forward to meeting you!

-Dan Steward

APPENDIX I

MUSIC-INDUCED HEARING LOSS SURVEY

Music-Induced Hearing Loss Survey

Name: _____

Date: _____

List the performance ensembles that you direct AND the grade level of each of these ensembles.

List any other classes that you teach.

How many years have you been teaching?

Put an X next to any of the following symptoms you have experienced?

If selected, also indicate how long you have experienced these symptoms?

High-End Hearing Loss _____ YES _____ NO _____ ???? _____ # of Years

Low-End Hearing Loss _____ YES _____ NO _____ ???? _____ # of Years

General Hearing Loss _____ YES _____ NO _____ ???? _____ # of Years

Tinnitus _____ YES _____ NO _____ ???? _____ # of Years

Physical Pain in Ear(s) _____ YES _____ NO _____ ???? _____ # of Years

Difficulty Hearing Speech _____ YES _____ NO _____ ???? _____ # of Years

(1). Indicate your level of using hearing protection while TEACHING.

Most of the Time Frequently Occasionally Rarely Never

(2). Indicate your level of using hearing protection while PLAYING.

Most of the Time Frequently Occasionally Rarely Never

(3). How often do you have your hearing tested?

Annually Every other Year Once every 5 years Infrequently Never

(4). Do you use a hearing aid? YES NO

(5). Which performance ensembles do you direct in your current position?

Concert Band Marching Band Jazz Band Pep Band Amplified Ensembles

(6). How many students are in your largest performance ensemble?

Less than 20 20-40 41-60 61-80 81-100 More than 100

(7). Which of the following best describes the instrumentation of your largest performance ensemble?

Well-Balanced + High-Range + Mid-Range + Low-Range Poor – Low Nos.

(8). How would you rate the acoustical properties of your rehearsal or performance space?

Excellent Very Good Adequate Poor Terrible

(9). How excessive do you think the levels of sound are in your work environment?

Extremely High High Moderate Low

(10). How often do you think you are exposed to excessive levels of sound in your workplace?

8+ hours/day 6-8 hours/day 3-5 hours/day 1-4 hours/day Less than 1 hour/day

(11). How often do you perform outside of your school responsibilities?

10+ gigs/month 5-9 gigs/month 2-4 gigs/month 1 gig/month

1 gig every few months 1 gig every six months or so Rarely perform publicly

(12). How often do you attend live concerts of amplified music (e.g. rock shows)?

Very Often Frequently Occasionally Rarely Almost Never

APPENDIX J
INTERVIEW QUESTIONS

Instrumental Music Educators' Lived Experiences of Music-Induced Hearing Loss: A Phenomenological Study

Phenomenological Research Protocol: Interview Questions

Date of Interview:

Time:

Location:

Interviewer:

Interviewee:

Introductory/Background Questions

1. When I first contacted you about this interview, and told you the focus of the research, what were your first thoughts?
2. Why did you decide to become a teacher?
 - 2a. When did you make this decision?
 - 2b. How do you feel about the profession, and your decision to become a teacher, today?
3. Tell me about your work history as a professional music educator.
 - 3a. How long have you been teaching?
4. Describe your current position.
 - 4a. What are your primary responsibilities?
 - 4b. What are your primary goals as a music educator?

Research Question #1: How does music-induced hearing loss affect the experience of being an instrumental music educator?

5. What has been your personal experience with hearing-related medical issues?
 - 5a. Describe the physical sensation of this phenomenon.
 - 5b. How do you feel when you are experiencing this?
 - 5c. When did you first experience this?
6. Have you ever seen a doctor, or hearing specialist regarding your hearing health?
 - 6a. If so, how did the medical professional respond to your description of the symptoms?
 - 6b. Were you given a diagnosis?
 - 6c. If so, what was your reaction?
 - 6d. If you received a diagnosis, what did you decide to do afterwards?
7. How often do you think about your hearing?
 - 7a. What do you think about?
 - 7b. When do you think about it?
 - 7c. What scenarios cause you to think about your hearing?
8. How do your hearing issues relate to your profession?
9. How would you describe the acoustic environment of your workplace?
 - 9a. Describe the physical properties of your workplace?
 - 9b. How do you suppose your students would describe this environment?

10. In your profession: what sounds do you find pleasant? unpleasant?

10a. In your personal life: what sounds do you find pleasant? unpleasant?

11. Free word association. Please describe the following sounds, as you perceive them, using one word: clarinet, trumpet, alto saxophone, bassoon, flute, trombone, snare drum, tuba, piccolo, bass drum, euphonium, piano.

11a. What is your primary performance instrument?

11b. Describe your past and present performance history.

Research Question #2: How does the use of hearing protection affect the experience of teaching within the music classroom?

12. Do you use earplugs as a teacher or performer?

12a. If so, how does this affect your perception of the music?

12b. What do things sound like while wearing the earplugs?

12c. If you teach while wearing them, how does this affect your teaching?

12d. How do students respond to your use of earplugs in the classroom?

12e. What do you tell your students about why you wear them?

12f. Do any of your students wear earplugs in classroom or performance situations?

12g. Do your colleagues, parents, or administrators know that you wear earplugs while teaching?

12h. If so, how do they respond to this?

Research Question #3: How might examining the lived experiences of music educators who experience the phenomenon of music-induced hearing loss

contribute to our understanding of hearing impairment and disability within music education?

13. Have you ever requested financial support from your school district in order to pay for audiology exams or hearing protection?

13a. Does your health insurance cover hearing health-related expenses?

13b. Have you ever requested an acoustical evaluation of your classroom or performance space?

13c. Have you ever requested any accommodations for a hearing disability

14. What classroom stories or anecdotes best illustrate your experience with hearing-related issues as a music teacher?

15. Do you think music-induced hearing loss is an avoidable problem for instrumental music educators?

16. What would you tell first-year music teachers about this issue?

17. Do you think this issue is adequately represented in teacher education programs?

17a. Do you think this issue is adequately represented in professional organizations or their literature?

17b. How often is this issue a topic of conversation with your colleagues, students, administrators, etc.?

Concluding Questions

18. What would you like to see happen with the results of this study?

19. Is there anything else about this topic that you would like to discuss that was not covered?

APPENDIX K

PHENOMENOLOGICAL REDUCTION WORKSHEET

The following document is an example of a reduction worksheet that I developed to identify the significant statements regarding the descriptions of hearing loss through the process of phenomenological reduction. I used this process in order to identify the significant statements for the three textural themes that described the participants': (a) physical, (b) emotional, and (c) pedagogical experiences of music-induced hearing loss. The reduction process that I employed consisted of the following steps:

1. List all of the relevant statements.
2. Assign a theme to each statement.
3. Begin eliminating the repetitive or overlapping statements for each theme.
4. Record the remaining statements.

APPENDIX L

RELEVANT STATEMENTS

The following list consists of the initial 328 relevant statements taken verbatim from the participant interviews. I grouped these statements into preliminary categories in order to organize the statements before reducing the data to a concise list of significant statements. The number following each category displays how many statements related to each category.

Descriptions of Hearing Loss (55)	
1.	"I used to always have music on all the time, but it's now gotten to a point where I generally don't."
2.	"The headaches . . . the amount of sound and . . . anecdotal discussions with other band teachers about their careers being shortened due to hearing loss . . ."
3.	". . . but learning that after a particularly loud period of time, to be willing to take time and find quiet, and find ways to let myself heal . . ."
4.	"The thing I thought about is when I'm hearing music now is it colored by the fact that I'm not hearing certain frequencies."
5.	"But I think that there are things that I'm missing, yeah, I think I could be a better teacher if I didn't have that."
6.	"Well, it's hard to participate in conversation."
7.	"We'll go out in the hallway, or to a different room, and it's so I can hear them; it's frustrating."

8. "... many times I have to look at him and have him repeat things for me."
9. "Mostly I have trouble understanding when certain people are speaking to me, particularly people whose voices are more pitched in the higher register, I have trouble understanding . . . "
10. "... when I was conducting in the orchestra, and we'd stop and one of the musicians had a question for me, and I couldn't always understand what their question was . . . "
11. "... I've started to notice even more that the difficulty to hear in large group settings, women's voices, distinguishing consonants, <i>Bs</i> and <i>Ds</i> , <i>Ps</i> and <i>Ts</i> , things like that."
12. "... but it definitely does to me feel like and sound like that it's deteriorating, and it's harder and harder for me to hear in those situations with a lot of background noise, etc . . . "
13. "I also notice I have problems hearing conversation, especially baritone voices—large crowds, forget it."
14. "I can pick out an out of tune flute, but I can't hear you in a room."
15. "... I have a problem when there are background noises when people are talking . . . understanding what they're saying."
16. "I think there's times when I might be talking with someone and I have issues with misunderstanding something they're saying if there's background noise."
17. "Like, if the students are warming up on their own and someone is asking me questions, it's difficult."

18. "I have trouble hearing people in a crowded room, and I have trouble hearing people talk."
19. ". . . it doesn't always bother me, but if I have an ear infection I have a difficult time paying attention to the students."
20. "The primary reason was to get hearing protection because all of my band colleagues, as soon as they hit 40 . . . are saying 'what, what, what'."
21. "I would say it's sometimes harder for me to hear people, I need to ask people to repeat things, where as in the past I never had that."
22. "I can hear things pretty well, musically; I just can't hear speech very well when I'm playing."
23. "If the decibel level gets a little bit higher, it becomes increasingly more difficult to hear people, where it shouldn't be."
24. ". . . there are situations where conversation voice is more difficult."
25. ". . . conversations with kids sometimes, and not being able to hear them in rehearsal, definitely."
26. "I'm noticing that it's hard for me to hear people speaking."
27. "It's hard for me to hear the higher pitches, like the consonants when people talk."
28. "Like, you can hear fine when the band, if the whole band is playing, but then you stop and rehearse something, and if people were talking, you couldn't hear what they were saying."
29. "Because I definitely ask my students these days to be sure to speak up when they're talking to me—and enunciate—especially if they're in the back of the

room."
30. "I feel like it can be . . . like physically exhausting . . . and like on a more personal, emotional level, it becomes really hard to deal with people when you're experiencing that."
31. ". . . I was not pleased to hear him [audiologist] say that I am a candidate for a hearing aid."
32. "I don't know that I'd get earplugs at this point, but probably a hearing aid is probably the next step in my saddeningly [sic] career."
33. "I found that what I couldn't hear was not their vowel sounds, of course I could hear them talking, their vocal chords working, but I couldn't hear the consonants."
34. "I felt like someone had an ice pick in my ears."
35. "The sensation of hearing is, in my opinion, muffled."
36. ". . . the inability [of] being able to hear speech in a room where there's competing noises."
37. "I can hardly hear the finger cymbal, yet I see the kid doing it."
38. ". . . there's like this whole range that's virtually gone."
39. "Sudden changes of volume to the loud side are . . . they used to be maybe startling, now are literally painful."
40. "I've had some hearing loss, mostly in the left ear. And it would be the high-end, my audiologist has told me."

41. "I noticed that I'm getting better at reading lips."
42. "I noticed a little bit more, like sensitivity to it. Not so much loss, but sensitivity to sound."
43. "Whereas I think most music educators have become even more fine-tuned over time, I feel like that's diminished [pitch] as well in the last several years."
44. "But all the time, at least . . . I'd say, at least four or five times an hour, every day."
45. "It's actually physical pain."
46. "It's just that it really physically hurts."
47. "Yeah, boy, at times it feels almost like blocked, almost stuffy."
48. "I guess I feel like at this point in time it feels almost sort of stabilized . . . It can, I think lull me into a sense of security . . ."
49. ". . . I feel like each year, by the end of the year, I feel like it definitely . . . I'm hearing less well."
50. ". . . I feel like, by over the summer, things recover a little bit."
51. ". . . and when they tested my hearing . . . it was like one spot in the upper register that I had like a big dip in my hearing."
52. "It affects the concentration, and definitely the mood."
53. "I have to have the room silent in order to hear any of the low pitches."

54. "When you go to concerts and you hear most of it, but there is still that section of the frequencies that you can't hear anymore."
55. "I wonder if I'm hearing things the way they really are sometimes."
Descriptions of Tinnitus (44)
56. "I mean it set in . . . where it was just like . . . one day it wasn't noticeable, and the next day it was like you turned on a switch, and it hasn't gone away since."
57. "It's like I got cicadas screaming at me all the time. Or, someone would follow me around with a glockenspiel, doing a roll on it."
58. "Silence is almost worse . . ."
59. ". . . but just to have T.V. on . . . just so I'm hearing something other than the ringing in my ears."
60. "Just a constant high pitch, kind of high pitch, that doesn't stop."
61. "I definitely feel less effective; in rehearsal, it's distracting."
62. "It's almost like a piercing sensation, like somebody is sticking something in my ear."
63. ". . . they cause this rumbling sensation that I hear, and it sounds like it's rumbling inside my eardrum."
64. "I'll get a ringing in my ears that will sometimes last for two or three days."
65. "All I would really say is that it's a high-pitched ringing in my ear from time to time."

66. "... it's more the ringing, and catching consonants at the beginning of sounds, that kind of thing."
67. "... it's the two pitches in both ears are about the same."
68. "Yeah, just laying [<i>sic</i>] there and hearing it for the first time, really, and then every night hearing it and going, 'ok, it's not going away, it's there.'"
69. "... it's not pain, but there's times where it does feel almost like things are wavering in the ear."
70. "... but definitely that stuffiness at times, and that wavering, or pulsing feeling."
71. "Usually it's one pitch, not two or three pitches clashing against each other."
72. "I remember laying [<i>sic</i>] in my apartment bed and all of a sudden, I said, 'oh, no,' and I heard the ringing."
73. "I have tinnitus, a low roaring sensation when it's quiet, definitely present; occasionally ringing in the ears, very high-pitched, high whine, doing that."
74. "When it's quiet, when you want that silence after a loud, noisy day, it's there—it's your constant friend."
75. "... I would experience the white noise, but it would always fade away. Well, it's always there now, in the background."
76. "What is that sound!? I just heard this sound!"
77. "Well, that humming sound, don't you hear that humming sound!?"

78. "... how to save your hearing so you're able to survive your teaching career, not be cursed with that terrible ringing sound that I have all the time.
79. "Every day. It rings every day. I have not heard silence in maybe twenty years."
80. "There's never one day that I'm not thinking about my hearing because it's like someone is either using a circular saw in the basement, or there's people all around me playing the triangle . . ."
81. "I think about my hearing all the time because you can't get away from the sound."
82. "It sounds like a . . . it's a tone. And it lasts probably about two minutes, and then it will go away. And I experience it about once a day."
83. "Sometimes it's loud and it wakes me up, like a noise."
84. "There's times I'll tell them that I can't play with you because my ears are ringing, and it's been too long of a day."
85. "... I tend to gauge things sharp, and I don't know if that's the tinnitus that's leading me sharp, because it's so high."
86. "Constant tone in both of my ears . . ."
87. "It's almost like an electrical, high-pitched tone that's very steady."
88. "And it will stay constant for several minutes, if not longer; and then it will dissipate, and it may or may not come back several times that day."
89. "... comes and goes throughout the day."

90. "And sometimes I'll even hear like a . . . like when you take a conch shell up to your ear, and they tell you you're hearing the ocean, but you're just hearing the air pressure inside."
91. "I don't have tinnitus all the time. I'd say it comes on every once in a while very rarely, maybe once every three months, for maybe five to ten minutes."
92. ". . . it never stops anymore, it's there continuously."
93. "I have tinnitus, and I got that my first year of teaching actually."
94. ". . . maybe after the first month, I started hearing the buzzing in my ears at night."
95. "There are days when I've had too much caffeine, things like that, and the buzzing is stronger, then it tends to get a little tough."
96. "If I blow a whistle, it would be really loud for like two days—the buzzing."
97. "It sounds like a really high-pitched tone . . ."
98. "I have tinnitus probably a couple times a week . . . I notice it when I lay down to go to sleep there's always a little tinnitus that I can hear when it's really quiet."
99. "That very quiet tinnitus that I hear every night never goes away."
Emotional (38)
100. ". . . because it is something I am pretty concerned about."
101. "It will irritate me when it happens three or four times, and even though she'll be trying [clanging dishes]."

102.	"Irritated. It's annoying, so my nerves are usually a little on edge."
103.	"I think the only thing it interferes with is my ability to calm down . . . I have a hard time calming down because it's there."
104.	"Higher elevated levels of stress, where I haven't brought myself down to coping with the situation yet."
105.	"Every time I practice, every time I rehearse, that thought [hearing loss] is there."
106.	"The biggest thing for me that it affects is—even with my hearing loss, I was able to teach pretty well, but—it took the joy out of my teaching."
107.	"In order to be a band director, you gotta love the sound of the band and, very frankly, a band just doesn't sound the same to me anymore."
108.	"Actually, I know this sounds weird compared to something, but when I get home from work I just want it quiet."
109.	"I rarely listen to music in the car. I don't want that sound coming at me after having sound coming at me all day long."
110.	"When it first came on it was very emotionally distressing, because my dad was a band director for about ten years early in his career and got out of teaching for a while and got recertified."
111.	"...how am I going to do this; how am I going to have a career in music, when I'm not even out of college yet?"
112.	". . . for me it's a constant struggle of trying to figure out, literally, how long

	can I sustain this."
113.	"Yeah, it's something that I still—and very often—think about and struggling [sic] with; and trying to figure out, 'how do I manage this,' and 'where is the line?'"
114.	"I remember I was going through depression, but not clinical . . . situational depression."
115.	"I'm not as good as I used to be. And I could only see this getting worse, and that's when some of my depression kicked in because of that."
116.	". . . just that I worry that I miss things in the ensemble that I could be fixing."
117.	"Is my last year going to be one of these things where the kids know that I can't hear as well . . . and the kids are taking advantage."
118.	"And I find it terribly ironic, that the thing that is my bread and butter and the most important to me is what is being taken away."
119.	"Emotionally, I get curious and concerned—well, almost angry—because I'm afraid it's leading toward hearing loss."
120.	". . . and there are certain things you don't hear anymore, which kind of saddens you."
121.	"Well, it saddens me . . . and I wish . . . because it could've been preventable."
122.	"I worry about it. I worry that I might be, that my hearing is not as good as it used to be. So I do worry that it might be declining."
123.	". . . but I think it very easily could continue to deteriorate, or get worse."

124.	"... a person becomes a musician by having exceptional hearing ... and they go from exceptional to below average, it's hard to take."
125.	"Frustrated that I don't have that ability."
126.	"Emotionally, sometimes I wonder if it is ever going to go away, and every once in a while I get angry that I sacrificed this."
127.	"If I get annoyed because of it I might act a little short-tempered, but it hasn't affected my sleep."
128.	"I get really aggravated ... it's aggravating and very annoying."
129.	"Usually it's remembering that annoying buzzing in my head, the ringing ..."
130.	"... somebody will make a joke about [inability to communicate]."
131.	"One of those little jokes that go on, 'you know, I'm going deaf already, back it down, that's why we play piano.'"
132.	"We usually joke about that [hearing] and eyesight, how the scores are getting small."
133.	"Oh, it's a joke at the high school ... 'speak up, I'm deaf.' The kids know that I have some hearing loss."
134.	"... analyzing risk of what are the long term detriments ..."
135.	"And then of course that triggers thoughts of 'what am I going to do about it'."

136.	"I honestly think that people, in the back of their minds, are worried about it."
137.	"So, there's a part of me that is somewhat concerned about my hearing, and part of me just thinks me aging, or not paying attention."
Career Longevity (11)	
138.	". . . frustrated . . . apprehensive about my future . . . will I be able to do this for another ten years?"
139.	"I guess just about every day I think about, 'is it the same as yesterday,' and 'how many more years do I have in front of me, that I can do this?'"
140.	". . . because I feel like at 59 it's premature . . . this shouldn't be happening for ten or fifteen more years."
141.	". . . I don't see how I can, at my age where my hearing is now, and tinnitus, and everything, I don't see how I can have a 35-year career as a band director."
142.	"So, that to me becomes, 'how do I manage it,' and 'where do I draw the line?'; and say, 'it's time to move onto something else.'"
143.	"I worry that maybe I wasn't careful enough and that will manifest in the future, later in my life."
144.	". . . can I at least make it to my retirement age, what am I supposed to do?"
145.	". . . when I had to quit playing that was very difficult, very difficult—besides quitting teaching."
146.	". . . but it is something that I'm concerned with, because my cooperating teacher ultimately retired a few years earlier than he wanted to because of hearing loss."

147.	"Wondering about the future . . . should I go and get an audiologist to take a look at me now, or how much longer can I wait?"
148.	"That it's unhealthy. That they need to do something about it."
Acoustical Environment (25)	
149.	". . . there's a double-paned glass window that looks into the band office, and that will rattle like crazy, it's so loud in there; and they've had administration say 'no' to any changes."
150.	"If I had stayed, then I would have had to push to get either a better teaching space, or acoustic treatment for the room or something."
151.	". . . it was an empty closet, so none of the sound was getting soaked up anywhere. The sound bounced around like crazy, it was awful to teach in; it was very loud."
152.	". . . and since there was no distance that I could put between myself and my students because it was such a narrow space; by the end of one teaching year, I had tinnitus in my ear."
153.	". . . you had to find your mistakes by knowing what mistakes were going to happen, rather than just hearing them and diagnose them."
154.	"So, getting the carpet on the floor, and all that kind of stuff improved the directionality, but it probably did not lower the volume enough, in hindsight."
155.	". . . just not adequate floor space, or room value . . . so, we just really crammed in there—and just sound echoing everywhere."
156.	"'. . . music and band are going to be taught in these two rooms, you're going to need to equip them for sound differently than you would a normal classroom,' and the architect basically laughed."

157.	"... they did build practice rooms, but they didn't sound proof them at all . . . 'wow, if I sit in there with more than a couple of kids, this is not going to be good.'"
158.	"I would say that the biggest thing is that they never—all along, never—bothered to hire any experts at all."
159.	"But just kind of all along these little band-aid type fixes that I don't think ever really fixed anything."
160.	"But I was in a really small room for several years, and I taught lessons in a locker room at one point before our district built [music facilities]."
161.	"And they went to all the expense of building this fake wall, but I don't think they ever consulted any type of expert on it."
162.	"And I'm very glad we have what we have, but it's just not a big enough space, even with the acoustic treatments for the size of groups that we have."
163.	"And at that time I didn't understand how loud 80-90 decibels are, and she's just . . . you just see the horror on her face."
164.	"But I've been complaining about it over the years, and they're finally putting in carpet this year, and now they're talking about putting some kind of sound-deadening on the walls of some sort."
165.	"When they did supposedly make the improvements, they actually made the room worse."
166.	"Well, I think more attention needs to be paid on the physical space . . . like my classroom right now, there's no way 75 people should be in that room."

167.	"... it would be in their [music educators] best interests to think constantly about the volume in their room . . . "
168.	"... but I did teach in closets, it was pretty awful . . . I was assigned to teach in a hallway, and if I wanted a different space, I had to look for it."
169.	"When they build their buildings and redesign things they should be thinking about these issues."
170.	"I've been through these situations where the space is really unhealthy and—even in a healthy situation, like I have now—I'm sure that the decibel levels are way higher than they should be . . . "
171.	"But ultimately, it's got very low ceilings—that's my biggest concern—and the fact that there is a flat wall directly behind the podium where I conduct. . . "
172.	"There's no sound baffling at all. There is carpeting, but there are no sound panels, or anything, anywhere in the room."
173.	"... but for a few years I was rehearsing on the middle school stage which was an echo chamber—it was awful."
Sound Exposure (24)	
174.	"... five full group rehearsals every day . . . [the] cumulative effect of that much sound input . . . I have quite a bit of ringing in my ears."
175.	"... if it has been an especially loud day, I'll have a headache for a couple hours afterwards."
176.	"I think it's probably that [sic] size of the room [that] contributed to my tinnitus."

177.	"It's right in your face, all the time."
178.	". . . 'you need to avoid loud noises—well, what are you talking about, it's my job!'"
179.	"I think it's very important that people know the exponential power of decibels . . . "
180.	". . . when I end up after a class with 75 kids, then my ears hurt."
181.	"I describe it as getting tired."
182.	". . . because it's loud, and my ears end up reverberating after class."
183.	"I usually get kind of annoyed with myself that I haven't been more proactive in trying to protect my hearing before class."
184.	"So, it's more that I'm going to have to start doing something about it instead of just thinking it's going to fix itself."
185.	". . . wow, this is really an assault."
186.	". . . this has got to be bad for me."
187.	"I remember thinking they really hurt, and how foolish that was that I was in that loud, loud gym . . . without any sort of protection or anything."
188.	"We don't have quiet time, ever. We're always supposed to be helping somebody; in order to help somebody, they have to make noise."

189.	"... but the band literature has changed . . . these people are asking for intense dissonances."
190.	"I think it's at an excessive level every time we have full band, which is every other day, for three hours a day."
191.	"I don't know that the rehearsal setting necessarily needs to dictate whether or not you have ear protection—even outside in marching rehearsals I will still have earplugs."
192.	"... it gets a little bit excessive, so I probably should be doing something."
193.	"Every time I step into the band classroom it's just . . . my ears feel like I'm getting blasted by way too much sound."
194.	"They're [sound pressure levels] well over 90, you're getting into 110, 115, maybe 120."
195.	"Well, in general, they [audiologists] don't understand musicians, and their need to hear really, really well."
196.	"... I've talked to a number of band directors that feel as I do: that the hearing loss that they experience is a consequence of their employment."
197.	"I think that I'm hearing sounds that are too loud—that aren't good for my ears—and I will continue to experience hearing loss; and I may really notice it as I get much older . . . "
Hearing Protection (74)	
198.	"I feel like when I have the earplugs in—from a classroom management standpoint—I feel like the kids try to take advantage of it at the middle school level."

199.	"They don't stay in, not when I'm teaching; I must jump around too much."
200.	"Sometimes they don't fit in your ears perfectly; you gotta kinda wiggle them around in there and it's kind of uncomfortable."
201.	"After four or five months . . . it all of a sudden shrinks a little bit or something, and I'm getting a little seepage—and it's like, 'wait a minute, I used to have better protection than I do now.' "
202.	". . . but they would deteriorate so fast, and I didn't notice that I was not getting as good a [sic] protection because it wasn't as good a seal."
203.	"I don't think it would be feasible to teach with any kind of hearing enhancement—or for that matter, to perform."
204.	"It doesn't feel as physical."
205.	". . . I would always have my drumline members at least have a pair of foam earplugs . . . "
206.	"You can't hear your own sound the right way with any kind of hearing protection in."
207.	". . . but you lose that ability to really control your sound quality, which is what people are paying for."
208.	"Sometimes it's like my ears are plugged, and I hear myself when I'm playing."
209.	"I can actually hear my lips buzzing inside my head."

210.	"I can hear myself and the sound my lips are making much more strongly than what else is going on, so I don't feel like I can get a good idea of balance and things."
211.	". . . I found that doing both ears was too weird—to try and play my horn while I had them in both ears."
212.	"Even with very good earplugs, I really feel as a performer I feel it affects my intonation."
213.	"I feel like it always hurts my ability to blend with those around me . . ."
214.	"Well, I don't know how you would possibly be able to balance yourself with everybody else, because that would be distorted . . . I would be very concerned about being able to balance."
215.	"I usually don't wear them during a performance; a lot [of] times it's just the practices."
216.	"Not sure if I was hearing myself being in tune, or not."
217.	"It's not fun; I don't like it because the horn sounds completely different."
218.	"I feel like it's harder to hear everything that's going on, and I rely more on the conductor."
219.	". . . but some of the more delicate stuff is harder to pick up on."
220.	"I couldn't stand the way it made me sound, and the way that things sounded around me."
221.	"You very rarely see band directors wearing hearing aids, or professional musicians wearing hearing aids; even though you know damn well that

	anybody that's pushing 60 is going to have [hearing loss]. . ."
222.	"And then the audience sees you, and it's like, 'eh, is that . . . well, whatever, I really don't care about you guys, I need to protect myself here.'"
223.	"I don't think that there's much situation that calls for it [hearing protection] . . ."
224.	"I know I've mentioned to drum set players to consider buying earplugs."
225.	"That should probably be something that I do better as a teacher, is talk with my percussionists . . ."
226.	"I do have most of them [percussionists] wear hearing protection when they're playing in marching band."
227.	". . . everyone's [percussionists] gotta wear them [hearing protection]. . ."
228.	". . . put the earplugs in and then they would play louder, or purposefully play wrong notes."
229.	". . . you can never get the same results with the earplugs in, let's put it that way."
230.	". . . the moment you put in any kind of hearing protection, the kids would assume that you can't hear at all and then they would start causing problems."
231.	"It depends on the group: with marching band and pep band, 'all the time'; jazz band, 'some of the time'; and concert band, 'rarely'."
232.	"I don't have a headache at the end of rehearsal [when using hearing protection]."

233.	"... sometimes I do feel like I don't hear everything when they're in."
234.	"When I do use them with my concert groups—my jazz band sometimes—I feel like I don't hear all the fine music . . . "
235.	"... it makes it almost impossible for me to hear other things, and so I'm always yelling at the kids to quiet down."
236.	"Honestly, at times it's a little frustrating, and that's sometimes why I don't wear them [hearing protection]."
237.	"I don't think he's comfortable with the idea of using something [hearing protection] that might detract from his skill level."
238.	"I just, actually this year, started wearing them at concerts."
239.	"... that's probably also why I've gotten in the habit of not wearing them as much as a director, because I do feel like I really just don't hear the balance and the blending of the tone nearly as well . . . "
240.	"Because I'm always pulling them in and out . . . because I don't realize how loud I'm talking."
241.	"And so I felt like I wore mine more, I wore the hearing protection more when I was teaching high school."
242.	"I think in some ways I'm almost more self-conscious when I'm wearing them."
243.	"It's just I find it difficult to hear, to pick up the things that I need to pick up." [while wearing hearing protection]

244.	"I tend to feel like I lose the mid-tones; it's like listening through a closed door. The nuances . . . I want to be able to pick up on subtle tones."
245.	"I put them in my ears all the time, except for my best band, my best concert band, and my best jazz band. Otherwise, I'd wear them all the time."
246.	"But when I was working with my best groups, I wanted to hear balance the way it was, not the way my earplugs let me hear it."
247.	"I mean, if you really wanted to have your band be as good as it could be, you can't have any of that stuff [hearing protection] in, at least for some of the time."
248.	"I'm afraid I'm going to miss something. I'm afraid it's [hearing protection] going to filter things out so badly that I'm going to miss something."
249.	"I felt like I wasn't getting an accurate reading of what was going on [while wearing hearing protection]."
250.	". . . because the quality of the earplugs just hasn't been good enough yet, because it just blocks out too much sound, and then it's hard to do your job."
251.	"I'm totally open to it [wearing hearing protection], as long as they have something that's going to do what we need it to, which is to not block out everything; we need to still teach."
252.	"In a nutshell, it's just very hollow, and I don't feel as comfortable listening for intonation and balance [while wearing hearing protection]."
253.	"But, I found that I couldn't hear the kids talking [while wearing hearing protection]."

254.	"It would be nice during rehearsal to block out the sound, but I couldn't hear the soft levels."
255.	"I started getting paranoid that the kids were being naughty during my rehearsals, so I just stopped wearing them during practices."
256.	"You could hear all right with them in, but it was still a somewhat muffled experience."
257.	". . . if kids have questions, I end up having to take the earplugs out to hear what they have to say, or ask the kids to quiet down, and then I'll put them back in."
258.	"It was a little harder to get used to them because you couldn't hear, like I said, some of the voicing, some of the harmony stuff . . ."
259.	". . . coming to grips with some of the realities, but also try to be more proactive, rather than reactive."
260.	"But it has become kind of a running gag [communication problems], I guess, 'oh, is it because I had my earplugs in.'"
261.	"Yeah, the response isn't as easy. You start using it [hearing protection] in concert band [and] it still cuts off the highs."
262.	"I don't think you're as direct [while wearing hearing protection] because then the kids [sic] asking a question, and you can't hear it as well."
263.	"The inability to hear kids talking to me in the rehearsal [while wearing hearing protection]."
264.	"You gotta start wearing ear protection . . . I can't; I have to be able to hear."

265.	"I can discern individuals who are playing wrong notes in different sections—which student it actually is—but if I put in my general earplugs than I wouldn't be able to pick that up."
266.	"I thought it [hearing protection] would affect my ability to hear finer things, like tuning, and balance, and things . . . I just couldn't function with them in."
267.	"I tried hearing protection for a while, and I couldn't stand it; it was too hard to function in my classroom with it [hearing protection] in."
268.	"Everything sounds more muffled and it's really hard to communicate with middle school students when you have some kind of hearing protection in . . . "
269.	"So then I was finding I was taking them [hearing protection] in and out all the time to talk to my students and..."
270.	"Just taking them [hearing protection] in and out, so that I could hear my students talk, or whatever, was a hassle."
271.	"If I know I'm going to be playing at pep band, then I'll put them in because I'm going to be deafened by everyone else."
Financial (23)	
272.	"I know at my other school they were very aware of it [hearing loss], because they actually purchased the musicians' earplugs for me."
273.	". . . you made your bed, now sleep in it." [administrative response to requesting an acoustical evaluation of classroom]
274.	"They were aware of the cost of doing it, but also aware of the health danger and risk of hearing [loss] . . . trying to work within a budget, but yet, try [sic] to create the best, healthy environment within their budget."

	275. "I think we did like acoustic panels on the doors, and acoustic seals around the doors and doors sweeps, and he's just not willing to spend the money to do that."
276.	". . . that they would be skeptical, or hesitant on it [reimbursement for hearing protection]."
277.	"Because of that band room, they already had a band director who was leaving . . . but of course, no administrator or anybody would admit to that."
278.	". . . it also can be such a big battle with your administrators to get anything done, you just choose your battles."
279.	"And I really think hearing some of the stories in my district of colleagues trying to fight with the administrators to get them to do something [prompted action from the district]."
280.	". . . when she brought that [information regarding acoustical treatments for music classrooms] to her administrator she was laughed at because it was so expensive."
281.	"She shouldn't have to be doing all of the work for this, and if she wants anything done she's got to do everything."
282.	"There is [<i>sic</i>] way too many people that don't understand how damaging it is, and frankly don't want to find out, because that would cost money."
283.	"It was an administrator that was not very supportive of arts and nothing happened."
284.	"I don't even think they were willing to jump and do the research to find used panels, or anything like that. They were just, 'no, it's going to cost us too much, we're not bothering.'"

285.	"... that [hearing loss] was certainly a contributing factor to my decision to retire."
286.	"... 'you gotta get out of teaching, you're only going to make things worse; things are kinda exponential on this [advice received from an audiologist].'"
287.	"... you know, maybe I should be applying for disability of some sort."
288.	"I don't know what the process is for that [applying for disability], I don't know who has ever done it."
289.	"The audiology exams were included with the health insurance through work, and I have requested and received money to help pay for the earplugs."
290.	"I recall when we were having this conversation about the options that we have available to us that it [hearing protection] would not be covered."
291.	"The earplugs were not covered, in any way shape or form, but the appointment was with the doctor."
292.	"... our insurance covered the appointment."
293.	"The district covered the hearing appointment, but neither the Flex Plan, nor the district covered the cost of the hearing plugs."
294.	"... because I was complaining about it, and so it was a workman's comp claim."
Representation (2)	
295.	"In terms of hearing and hearing loss, it's something that, at least in my education, was never mentioned until briefly in college."

296.	"... you can't prove what you have, there's no way to prove the sounds that you're hearing. . ."
Sociopolitical (9)	
297.	"To be a really good teacher, and to really do what you want to do, it's pretty hard to avoid having your ears abused."
298.	"I have to admit that not a lot of people know that I have a hearing loss."
299.	"... but musicians with, let's say, hearing aids—you have absolutely no credibility, whatsoever."
300.	"So, the moment you tell them that your hearing isn't as good anymore, you've already lost credit."
301.	"At the high school level, I felt like the kids could understand, and empathize with it [hearing loss] a little bit more, and didn't really try and take advantage of it as much."
302.	"His reaction was such that I was afraid to admit that [hearing loss] to anybody else."
303.	"That I'm damaged."
304.	"... [hearing loss and excessive sound exposure] comes with the territory [of teaching instrumental music]."
305.	"... your credibility to work with a group is diminished, because they think you can't hear."

Coping (3)	
306.	"I have a sound-soother that creates the sound of water running, to try to mask it [tinnitus] if it's bad."
307.	"I guess just over the years I've come to terms with it and I've found ways to cope with it [tinnitus and hearing loss]."
308.	"That's what's been very challenging about it is trying to find those ways to cope."
Awareness (18)	
309.	"It [music-induced hearing loss] tends to get swept under the rug."
310.	"If you first get that moment when you think, 'whoa, that was too loud,' then it probably is too loud."
311.	"I guess I just didn't think I would need it [hearing protection] . . . when you're young you just don't think there's gonna be a consequence to some of your actions."
312.	"But I still don't think he fully grasps what can happen to him [colleague] over time; so I think by the time most people would be willing to do it [wear hearing protection], it's too late."
313.	"I've had student teachers and that's not a discussion [music-induced hearing loss] that I've ever had, but I might now after our discussion today."
314.	". . . it's our profession, and we need to be looking out for our people."
315.	". . . well, I think I should do this [pursue legal action for occupational hearing loss] for other band directors who are going to be going through the same

	thing I am, but basically I was convinced otherwise by my lawyer.”
316.	“... it would have gotten some publicity that maybe an awareness, a better awareness might have been out there—and so I do regret that now.”
317.	“... I think that’s just one layer that we really don’t pay attention to ourselves—we’re always focused on the kids.”
318.	“I think there needs to be a level of respect for hearing that isn’t there.”
319.	“I think it’s [music-induced hearing loss] just accepted.”
320.	“Maybe our audio health is just as important as our seeing and overall physical health.”
321.	“And once I got into my own practice it became a little bit more apparent, because one of the predecessors that I was replacing had just traumatic hearing loss.”
322.	“If they were just aware that this [music-induced hearing loss] is an occupational hazard that they need to address.”
323.	“We have to change the attitude of this [music-induced hearing loss] as an acceptable work related injury.”
324.	“I think it’s [conversations about music-induced hearing loss] something that we just kind of like avoid.”
325.	“So, yeah, I think that’s something that maybe veteran teachers have a responsibility to mention to younger teachers.”
326.	“And someone on the school board had basically just said, ‘well, just wear earplugs then, if it’s so loud in there, just wear earplugs.’”

Prevention (2)	
327.	“I don’t think it [music-induced hearing loss for music educators] can ever be eliminated; I think the problem can be reduced.”
328.	“But as far as eliminate it [music-induced hearing loss for music educators], no way to eliminate it.”

APPENDIX M

SIGNIFICANT STATEMENTS

The following list comprises the 48 significant statements that emerged from the process of horizontalization discussed in Chapter Five.

Significant Statements	
1.	“ . . . but learning that after a particularly loud period of time to be willing to take time and find quiet, and find ways to let myself heal . . . ” (Greg)
2.	“I have trouble hearing people in a crowded room, and I have trouble hearing people talk.” (Lana)
3.	“ . . . at times it feels almost like blocked, almost stuffy.” (Greg)
4.	“When you go to concerts, and you hear most of it, but there is still that section of the frequencies that you can’t hear anymore.” (Steve)
5.	“I feel like it can be . . . like physically exhausting . . . and like on a more personal, emotional level, it becomes really hard to deal with people when you’re experiencing that.” (Curt)
6.	“It’s actually physical pain.” (Gerald)
7.	“I noticed a little bit more, like sensitivity to it. Not so much loss, but sensitivity to sound.” (Curt)
8.	“I mean it set in . . . where it was just like, one day it wasn’t noticeable, and the next day, it was like you turned on a switch, and it hasn’t gone away since.” (Andrew)
9.	“It’s like I got cicadas screaming at me all the time. Or, someone would follow me around with a glockenspiel, doing a roll on it.” (Andrew)
10.	“There’s never one day that I’m not thinking about my hearing because it’s like someone is either using a circular saw in the basement, or there’s people all around me playing the triangle . . . ” (Larry)
11.	“And sometimes I’ll even hear like a . . . like when you take a conch shell up to your ear, and they tell you you’re hearing the ocean, but you’re just hearing the air pressure inside.” (Rachel)
12.	“ . . . how to save your hearing so you’re able to survive your teaching career, not be cursed with that terrible ringing sound that I have all the time.” (Larry)
13.	“ Just a constant high pitch, kind of high pitch, that doesn’t stop.” (Catherine)
14.	“I definitely feel less effective in rehearsal, it’s distracting.” (Curt)

Significant Statements

15. "It's almost like a piercing sensation, like somebody is sticking something in my ear." (David)
 16. "... they cause this rumbling sensation that I hear, and it sounds like it's rumbling inside my eardrum." (David)
 17. "... it's the two pitches in both ears are about the same." (Gerald)
 18. "... it's not pain, but there's times where it does feel almost like things are wavering in the ear." (Greg)
 19. "Every day. It rings every day. I have not heard silence in maybe twenty years." (Larry)
 20. "Sometimes it's loud and it wakes me up, like a noise." (Lisa)
 21. "... put the earplugs in and then they would play louder, or purposefully play wrong notes." (Andrew)
 22. "... the moment you put in any kind of hearing protection, the kids would assume that you can't hear at all, and then they would start causing problems." (Andrew)
 23. "Because I'm always pulling them in and out ... because I don't realize how loud I'm talking." (Greg)
 24. "The inability to hear kids talking to me in the rehearsal." (Sam)
 25. "Sometimes they don't fit in your ears perfectly, you gotta kinda wiggle them around in there and it's kind of uncomfortable." (Wendy)
 26. "After four or five months ... it all of a sudden shrinks a little bit, or something, and I'm getting a little seepage, and it's like, 'wait a minute, I used to have better protection than I do now.'" (Gerald)
 27. "Just taking them in and out, so that I could hear my students talk, or whatever, was a hassle." (Wendy)
 28. "I couldn't stand the way it made me sound, and the way that things sounded around me." (Wendy)
 29. "... that's probably also why I've gotten in the habit of not wearing them as much as a director, because I do feel like I really just don't hear the balance and the blending of the tone nearly as well ... " (Greg)
 30. "Emotionally, I get curious and concerned - well, almost angry, because I'm afraid it's leading toward hearing loss." (Rachel)
 31. "When it first came on [tinnitus and hearing loss] it was very emotionally distressing because my dad was a band director for about ten years early in his career and got out of teaching for a while ... " (Greg)
 32. "The biggest thing for me that it affects is - even with my hearing loss, I was able to teach pretty well, but - it took the joy out of my teaching." (Andrew)
 33. "In order to be a band director you gotta love the sound of the band and, very frankly, a band doesn't sound the same to me anymore." (Andrew)
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Significant Statements

34. "I rarely listen to music in the car. I don't want that sound coming at me after having sound coming at me all day long." (Erin)
 35. "... and there are certain things you don't hear anymore, which kind of saddens you." (Steve)
 36. "I wonder if I'm hearing things the way they really are sometimes." (Lisa)
 37. "And I find it terribly ironic, that the thing that is my bread and butter and the most important to me, is what is being taken away." (Lisa)
 38. "... because I feel like at 59 it's premature ... this shouldn't be happening for ten or fifteen more years." (Erin)
 39. "... just that I worry that I miss things in the ensemble that I could be fixing." (Horace)
 40. "I worry about it. I worry that ... my hearing is not as good as it used to be. So I do worry that it might be declining." (Viki)
 41. "Emotionally, sometimes I wonder if it is ever going to go away, and every once in a while I get angry that I sacrificed this." (Lisa)
 42. "I'm not as good as I used to be, and I could only see this getting worse, and that's when some of my depression kicked in because of that." (Larry)
 43. "To be a really good teacher, and to really do what you want to do, it's pretty hard to avoid having your ears abused." (Wendy)
 44. "... comes with the territory." (Sam)
 45. "That I'm damaged." (Lana)
 46. "So, the moment you tell them that your hearing isn't as good anymore, you've already lost credit." (Andrew)
 47. "Oh, it's a joke at the high school ... 'speak up, I'm deaf'. The kids know that I have some hearing loss." (Sam)
 48. "... at my age, where my hearing is now, and tinnitus and everything – I don't see how I can have a 35-year career as a band director." (Greg)
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