Nickel Allergic Contact Dermatitis in Instrumental Music: A Multiple Case Study

by

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ABSTRACT

The purpose of this multiple case study was to illustrate the challenges that five musicians with nickel allergies have faced in instrumental music. Research questions included: (a) What narratives do musicians with nickel allergies share regarding their awareness of their allergy and its impact on their instrumental music experience? (b) How do musicians with nickel allergies describe efforts to find appropriate solutions for their allergy? (c) What narratives do musicians with nickel allergies share in regards to their experiences with peers and teachers understanding their allergy? (d) How do participants describe their motivations to continue in instrumental music, regardless of allergies? Five musicians with nickel allergies were interviewed and asked to reflect on their own experiences and challenges in instrumental music from their diagnosis to present day. Overall, participants described challenges in the following areas: diagnosis, teacher and peer interactions, feelings of isolation, finding appropriate solutions, and lack of confidence. Participants shared their narratives regarding each of these challenges. Participants also shared how they diagnosed and found solutions for their allergy. Recommended solutions for each instrument are included in the appendices.

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TABLE OF CONTENTS

Chapter I

Introduction

Need for the Study

Nickel allergies are not uncommon in the world of medicine or instrumental music. Schafer, et al. (2001) found that 13.1% of participants were found to have a sensitization to nickel. Overall, Schafer, et al. (2001) suggested that 9.9% of the general population can be estimated to have a nickel sensitization. This study also showed a considerably higher percentage of sensitization to nickel in women (20.4%) as compared to men (5.8%). Onder, et al. (1999) found that over 12% of musicians in the Presidential Symphony Orchestra had a type of contact dermatitis that could be linked to their instrument.

Teachers strive to effectively include all students in their classrooms. Most music teachers also strive to include as many students as they can in music, even though some may require adaptive solutions from their teacher to participate in music. Such solutions are extremely important, as they can "make or break" a student's musical experience. "To achieve true immersion—ensuring these students feel as though accommodations are minimal and trouble-free—teachers should be familiar and comfortable with assistive technology and view these techniques as accommodations not only for their student but also for themselves" (Rush, 2015, p. 82). Most of the time, teachers consider the accommodations needed in the instrumental music classroom to have to deal with learning disabilities, and every once in a while, physical disabilities. However, there are not resources regarding solutions for allergies in the instrumental music classroom. Such resources would be a huge asset to teachers, students, and parents, and could increase the number of students who are available to participate in instrumental music. For the purpose of this paper, the word "accommodation" will refer to situations in which a

registered disability is present. Such disabilities generally include physical or cognitive disabilities. Such accommodations are in line with, and guaranteed by the Americans with Disabilities Act. The words “medical solution” or “solution” will be used in regards to equipment or techniques that can be used for musicians with nickel allergies to safely play their instrument without reactions.

Personal Background

Since the time I was a baby, it was known that I had rather severe nickel allergies. When I began playing the french horn in fifth grade my parents and I had never considered that my instrument might cause an allergic reaction, as there is a limited amount of nickel in brass. When I was in 7th-grade, a terrible rash, which we assumed was just eczema, developed on my right hand. I went to several dermatologists and no matter, it would never fully go away. After trying everything, my mom questioned if it could be my horn that was causing the rash. She mentioned this in regards to my nickel allergies to the dermatologist and they suggested that I tried playing my horn with white cotton gloves for a week, in hope that the rash would disappear. The rash began to clear up immediately, and I figured that all of my allergy problems in music had been solved. Still, I didn’t realize how many challenges still lied ahead of me.

A couple of months later, I participated in a middle school honors band. As is usual in these groups, I played my instrument all day for the entire weekend. During the span of the weekend a rash began to develop on my neck and chest and my lips swelled. By the end of the weekend hives were all around my lips, and covered my entire neck and chest. I was miserable and both my parents and I were sure that it was an allergic reaction from the nickel in my horn mouthpiece, which made me even more miserable. I went to the allergist immediately and our suspicions were confirmed. The allergist informed us that my allergy to nickel had become so

severe that my skin could no longer tolerate exposure to any metal that contains even a fractional amount of nickel or cobalt. Essentially, I am allergic to every metal but platinum and titanium. When we mentioned my horn playing and the reactions that we believed may have been caused by it they suggested that I stop playing the horn immediately and switch to another metal free instrument.

By this time, I had already decided that I wanted a career in music and I was so in love with the horn that I didn't see changing instruments as a reasonable option. My parents and I immediately began looking for solutions that would allow for me to continue to play the instrument that I had fallen in love with. My band director, who has mild nickel allergies himself, suggested plastic, stainless steel, or gold mouthpieces as an alternative to my parents. Since the allergist had confirmed that I was also allergic to stainless steel and gold, the only real option I had was to try a plastic mouthpiece. My parents ordered a Kelly mouthpiece right away for me and I played without any problems until my junior year of high school on it.

By the time junior year came around we knew it was time to search for a better alternative. I had been on a few college tours and had a few lessons with horn professors, all of whom had questioned my Kelly mouthpiece. I knew it wasn't the best, but it had allowed for me to at least continue playing. My dad and I began to hunt for a titanium mouthpiece on the internet, in hopes for a better alternative. We were able to find a titanium coated mouthpiece available from Houser Mouthpieces. While it improved my sound and responded much better than my Kelly mouthpiece, my Houser mouthpiece had its own issues. From the time we first purchased it we had issues with the coating wearing off inside of the cup and causing me to develop a reaction. After sending it back several times to be recoated, we finally gave up and decided that we could come up with a better solution on our own.

My dad works on guns in his free time and had some ceramic gun paint. He suggested that we try coating the inside with it, as it would provide a barrier and would be much more durable than the titanium coating that kept wearing off. This solution did work. If fact, this paint stayed on for years with no problem. Over time, the paint did begin to chip off and did cause me to react. Once a new coat of paint was on again I would be fine, but it was annoying to have to continuously check to make sure there were no chips. Furthermore, the paint had to be sandblasted off before a new coat could be put on and then it had to be baked to cure the paint. It seemed like every time that the paint wore off it lasted for less time than the previous coat did.

This past year I began to break out again from the paint wearing off inside of my mouthpiece. This happened during the holiday season when I was busy playing. I didn't have time to repaint the inside of my mouthpiece and I couldn't continue to play with the tiny little scratches of exposed stainless-steel. For years, I've considered purchasing a titanium mouthpiece from Giddings Mouthpieces. After I started breaking out this past December, I decided that it was finally time to invest one of these mouthpieces.

My allergies proved to be a problem for me while learning how to play secondary instruments in my college methods courses. Adapting brass instruments was easy, as it only required plastic mouthpieces and cotton gloves, all of which I was already familiar with. Woodwind instruments proved to be more difficult, as cotton gloves will not allow you to effectively cover the wholes on a woodwind instrument. I quickly found that tight nitrile gloves were effective for playing these instruments. Stringed instruments proved to be my hardest challenge, especially since I could not find any helpful information or tips on these instruments for my allergies. Some professors seemed to misunderstand the severity of my allergy and the fact that I really could not touch the strings on the instrument. Someone suggested that I

purchase a set of gut strings for each string instrument that I needed to learn. After looking up the price to do so I quickly decided that that was not a feasible idea. Eventually, I purchased Wittner chin rests (which do not have any exposed metal) and found that while not ideal, it is possible to play stringed instruments while wearing nitrile gloves.

Metal allergies are not all that uncommon. Darlenski, Kazandjieva, and Pramatarov (2012) note that nickel is among the most common allergies, they stated "The rate is established at about 10% or even higher, but it varies in different counties" (p. 523). People always ask me why I wear gloves and play with a unique mouthpiece. I often find that when I tell them why they tell me similar stories of their own nickel sensitivities or a similar story about one of their friends. It is amazing to me that so many musicians have suffered through similar experiences, yet there is very little information available about how musicians can effectively adapt for such allergies. I wonder if some students quit instrumental music because of their allergies, or do not even begin instrumental music because of such allergies. If I hadn't been motivated to find solutions for myself, I could have easily fallen into this category and would not be where I am today. If the severities of my allergies had increased sooner in my life, it's possible that I may have never participated in instrumental music.

It is important to note that in regards to allergies I am an extreme case. I am allergic to all metals besides platinum and titanium and will break out almost instantly from contact with any other metals. Even my braces were titanium. I've even had allergic reactions to water from the amount of iron in the water. The first summer that I went to Blue Lakes Fine Arts Camp I broke out everywhere from the water. The following two years I went there I actually had to pack my own water for drinking and showering. When looking at colleges, I actually ruled a couple out, just because of the iron content of their water. I have also recently discovered that I have a nickel

food allergy, meaning that I cannot eat foods that have a high nickel content (such as chocolate, salad greens, or soy), or have been cooked or stored in metal receptacles.

Purpose Statement

The purpose of this multiple case study was to illustrate the challenges that five musicians with nickel allergies have faced in instrumental music.

Research Questions

(a) What narratives do musicians with nickel allergies share regarding their awareness of their allergy and its impact on their instrumental music experience?

(b) How do musicians with nickel allergies describe efforts to find appropriate solutions for their allergy?

(c) What narratives do musicians with nickel allergies share in regards to their experiences with peers and teachers understanding their allergy?

(d) How do participants describe their motivations to continue in instrumental music, regardless of allergies?

Definitions

Accommodations: Arrangements put in place to help students with a registered disability. Such disabilities generally include physical or cognitive disabilities. These accommodations are guaranteed by the Americans with Disabilities Act.

Allergen: A substance that causes an allergic reaction.

Allergic Contact Dermatitis: Eczema or other dermatitis caused by contact with an allergen. Usually occurs in the area where contact was made with the allergen.

Brass: Brass is comprised of mostly copper and zinc. Nickel is added to brass to make it more durable and cost effective.

Contact allergies: An allergy that is aggravated by being in physical contact with the allergen. Allergic reactions from contact allergens are of the dermatologic kind.

Cheilitis: Inflammation or scaling of the lips and or area surrounding the lips.

Disability: Disabilities that are accommodated for and protected under the Americans with Disabilities Act. Such disabilities are generally cognitive or physical.

Gold: An alloy that generally contains gold, silver, copper, and small amounts of nickel.

Nickel: An inexpensive silver-white metal that is primarily used as an alloying agent. Some amount of nickel in found in nearly all metals used to make instruments or jewelry, including: silver, brass, and gold.

Nickel Silver: A metal alloy that does not contain any silver, but rather is comprised of nickel, copper, and zinc. Anywhere from 7-30% or more nickel can be found in nickel silver.

Monel: A copper and nickel alloy. This alloy often contains 50% or more nickel. Monel is sometimes used as a winding material for strings.

Solution (or Medical Solution): Techniques or equipment that allow for musicians with nickel allergic contact dermatitis to safely play their instrument without reactions. These techniques or materials limit nickel exposure or serve as a barrier between the musician and the nickel.

Stainless Steel- Considered to be one of the most hypoallergenic metals available, but may still contain more nickel. There is no standard for what qualifies as “medical grade” stainless steel, meaning that even “medical grade” stainless steel generally contains 8-12% or more nickel.

Sterling Silver: A metal alloy that contains at least 92.5% pure silver. Generally alloyed with copper and small trace amounts of nickel.

Chapter I has shown a need for researching nickel contact dermatitis in instrumental music by highlighting my own experiences with allergic nickel contact dermatitis in my

instrumental music career. It has also defined the research questions for the study and key definitions in relation to the study. Chapter II will present the literature review that supports this study.

CHAPTER II

Review of the Literature

This literature review will be presented in five categories: (a) Research Regarding Metal Allergies in Musicians; (b) Research Regarding Metal Allergies in the General Population; (c) Research Regarding Allergies in General Education; (d) Research Regarding Student and Teacher Perspectives; and (e) Methodological Example. For the purpose of this literature review, disabled applies specifically to those students with physical disabilities (i.e. blindness or visual impairments; deafness or hearing loss, or the inability to utilize specific body parts), although some applicable research that also involved learning or cognitive disabilities has been included when appropriate.

Research Regarding Metal Allergies in Musicians

The fields of dermatology and allergies provide numerous accounts of musicians impacted by a contact allergy to nickel in their instrument. Many report case studies of specific musicians who experienced allergies to their instrument (Machácková & Pock, 1986; Marshman & Kennedy, 1992; Fisher, 1993; Inoue, Shoji, & Fujita, 1997; Nakamura, et al. 1999; Thomas, et al., 2000; Alvarez & Brancaccio, 2003; Gottschalk, 2005). Rather than investigate specific musicians, Rezic, et al. (2014) examined strings from stringed instruments to see how their corrosion could impact allergic musicians. Two others (Onder, et al., 1999; Gambichler, et al., 2008) conducted studies to better understand the prevalence of contact allergies in the instrumental music field. Together, all of these sources can help one better understand the prevalence of contact allergies in the instrumental music field, and the impact that they have on the musicians who are diagnosed with such allergies.

Machácková and Pock (1986) examined a case of a 59-year-old professional cellist who experienced eczema on his fingers. He was patch tested and showed a strong positive reaction to nickel. The subject was also tested for mahogany, which was negative. His bow was tested for nickel, and it was discovered there were small inlays on his bow that contained nickel.

Marshman and Kennedy's (1992) case report investigated the cause of hand dermatitis in a 24-year old man. The man had a history of hand dermatitis for 4 years. He was a guitarist who enjoyed playing several hours each day. He had been employed in a variety of jobs, but was not a professional musician. The man was patch-tested using the European standard series, and a piece of his guitar string was also tested. The tests revealed a positive reaction to both nickel and the guitar string. After the test concluded that the man had a nickel allergy, his guitar was outfitted with 24-karat-gold strings and no further dermatitis was observed.

A harmonica player with a nickel allergy is examined by Fisher (1993). The harmonica player experienced dermatitis around the contact area of the harmonica for several weeks. The musician was patch tested and showed a positive reaction to nickel. The harmonica was tested for nickel using the dimethylyglyoxime test, and showed a high nickel content. The patient was able to continue playing harmonica, but needed to switch to a harmonica that was comprised of stainless steel, instead of nickel. Fisher (1993) noted that while stainless steel was a suitable switch for this particular musician, it may not be for many, as stainless steel can contain as much as 20% nickel. Fisher also emphasized the importance of allergic musicians testing their instruments for nickel.

Musicians who have an undiagnosed dermatitis, who play instruments that contain metal parts, and who have a positive patch test reaction to nickel should have the metallic

portions of their instruments tested with the dimethylglyoxime test for the presence of available nickel (Fisher, 1993, p. 75).

Inoue, Shoji, and Fujita (1997) discussed a young female flautist that developed eczema on her chin that aligned with the lip plate of her flute. She had also recently developed allergic reactions to her earrings. Her flute was tested and found to contain only traces of nickel. She was patch tested and found to react positively to nickel. While her flute was observed to only contain a trace of nickel, Inoue, Shoju, and Fujita (1997) noted that the combination of sweat and friction increase the likelihood of a reaction developing.

Nakamura, et al. (1999) observed a young female trumpet player who was experiencing eczema around her mouth, eyelids, and lips. This woman had also experienced similar reactions in the past to metallic jewelry. The woman was patch tested and reacted positively to nickel, but not to any other metals. After being asked to stop playing trumpet and wearing jewelry her rashes went away. After this observation, she had her mouthpiece coated in plastic, to avoid future reactions. No further reactions were observed after this.

Onder, et al. (1999) evaluated 97 musicians in the Presidential Symphony Orchestra for instrument related skin problems. Of the 97 musicians, 12 reported some type of dermatitis that could be linked to their instrument. These twelve musicians were patch tested using the European Standard Series. Three of the twelve musicians tested reacted positively to nickel. One clarinetist was found to be allergic to nickel, and 2 violinists also tested positively for a nickel allergy.

Thomas, et al. (2000) reported on the case of a 32-year-old man with contact dermatitis on and around his lips, caused by the nickel in his trumpet mouthpiece. The man was not a professional musician, but an amateur player. He did not have any prior contact allergies or skin

diseases. After noticing cheilitis and scaling on the top ⅓ area of his lip, he was patch tested and found to react positively to nickel. After this finding, he changed to a gold-plated mouthpiece. After this mouthpiece change, it was observed that his rash cleared and did not return.

Alvarez and Brancaccio (2003) discussed a 25-year-old professional violinist with a 6-month history of dermatitis on the fingertips of her left hand. She did have a history of skin dermatitis. The dermatitis was observed to correspond to the fingerboard and strings of the 1836 antique Rivolta violin that she had been playing for many years. It was also observed that her right hand and the rest of her left hand were clear of any type of dermatitis. The patient was patch tested for 54 allergens using the NACDG Screening Series (Chromotechnique Diagnostics), and was tested with her own violin rosin. Alvarez and Brancaccio cited the following findings:

> Positive reactions were noted to nickel sulfate, cobalt chloride, colophonium, her own rosin, neomycin sulfate, formaldehyde and 3 formaldehyde-releasing preservatives (quaternium-15, imidazolidinyl urea and diazolidinyl urea). Further testing was negative to propolis and to a solid piece of unfinished ebony wood, but positive (þþ) to shavings from this ebony wood. Evaluation of the patient's metal E string proved dimethylgloxime spot test positive, confirming the release of nickel. (Alvarez and Brancaccio, 2003, pg. 44)

Alvarez and Brancaccio (2003) discussed the difficulty musicians face when looking for ways to effectively adapt their instruments in accordance with their allergies. They noted that rosin substitutes are extremely difficult to find, but that some string players have had success with Clarity Rosin from Shar Products in Ann Arbor, Michigan. The authors also noted that

while true gut strings are available, they can cause a change in tone that is undesirable, and therefore poses a challenge to musicians.

Gottschalk (2005) shared a fascinating case about a professional horn player who had nickel allergies that were so extreme that he had to stop playing the horn and for some time. The musician noted that even when using gloves, he was having such serious reactions that he was noticing wounds in his mouth, headaches and flu like burning sensations, he also noted that he found himself to be very tired all of the time. The musician, Kristiansen, also stated that his nickel allergies had become so advanced that he had developed a nickel food allergy and needed to avoid foods high in nickel: including soy, chocolate, and nuts. Kristiansen determined that in order to continue playing, he would need to acquire a horn that was completely nickel-free. He reached out to several horn producers and said that some did not seem to be able to understand or adapt his allergy. Some did offer to plate a horn in gold. While this solution may seem helpful, it would not solve the fact that Kristiansen was observing reactions from breathing in the nickel in the horn, something that could not be solved by plating a horn in gold. Among the horn manufacturers that Kristiansen reached out to was Engelbert Schmid. Schmid was willing to help Kristiansen develop a completely nickel-free horn. When asked whether the horn was completely nickel-free, Schmid describes the horn as follows:

> Practically, since Mr. Kristiansen does not have any reactions to the horn, there are no traces of nickel. However, the suppliers of the raw material admit that there might be up to 0.3% nickel in the yellow brass alloy. I told Mr. Kristiansen and that is why he ordered the horn with a sterling silver body; i.e., bell flare, bell tail, first branch, lead pipe, and hand guards made of sterling silver (92.5% silver, 7.5% copper, and no trace of nickel). These are the parts that you touch most often on the horn. We silver-plated the yellow-

> brass finger plates and levers, and the whole horn was carefully lacquered, in order to guarantee no contact with nickel. (Gottschalk, 2005, p. 41)

Kristiansen noted that he did not having any reactions from playing the nickel-free horn that was designed and produced by Engelbert Schmid. Schmid noted that since every piece to their horns is made in house, they have the capacity to make any model of their horns nickel-free.

Gambichler, et al. (2008) conducted a self-reported survey examining skin conditions in instrumental musicians. The survey was sent out to 3,120 students in 19 German music universities. In total, 412 musicians submitted a completed survey. The following results were reported:

> 21.6% (89/412) had an instrument-related skin disorder including callosities (52/89; 58.4%), contact dermatitis (CD; 17/89; 19.1%), fiddler's neck (17/89; 19.1%), and erosion (3/89; 3.4%). Allergic CD (13/17; 76.5%) was most frequently reported in violinists and violists. Of 116 violinists and violists, 17 (14.7%) suffered from fiddler's neck. String and plucking instrumentalists most frequently reported callosities (61/89; 68.5%) and skin problems (32/37; 86.5%). (Gambichler, et al., 2008, p. 217)

The results from this survey showed that string players and musicians who play plucking instruments have the highest reported allergies and seem to be more at risk to develop such allergies than instrumentalists from other groups. They suggested that the type of contact that is required to perform on these instruments may be the reason for this.

Rezic, et al. (2014) investigated the release of metal ions from viola, violin, and cello strings. To do so, they dissolved the sample strings in pure nitric acid. After the strings were dissolved, the solution was transferred and the ions released were measured through ICP-OES.

They did this to examine the way in which corrosion of strings may impact musicians who are sensitized to or allergic to metal.

> Musical strings corrode during their usage, releasing metal ions into their environment. The most important problems related to their corrosion are: abrasive damage of expensive strings, lower sound quality, and provocation of skin diseases in professional musicians. Musicians suffer from different skin diseases, and the most frequent is contact allergic dermatitis, caused by metals present in strings. Nickel is the most allergenic metal, although allergies to other metals (zinc, aluminum, chromium, copper) have also been reported. Today around 20% of female population and 6% of the male population are allergic to nickel. (Rezic, et al., 2014, p. 931-932)

Different compositions of strings were examined during the experiment, including steel, copper, and aluminum alloys. Rezic, et al. (2014) noted that an alloy containing .05% or more nickel can cause an allergic reaction for someone who is especially sensitized to nickel. High concentrations were found in some strings, including a Viola C string that contained 37.67% nickel. High concentrations of nickel were also found in other strings, and varied from 9.22% (Cello G String) to .05% (Viola G String).

Research Regarding Metal Allergies in the General Population

Research regarding metal allergies in the general population can help one better understand the overall prevalence of nickel contact allergies, and how they may impact musicians, or even keep allergic students from ever becoming musicians. Nickel allergies in the overall population are not uncommon, which leads one to believe that the same would likely be true for instrumental musicians. Research shows that women are considerably more likely to be diagnosed with a nickel contact allergy than men (Peltonen, 1979; Moller, 1979; Meding and

Swanbeck, 1990; Basketter, et al., 1993; Schafer, et al., 2001). Several authors also link the prevalence of eczema or other dermatitis to allergic individuals (Peltonen, 1979; Moller, 1979; Meding & Swanbeck, 1990).

Peltonen (1979) patch tested 958 subject from 5 different groups: 158 school children, 46 medical students in a dermatology course, 51 Dermatology staff members at Turku Central University Hospital, 686 staff members at a Turku printing plant, and 39 residents from a home for the elderly. Overall, a 4.5% occurrence of nickel allergy was observed, .8% of males and 8% of women tested positive for a nickel allergy. All 44 subjects that tested positive to nickel had a history of dermatitis, and 42 of them noted that dermatitis occurred in relation to contact with nickel. Of those that reacted positively to nickel, 78% reported eczema due to contact exposure with nickel before the age of 30.

Patients are often patch tested for contact allergies after exhibiting eczematous patches, but it is possible to have a contact allergy without exhibiting such a reaction. Magnusson and Moller (1979) wanted to examine the likelihood of contact allergies in patients who did not exhibit classic eczematous symptoms of contact allergies. Two hundred and seventy-four patients undergoing orthopedic surgeries were patch tested using the standard series. Sixty patients reacted positively to one or more allergens. Of these 60, 25 of these patients did not have any prior history or ongoing dermatitis. Sixteen of these patients reacted positively to nickel. Fifteen of the 16 patients that reacted positively to nickel were women, while only one man exhibited a positive reaction.

Meding and Swanbeck (1990) examined hand eczema and its relation to occupation in Gothenburg, Sweden. Meding and Swanbeck (1990) randomly chose 20,000 individuals in the city to send a questionnaire to. The 1,385 (11%) who cited having hand eczema within the past

year were invited to participate in the study. Subjects were examined by a dermatologist and offered patch testing. Those who had previously undergone patch testing were offered to include their previous patch test results. Overall, patch test results were available for 87% of subjects. Woman were observed to be twice as likely to suffer from hand eczema as men. Nineteen percent of the 1,385 participants had hand eczema that was caused by allergic contact dermatitis. A total of 14.8% of participants had a positive reaction to nickel sulfate during patch testing. It was observed that 21.9% of women reacted positively to nickel sulfate, while only .3% of men had the same reaction. Similarly, 9.4% of woman reacted positively to cobalt, while only 1.1% of men did, resulting in a 6.7% total among participants.

Basketter, et al. (1993) stated that nickel is the most commonly observed contact allergen. This allergen can sometimes be linked to occupation, but often exposure comes from other places. Women often see sensitization to nickel after getting their ears pierced or wearing jewelry, belts, or clothing with exposed metallic clasps or closures. In general, women are thought to have more exposure to nickel than men. The occurrence of nickel allergies in the general population has been growing, especially among women. About 10% of woman are nickel allergic. Nickel release from metallic objects varies based on the composition of the object, and exposure to skin. Sweat actually increases the amount of nickel that is released from an object. Close contact or elongated contact with nickel can greatly increase one's exposure and reaction to nickel.

Schafer, et al. (2001) patch tested 1,141 adults for 25 standard allergens to determine the impact of contact sensitization and to determine if there are any socioeconomic links that may predict contact sensitization. Thirteen-point one percent of participants were found to have a sensitization to nickel. Overall, Schafer, et al. (2001) suggested that 9.9% of the general

population can be estimated to have a nickel sensitization. Schafer, et al. (2001) also observed a considerably higher percentage of sensitization to nickel in women (20.4%) as compared to men (5.8%). They observed an overall higher risk for women and subjects with lower occupational education for contact sensitization to nickel.

Research Regarding Allergies in General Education

Food allergies have been experiencing more media coverage and attention from the educational system. Food allergies have continued to rise in recent years, and tend to draw the most media attention of any type of allergy. While food allergies do not directly relate to allergies impacting musicians in the instrumental setting, the literature on food allergies can support the need for continued research for contact allergies, such as nickel, that can impact a student's ability to learn or participate in music.

Lacina (2010) cites the educational policies that protect students with food allergies in the educational system. These policies ensure that students with such allergies have access to a thorough education and a safe environment. Because of the Americans With Disabilities Act (2010), discriminating against a student with a severe allergy is illegal. Some severe allergies are thereby considered to be a disability. Most contact allergies are not severe enough to warrant accommodations that are provided for them according to the Americans With Disabilities Act. However, those with extremely severe contact allergies that are impacting their education may qualify for accommodations through a 504-plan. Just as schools must accommodate for students with learning or disabilities by creating an educational plan (most often a 504-plan) by providing such students with the resources that they require to learn, the same must be legally done for students with severe enough contact allergies that are medically documented as a disability, and have been approved as such by the special education department of the student's school. Lacina

emphasizes the importance of creating a plan for each allergic student by involving the student's guardians, doctors, and teachers. Such plans can and should be created for allergic students even if their allergies are not considered severe enough to warrant accommodations, but are rather solved using medical solutions. In this case, simple plans for success and solutions can still be created among the student, teacher, doctors, and parents.

Research Regarding Student and Teacher Perspectives

As discussed above, severe allergies are considered to be a disability, and students with such allergies are protected by the Americans With Disabilities Act (2010). The Americans With Disabilities Act (2010) outlines the steps that schools must take in order to accommodate for students with such allergies. Such accommodations are often developed by examining the accommodations made for students with physical, learning, or cognitive disabilities. Plans for allergic students are also often developed, organized, and enforced in the same way as accommodations for physical, learning, or cognitive disabilities. Instrumental students with allergic contact dermatitis may feel some of the same frustrations with solutions, or lack thereof, as students with other types of disabilities. The fact that many teachers do not view such extreme allergies as disabilities or obstacles to learning for such students can be frustrating and disheartening for these students and their families. Because the information in these studies do not directly relate to nickel contact allergies, these studies will not be examined in detail. These studies show how crucially music educators view accommodations for physically and cognitively impaired students.

These studies also show that music educators feel that it is important to make sure that a student does not feel like their accommodations are a burden, or make them different from other students. These are the same ideas that can help musicians with nickel allergies continue to

succeed, despite their allergy. However, there are not yet any studies in the field of music education that emphasize the importance of solutions for musicians with nickel allergies in instrumental music. This section will explore teacher and student perspectives in the area of disability, to provide a clearer picture of how allergic contact dermatitis may impact the learning process of allergic students.

Noted in most research and scholarship in this area is the importance to make sure that students with disabilities feel valued and fully emerged in the program that they are a part of (Moss, 2009; Abramo & Pierce, 2013; Rush, 2015). Many authors stated that teachers are often overwhelmed by the additional duties that including a disabled student can bring (Nabb and Balcetis, 2010). "To achieve true immersion—ensuring these students feel as though accommodations are minimal and trouble-free." (Rush, 2015, p. 82).

A disconnect can be seen in the research when examining perceptions of how effective music teachers felt that they were at including disabled students, versus how music teachers feel that disabled students in general are accommodated in music classes (Frisque, Niebur, & Humphreys, 1994; Atterbury, 1998). From examining the research, one can see that it appears that music teachers' opinions are often not valued or utilized when creating Individualized Education Plans (IEP) for students (Gilbert & Asmus, Jr., 1981), even though including music teachers in the IEP process could help teachers accommodate disabled students more productively. These subjects will be examined in the section Research Regarding Student and Teacher Perspectives.

Teachers can find a number of articles that provide resources and recommendations for effectively including students with disabilities in the instrumental music setting. Most authors of such scholarship stress the importance of finding an instrument that will allow success for the

student, regardless of their own limitations (Zdzinski, 2001; Hash, 2003; Mixon, 2005; Coates, 2010; Darrow, 2011). Authors also stated the importance of working with special education teachers and parents to ensure success for disabled students (Zdzinski, 2001; Mixon, 2005; Coates, 2010). Some discussed accommodating or making use of instruments that are designed for students with specific needs (Snedeker, 2005; Nabb and Balcetis, 2010; Darrow, 2011).

Gilbert and Asmus, Jr. (1981) examined teachers' perceptions of mainstreaming, their knowledge of legislation revolving around disabilities, and their needs for developing a comprehensive music program to effectively mainstream students with disabilities. A survey was developed, piloted, and sent to 789 music educators.

> The final survey consisted of five sections: (1) music education and Public Law 94-142; (2) teaching skills in mainstreamed classrooms; (3) using music activities to teach other skills; (4) using music activities to teach academic subjects; and (5) classroom operation and administration. (Gilbert & Asmus, J., 1981, p. 32)

Of the music educators surveyed, 62.9% of respondents reported working with disabled students. Seventy-one percent were familiar with PL 94-142, or the Education for All Handicapped Children Act. Gilbert and Asmus (1981) found a large disparity in music educators who have helped develop IEPs for students. They found that 97.2% of general music educators had helped develop student IEPs, but only 15.1% of vocal music educators reported being involved in this process.

Frisque, Niebur, and Humphreys (1994) examined mainstreaming practices in music classes in Arizonia. Frisque, Niebur, and Humphreys (1994) designed a survey to measure teachers' perceptions of mainstreaming in music education, support provided to teachers for mainstreamed students, teachers' experiences mainstreaming students, and teachers' perceptions

towards inclusion of students with specific disabilities. Surveys were mailed to teachers with K-12 teaching responsibilities who were members of the Arizona Music Educators Association. A total of 107 usable responses were collected for analysis. Less than 6% of the teachers surveyed stated that they had never had experience with a special learner in their class. Forty-two percent indicated that special learners in their school are mainstreamed into music classes. Mainstreaming into music classes was identified as the only music option for special learners by 75% of teachers. Over 40% of teachers indicated that they have never received any formal training in the area of special education. Sixty-two percent of teachers surveyed felt confident in their ability to effectively teach special learners in their music class. Almost half that number, 33%, felt that special learners are effectively incorporated into music classes in general.

Atterbury (1998) examined the effects of mainstreaming special education students and the preparedness of educators to include special education students who had been mainstreamed into their music classroom. Atterbury (1998) surveyed 111 Maine teachers about the impact and effects of mainstreaming in their music classrooms and their feelings of preparedness to accommodate these students in their music classes. All 111 teachers cited that they had experience with at least one special education student in their classroom. Fifty-three percent of the 111 teachers surveyed indicated that all special education students in their district are mainstreamed into music classes.

> The two classifications that were most often met by these teachers were students with learning disabilities (93%) and emotionally disturbed (75%). Less than half of the respondents taught students who were speech impaired (44%), physically handicapped (41%), hearing impaired (38%), trainable mentally retarded (30%), educable mentally retarded (29%), visually handicapped (25%), autistic (19%), or have multiple handicaps

(17%) (Atterbury, 1998, p. 30).

Only 8% of the teacher respondents had never had any formal training in special education. Sixty-two percent of responding teachers stated that they had completed at least one special education course in college. Sixty-six percent of responding teachers indicated that they felt confident in their ability to provide for main-streamed students in their music classroom. Only 45% of the teachers responded indicated that they felt like students with special needs tend to be successfully mainstreamed into music classes.

Kaiser and Johnson (2000) investigated the perceptions of deaf students held by 23 pre-service music educators. They also examined how these perceptions evolved after the students were a part of an interactive music lesson with elementary-aged deaf children. The deaf students attended an interactive brass choir performance by the pre-service music educators in the study.

> The interactive experience included: (a) performances by both the full brass choir and an organist, (b) visual-tactile demonstrations of sound vibrations and pitch (high/low), and (c) opportunities for the deaf children to feel and play percussion instruments, to feel different brass instruments as they were played, and to conduct the full ensemble as it performed (Kaiser & Johnson, 2000, p. 226).

The preservice teachers were given both a pre- and post-test that included the same questions. In this questionnaire, the pre-service music educators were asked about their perceptions of music education for deaf children, their own preparedness in feeling ready to provide deaf children with a musical education, and about any prior experience educating deaf children. Two of the 23 pre-service music educators stated that they had prior experience working with deaf children. Before the interactive performance, 16 of the 23 pre-service music educators stated that they had never considered music education to be for deaf students. All 23 of

the pre-service music educators stated after the performance that they would at least consider teaching deaf students. Kaiser and Johnson's (2000) results show that just one single interaction with deaf students was able to impact pre-service music educators' perceptions of deaf children and the impact of music education in their lives.

Hammel (2001) had three elementary music teachers pick one student with special needs to observe for eight separate music classes. Teachers were given a form to record competencies used to help the specific student that they were observing. Once a specific competency was identified by 66% of participants in two or more data collections instruments, it was deemed by the researcher to be essential for teachers. The following competencies were deemed by this study:

1. acquaintance with various handicapping conditions (general knowledge)
2. knowledge of "Individuals with Disabilities Education Act (IDEA)" (legal aspects)
3. knowledge of music teacher's role on evaluation team (assessment and evaluation)
4. ability to develop and use informal assessment procedures (assessment and evaluation)
5. ability to monitor the learning process of all students (assessment and evaluation)
6. ability to evaluate program effectiveness for specific learners (assessment and evaluation)
7. ability to identify areas of particular difficulty for a student (assessment and evaluation)
8. ability to modify, if necessary, the instructional program to accommodate special learners (curriculum planning)
9. knowledge of how to modify the physical environment of a classroom for special learners (classroom structure)

10. ability to encourage appropriate social interactions among all students (classroom management)

11. knowledge of effective classroom management techniques (classroom management)

12. knowledge of appropriate materials for diverse learning abilities and styles (methods and materials)

13. ability to adapt material to provide for individual differences (methods and materials)

14. ability to communicate effectively with support personnel (communication skills) (Hammel, 2001, p. 11).

Scott, Jellison, Chappell, and Stanbridge (2007) interviewed teachers to determine teachers' attitude regarding including students with disabilities in the music classroom. "Questions focused on: (1) information, support, resources, and placements; (2) parental contact and involvement; (3) outcomes on students with disabilities, typical students, and teachers; and (4) teachers' advice" (Scott et al., 2007, p. 1). Forty-three music teachers were interviewed for this study. Sixteen were elementary music teachers, 15 were orchestra teachers, and 12 were band teachers. Scott et al. (2007) found that a majority of teachers were notified about disabled students before they were placed in their classroom. However, they found that even though teachers were notified in advance about students, many teachers did not participate in IEP meetings for these students. Only 38% of elementary music teachers surveyed noted that they had participated in an IEP meeting. Participating in an IEP meeting was more common among instrumental music teachers, with 87% of orchestra teachers citing that they have served in IEP meetings and 58% of band teachers citing the same. Several elementary teachers volunteered that the reason that they had not been involved in IEP meetings was that they were either unfamiliar with the process and did not feel that they would be of help, or that they felt left out of the

process. One teacher even commented that they were not notified of the meeting until it was too late. Support in the music classroom from outside sources, such as music therapists, classroom aides, or special education teachers was fairly high, with 94% of elementary teachers citing that they received additional support for disabled children in their classroom. “In the present study, all groups of teachers cited positive outcomes of inclusion for their typical students, although orchestra teachers were particularly forthcoming with positive comments” (Scott et al., 2007, p. 9). The authors stated that the fact that orchestra teachers generally see less students than other types of music teachers may have contributed to the fact that orchestra teachers seemed especially enthusiastic to include disabled students in their program.

Nabb and Balcetis (2010) surveyed 221 Nebraska high school band directors to examine teachers’ experiences with students with physical disabilities and to evaluate the concerns that these directors have in regards to including physically disabled students in their programs. The authors cite that many music instruments are designed in a way that requires the use of two arms and or hands, which can seem daunting to students with physical disabilities, or to teachers who are working with such students. They mentioned a variety of challenges that band directors with physically disabled students face including finding instruments adapted to allow the student to play, locating and affording adaptive instruments for their student, and learning how to effectively play and teach their students how to play adapted instruments (Nabb & Balcetis, 2010). Fifty-five percent of respondents indicated that they had at least one physically disabled student in their school. Of this subgroup (n=122), 61% of respondents indicated that they could think of at least one instance in which the students’ physical disability placed limitations of their participation in the instrumental music program. Sixteen (7%) respondents noted that they had a student who had to discontinue their participation in instrumental music because of their

disability. Sixty-seven percent of respondents indicated that they were aware of the ability to adapt instruments for students with physical limitations and disabilities. Respondents were asked if they were aware of the availability of a one-handed flute and if they believed that access to a one-handed flute would enable more physically disabled students to be involved in instrumental music. Eighty-four percent of all respondents denoted that they felt that the availability of such an instrument would increase the number of physically disabled students in instrumental music. Only 26% (n=56) of the total respondents surveyed specified that they had experience with a physically disabled student in their school music program.

Abramo and Pierce (2013) explored the way that music is taught to visually impaired students and the perceptions that these students had about their own musical education. Fifty-five students were participants in their ethnographic case study of visually impaired students at a school for the blind. Pierce served as a participant-observer for 80 hours. Semi-structured group interviews were conducted with 10 select visually-impaired students. The teacher, who was not visually impaired, was also interviewed. Abramo and Pierce (2013) found that four themes emerged from the coding of their data: "(1) negative experiences in inclusion music classes, (2) uses of notation, (3) modes of communication and pedagogy, and (4) repertoire choices" (Abramo & Pierce, 2013, p. 16). In the interviews, students discussed the difficulties that they faced in classes, specifically their music classes. "The middle school students described their public-school teachers as unknowledgeable and unequipped to effectively teach them, and lacking an interest to help them succeed because of the extra effort required to understand and provide for their needs" (Abramo & Pierce, 2013, p. 17). Many students stated that their public-school teachers did not make any accommodations for them, such as printing large scale music, and that they were left to make these accommodations for themselves. Some students also

described a hostile environment that was created by other students in the class, lack of teacher involvement often contributed to these situations. These experiences are part of what encouraged each of these students to leave public school for a school for the blind. Many students observed learned the majority of their music by ear. Students with low visual capabilities were observed learning music by reading music that had been enlarged or reduced, in order to accommodate for their specific visual disability. Abramo and Pierce (2013) stated that the use of Braille music was not observed. Through their interviews, they learned that many students viewed Braille music as cumbersome, as it requires the student to have one hand continuously off of their instrument in order to read the Braille music.

Methodological Example

I loosely modeled this multiple case study after the study Moss (2009) study. I chose this study as a methodological example because I felt that Moss (2009) was able to effectively describe the challenges and narrative told by his participants because of the way that he framed his study. I felt that this study would be most effective if I was able to effectively convey the challenges, large to small, that each participant has undergone and continues to deal with.

Moss (2009) investigated the experiences of blind or visually impaired students' musical education. Moss (2009) explored visually impaired high school students in the United States regarding the following: "(a) their motivations for participation in band or orchestra; (b) their strategies for participation; (c) the extent to which other people assist them in their participation; and (d) the extent to which feelings of social connectedness contribute to their instrumental music experience" (Moss, 2009, p. 91-92). Moss conducted and recorded phone interviews which included the following topics:

(a) selected demographics, (b) how respondents came to play their instrument and

> participate in the school ensemble, (c) motivations for playing in the school band/orchestra, (d) strategies students use to learn music and participate in the band/orchestra, (e) the intervention of other people in the students' music learning, (f) if and how respondents engage in social functions outside of class with their sighted peers from the musical ensemble, and (g) informants' future plans in music" (Moss, 2009, p. 98-99).

A number of the students interviewed by Moss (2009) described struggling to have effective accommodations made for them. Many students described that they faced challenges in making accommodations for themselves. Several also cited that they felt marginalized by their sighted peers. The students interviewed by Moss were much more serious about their musical careers than those in similar studies, many of them even planned to pursue musical careers. A number of students involved in Moss' (2009) study cited that their motivation for being involved in music was to help develop their identity in a way to encourage peers to think of them in a way other than blind. Other students stated that music or their instrument served as their motivation, while others still described the importance of developing relationships through music as their motivation. Students in Moss' (2009) study cited many of the same accommodations that were observed by Abramo and Pierce (2013), including learning by ear, adaptation of written music, and Braille music.

Evolution of Proposal

My personal connection in the area is what originally led me to explore the research base for contact allergies in music education. I did not expect to find very many resources that specifically addressed challenges presented by contact allergies in the instrumental music classroom. Still, I was surprised by the lack of resources for allergies in the music education

field. This lack of research base led me to investigate the research base for accommodations for special needs in music education. Again, I found myself surprised that this research area in our field was so small.

To help further develop my study and to connect special needs accommodations in music education and allergies in education, I turned to the general education research base, in hopes of finding literature on any sort of allergies in education. This, I expected to be a successful endeavor. There are so many concerns in schools now about allergies, specifically nut allergies, and I assumed research in this area in education must be plentiful because of this. I was very surprised, that after an extensive search in this research base, I was only able to find a few articles regarding allergies in the field of education. I also did not feel that the articles that I did find painted a clear picture of how educators address allergies in the American public school system.

Chapter II has presented the literature that supports and shows the need for researching nickel contact dermatitis in the instrumental music setting. While there is research available to show the impact of nickel allergies in musicians and the general population, there is not yet research that shows the impact of those with nickel contact dermatitis to their instruments during their time as a secondary instrumental music student. In fact, the most applicable research comes from the areas of physical, learning, and cognitive disabilities. This gap in research makes it difficult for music educators to find resources to help allergic students and allow for them to continue their instrumental music career without putting their own health at risk. Chapter III will outline the multiple case study to examine the experience of instrumental musicians with nickel allergic contact dermatitis to their instrument.

CHAPTER III

Design and Methodology

Purpose Statement

The purpose of this multiple case study was to illustrate the challenges that five musicians with nickel allergies have faced in instrumental music.

Research Questions

(a) What narratives do musicians with nickel allergies share regarding their awareness of their allergy and its impact on their instrumental music experience?

(b) How do musicians with nickel allergies describe efforts to find appropriate solutions for their allergy?

(c) What narratives do musicians with nickel allergies share in regards to their experiences with peers and teachers understanding their allergy?

(d) How do participants describe their motivations to continue in instrumental music, regardless of allergies?

Design

This is a multiple case study (Merriam & Tisdall, 2016). A case is defined as one musician and the case is bound by current reflections on their experiences since their diagnosis. Five musicians with nickel allergies currently serving as teachers, undergraduate or graduate students in music, or professional musicians served as the case study. This study aimed to highlight the experiences and challenges that these individuals have overcome to continue to pursue their passion.

Selection of Participants

A call for participants was posted on the “Band Directors” group on Facebook. I have

seen numerous posts on this page from educators asking for advice on how to help students who have contact allergies to their instrument. I expected that finding subjects might be a challenge, but I thought that the use of snowball sampling (Patton, 2015) would lead to a good participant sample. The purpose of snowball sampling is to find other participants through a person who is an ideal case for the study. Eventually this "snowball" grows as one person leads to another who shares a similar narrative.

I was quite surprised to find that although I see many posts on the "Band Directors" page about nickel allergies in instrumental music, no one from the group was interested in participating in my research project. I even had some directors comment that they've struggled with these allergies on their own, or had students who had, but they were not willing to participate in the study. The difficulty in finding willing participants made me quickly realize one of the reasons as to why there may not be more research involving nickel contact dermatitis in instrumental music. After a few failed calls for participants on the "Band Directors" Facebook group, Dr. Conway and I both reached out to teachers and students within our circles and were able to form a pool of interested and willing participants.

Description of Participants

Participants were instrumental musicians who have a contact allergy to nickel. At some point in their career, this contact allergy to nickel has impacted their ability to play their instrument in some way. One of the research questions involves the motivation to continue playing, despite their allergies. Because all of the participants have overcome their allergy enough to become a professional musician, it is assumed that they have higher than average motivation to continue, despite their allergy. Allergens involved include nickel, or a metal alloy

containing nickel (such as brass or silver). Each participant has been given a pseudonym to protect their identity and privacy.

Elizabeth. Elizabeth is an undergraduate student in the area of Clarinet Performance at a Big Ten University. She experienced a reaction to the nickel in her clarinet's thumb rest. Elizabeth is allergic to nickel, but is not allergic to other metal alloys that contain small amounts of nickel, such as silver.

Madison. Madison is a graduate student in the area of Trumpet Performance at a Big Ten University. Her primary instrument is the trumpet. She has had allergic reactions to silver-plated mouthpieces and sometimes has mild reactions on her hands, when she plays for an extended period of time. Her reactions to silver-plated mouthpieces are from the amount of nickel in the silver plating.

Stuart. Stuart is a trumpet player who has experienced reactions from mouthpieces and on his hand from contact with a trumpet. Stuart is allergic to nickel and is also allergic to other metals due to their nickel content, such as silver and gold. He is not allergic to stainless steel. Stuart currently teaches band.

John. John is a band teacher. He is now a percussionist, although he began his studies in band as a trombonist. John experienced a reaction from his silver-plated mouthpiece (due to its nickel content) when he played the trombone. Because of this reaction, John transitioned from trombone to percussion.

Zoey. Zoey is a private instructor and free-lancing professional musician in the capital district of New York. As a student, she experienced a reaction on her chin from the nickel in the lip plate of her flute. She has a nickel allergy, but can tolerate the small amounts of nickel found in silver.

BlueJeans Interviews

BlueJeans was utilized as a means to interview participants. This is the secure platform that the University of Michigan Institutional Review Board requires that students and faculty use for such interviews. With permission from the participants, interviews on BlueJeans were video-recorded for future transcribing and reference. This was done so that I could be sure that I correctly communicated each participant's journey as a nickel allergic musician. Motivation to find solutions and continue in music were discussed, as well as the role of the participants' teachers and parents in their journey with nickel allergies. An interview protocol was utilized (Appendix C), but unscripted follow-up questions were sometimes used during the interview to lead to more profound information and data.

Participants were encouraged to ask any questions that they might have or to discuss any insights or stories related to their allergy that they feel contributes to their story and the overall impact of nickel allergies in instrumental music. Most interviews were participants openly telling their story with a few questions posed by me. It was expected that participants would be effective in elaborating on information and effectively conveying their own narrative. Since the participants know their own story better than the researcher, it was expected that the participants themselves would be able to effectively communicate their experience with only a few questions posed by the researcher. This is why the researcher chose to allow for the participants to lead the majority of the interview, although a few opted to have the researcher start with the interview protocol.

Procedure

This plan for research was submitted to the IRB and followed all needed procedures for approval through the IRB. Collection of data and the selection of participants did not take place

until the study was approved by the IRB in October of 2018. All participants were interviewed individually by the researcher. The researcher sent each participant the interview protocol prior to their interview, so that they could reflect on their experiences and feel prepared for the interview. By allowing participants to see the interview protocol prior to the interview, participants felt more at ease and were not surprised by any of the questions or topics brought up by the researcher. This also allowed time for the participants to think about their past experience, since many of them reflected on experiences from years ago.

The researcher began each interview by briefly describing to participants the goal of the study and the procedure for the interview. The researcher allowed for the participant to either begin the interview by describing their journey with nickel allergies in instrumental music, or by starting with the questions on the interview protocol.

Timeline

Participants were selected by November 2018. All interviews took place from December 2018-February 2019, depending on the availability of each participant. Data collection concluded in February 2019.

Data Analysis

Coding process.

Data compilation. I began by transcribing and compiling all interviews. All interviews and transcripts were saved in multiple places to ensure that no data would be lost. These storage places included: internal hard drive, external hard drive, and cloud storage devices. All data for this study was digital. Data included videos from individual interviews on BlueJeans and transcripts from each interview. I utilized Miram and Tisdell's (2016) idea of a "case study

database" to ensure that I could easily find and access all needed data for each participant throughout the course of this study (p. 233).

Within-case analysis. As this was a multiple case study, the data was analyzed in two different phases: within-case analysis and cross-case analysis (Merriam & Tisdell, 2016, p. 234). In the first stage of analysis, I conducted the within-case analysis on the data for each participant. To do so, I analyzed each individual participant's data as if it were a stand-alone case study.

> For the within-case analysis, each case is first treated as a comprehensive case in and of itself. Data are gathered so they can learn as much as possible about the contextual variables that might have a bearing on the case (Merriam & Tisdell, 2016, p. 234).

All interview data was transcribed and coded for themes relating to the research questions, and important themes that emerged from the data. I began coding for themes in each individual case by highlighting and color-coding broad themes that arose. These themes included: family involvement, solutions, challenges to finding solutions, teacher interactions, school, feelings of self-consciousness, symptoms, equipment issues, cost of equipment, feelings of isolation, feelings of misunderstanding, peer interactions, doctor involvement, and knowledge of outside research and resources.

The within-case analysis allowed for me to develop a clear picture of how each participant was impacted by their experience with allergic contact dermatitis. This helped me understand the challenges that each participant faced with nickel contact dermatitis and helped me understand how each individual viewed these challenges from their own perspective.

Cross-case analysis. After I conducted the within-case analysis for each participant, I complied the list of all themes found throughout all cases and compared and contrasted the themes found between all participants. It was clear after conducting the within-case analysis that

many of the themes were shared among participants. After this within-case analysis, I conducted the cross-case analysis (Merriam & Tisdell, 2016).

> Ultimately, cross-case analysis differs little from analysis of data in a single qualitative case study. The level of analysis can result in a unified description across cases; it can lead to categories, themes, or typologies that conceptualize the data from all the cases; or it can result in building substantive theory offering an integrated framework covering multiple cases (Merriam & Tisdell, 2016, p. 234).

During the cross-case analysis, I chose to further focus on the themes that all participants shared and that were the most saturated among all participants. These themes included: solutions, challenges to finding solutions, feelings of isolation and misunderstanding, equipment issues and cost. I further analyzed each interview for these themes and created a separate transcript for each interview where I could make notes on each of these themes. I also further coded to compare and contrast each of these themes among participants. To do this, I created a separate document for each transcript that allowed for me to enter a code for each line of data in the transcript. The cross-case analysis allowed for me to identify and examine themes that arose from interviews across all participants. Similar themes arose among all participants, but they also all communicated slightly different challenges. Some of these challenges came as a result of the instrument that they play or as a result of the severity of their own allergy. By analyzing both within-case and across-case, I was able to provide a comprehensive outlook on nickel contact dermatitis and its impact on the instrumental music experience for all five of the participants in this study.

Organization of findings.

After collecting all data, I began to outline the chapters for the thesis. When I first began interviews and collecting data, I envisioned that each participant would likely have a chapter of their own that would examine their own narrative. After conducting my analysis of the data, I realized that all five of the participants' narratives were far more similar than I had anticipated. After conducting the within-case and cross-case analysis, a few clear themes began to arise from the data. Upon further analyzing the themes among all participants and the saturation of each theme, it became clear that the overarching themes included general challenges from nickel contact dermatitis and the challenges to find solutions for these allergies. I have chosen to title each chapter as follows: "Chapter IV: What are the challenges that musicians with nickel allergies face?"; "Chapter V: What kind of equipment can help musicians with nickel allergies? What can educators do to help musicians with nickel allergies succeed in instrumental music?"; "Chapter VI: Summary and Conclusions."

Chapter sub-headings. After selecting the title and overall theme for each chapter, I decided that I would like to include a sub-heading for each participant in chapter IV and V. I believe that these subheadings help the reader better understand the individual challenges that each participant has faced, due to their allergy. I also included headings for each individual instrument family in chapter V, as this allowed for me to suggest some solutions not used by the participants, as the selected participated only represent a small sampling of possible reactions and instrument played. I also believed that a sub-heading for each instrument family would be a valuable resource for music educators. Presenting the data in this way also allowed for me to highlight the similarities in challenges for solutions that instruments in each family share. In chapter VI, I chose sub-headings that I believe provide an organized approach to educators as to

how they can effectively help any musicians with nickel allergies diagnose and find solutions for their allergy.

Trustworthiness

Personal expertise. My own experiences provided a unique insight into the narrative described by the participants in this study. My own allergic experiences helped me understand the importance and relevance of certain questions or narratives.

Member checks. Member checks (Merriam & Tisdell, 2016) were performed for all interviews, to ensure accuracy of data and that the data effectively communicated the narrative told by each participant. As Merriam and Tisdell describe "…the idea here is that you solicit feedback on your preliminary or emerging findings from some of the people that you interviewed (p. 246). In order to do this, I complied each written section from my draft that was about each participant into a separate document. I sent each participant a copy of the document that had only their findings and quotes and asked for them to give me their feedback and to tell me if there was anything that did not "ring true" (Merriam & Tisdell, 2016, p. 246) about their narrative. A few participants did request slight changes in their descriptions. Additionally, one participant chose to slightly reword one of their quotes for clarification. This allowed for me to work with the participants to ensure the accuracy of all information and quotations. This guaranteed the internal validity of the study, ensured that the participants felt that their experiences were accurately recorded, and that they felt that my writing effectively portrayed their story.

Saturation of themes. This saturation of themes (Merriam & Tisdell, 2016) from different perspectives allowed for me to paint a clear picture of the issues that are caused by nickel contact dermatitis in instrumental music. This saturation of themes shows that although

each participant's case is different, there are key themes that connect them all. Merriam and Tisdell describe saturation of themes as follows:

> Saturation occurs when continued data collection produced no new information or insights into the phenomenon you are studying. For example, as you continue to interview you begin to realize that you are hearing the same things you've heard earlier; no new information is forthcoming, or some tidbit is relatively minor in comparison to the effort spent collecting the information. Also, the ongoing analysis of your data has produced categories, themes, or findings robust enough to cover what emerges in later data collection. (p. 199)

Audit trail. I have provided an audit trail (Merriam & Tisdell, 2016) to provide a clear picture of how the study was organized and conducted. Merriam and Tisdell (2016) describe an audit trail as follows: "Essentially, it is a detailed account of how the study was conducted and how the data were analyzed" (p. 253).

Summary

This study attempts to identify the challenges that nickel allergic instrumentalists face in order to continue to play their instrument while maintaining their own health. These challenges are often overlooked or belittled by non-allergic musicians or teachers, due to misunderstandings and lack of research about nickel allergic instrumental musicians. This study involved interviewing five instrumental musicians with a nickel contact allergy that has somehow impacted their involvement in instrumental music. These participants were asked to share their own story and journey from the time that they were first diagnosed with a nickel allergy to where they are today in regards to their nickel allergy. Participants were asked to share their stories of success and frustration along their journey of finding solutions for their allergies.

Chapter III has discussed the design of the study, how research was conducted, and how the validity of this study has been ensured in this multiple case study. Chapter IV will present the findings of the study described in chapter III.

Chapter IV

What are the challenges that musicians with nickel allergies face?

Each participant for this study shared a story that involved challenges in music relating to their nickel allergy. These musicians most obviously experienced physical challenges, but they also described emotional or social challenges that they dealt with as a result of their allergy. Whether they were aware of a nickel allergy before or after they began playing their instrument, every participant experienced a time when they had to confront their medical issues and make decisions that could have ultimately ended their instrumental career.

Each participant was asked to describe how their allergy was first diagnosed. They were also asked whether they had been diagnosed with a nickel allergy before starting their instrument, and if prior knowledge of a nickel allergy had led to any suggestions for or against choosing a certain instrument. Each participant shared that even since their allergy was diagnosis, they continue to face challenges in instrumental music. Overall, participants described challenges in the following areas: diagnosis, teacher and peer interactions, feelings of isolation, and lack of confidence. I will discuss how these challenges have impacted each participant.

Diagnosis

Elizabeth. "It was actually like elementary school… probably like first or second grade. I had a hello kitty like necklace and I came home with hives across the back of my neck and I didn't know what it was." Elizabeth's first allergic experience is one that many people can relate to. In Elizabeth's case, as is the case for most people with such experiences, she found that her body could not tolerate "costume jewelry" but did not experience any issues when exposed to everyday metallic items, or fine jewelry made of gold, silver, or stainless steel. When selecting an instrument neither Elizabeth or her mother considered that her nickel allergy could pose an

issue. Like many of the other participants, Elizabeth assumed that the metals used to make instruments would be of high quality and would be contain little to no nickel.

Interestingly, Elizabeth's reaction to her clarinet did not begin until towards the end of her high school career and didn't pose any serious issues until college. This delay of reaction and the pattern to her reaction made it even more difficult for Elizabeth to realize that the nickel in her clarinet was the cause of her rash. Elizabeth described that her reaction: "It had basically taken over my thumb and it was basically like an open wound. It was kind of gross." When her reaction first began, she didn't understand what was happening and was confused as to why only the skin on her thumb was dry and why it never seemed to get any better, even with the use of lotions and creams. She said that she had never even considered that her clarinet could be the cause of her rash. Even her clarinet professor seemed baffled by her thumb, advising her to put lotion on her thumb, but not drawing any connection between the rash on her thumb and her nickel-plated clarinet.

While sitting in a masterclass, one of Elizabeth's friends looked at her thumb and then asked her if she had any allergies, suggesting that perhaps her rash was actually an allergic reaction. Suddenly Elizabeth remembered her nickel allergy and considered that her clarinet was likely the cause of her rash. "I was like, oh my God! I have a nickel allergy! How could I not think about that?" After this realization, she called her mom to tell her that she believed that she was allergic to her clarinet. Her mom also believed that the nickel from her clarinet seemed like a likely culprit for her mysterious thumb rash.

For several days, Elizabeth said that she felt like she was in a sort of daze, unsure of what to do, how she could possibly be allergic to her instrument, and how she could continue to play

without causing herself harm. She never considered quitting but was not sure where to go or how to find a viable solution that would allow for her to continue to major in clarinet.

Madison. "I first noticed it with cheap jewelry when I was younger. It would give me rashes." Madison's initial diagnosis for a nickel allergy was almost identical to that of Elizabeth's. Like Elizabeth, Madison also did not consider that her nickel allergy could impact her instrumental music studies in any way. Madison did not experience any sort of allergic reaction during the first couple of years in her trumpet playing. In seventh grade, she suddenly noticed that she couldn't play for more than five minutes without feeling like her lips had become "raw." Unsure as the cause of this feeling, she asked her private trumpet teacher for advice. He suggested that she try to purchase a gold mouthpiece to try. Interestingly, her trumpet teacher's suggestion for a gold mouthpiece wasn't due to the fact that he suspected an allergy in any way, but because he believed that a "softer metal" might work better for her. "So I tried it (a gold mouthpiece) and it magically went away, but it wasn't because it was just a softer metal you know?"

After spending a couple of years using only a gold mouthpiece, Madison tried a silver mouthpiece again and immediately experienced the same reaction that she had before switching to a gold mouthpiece. It was at this time that she realized that it was likely the nickel content in silver that was causing the reaction.

Stuart. Unlike Elizabeth and Madison, Stuart was unaware of his nickel allergy until he began experiencing adverse reactions from his silver-plated trumpet. Stuart shared that he had experienced what he believed to be eczema on his hands throughout high school. Upon entering his undergraduate studies, he noticed that the rash on his hands became significantly worse. He believes that his rash likely worsened at this time because he had increased exposure to his

trumpet by increasing the amount of time he spent practicing and rehearsing each day. Because of the location of his rash and the positive correlation between the severity of his rash and the amount of time spent playing his trumpet, his trumpet professor suggested that he could possibly have a nickel allergy. To test this theory, his trumpet professor asked him to not play his trumpet for a week. During this time, his rash improved significantly.

John. John vaguely remembers having a sensitivity to nickel before he began playing the trombone. He said that he's always known that objects like belt buckle or watches would cause him to break out. He generally was able to avoid any issues with nickel, until after he had been playing the trombone for a while. Like Elizabeth and Madison, John and his family assumed that his mouthpiece would be composed of metal that would be non-reactive to his skin, such as stainless-steel:

> We discovered over time that I was getting a big ring around my mouth, and that my lips would get really chapped and dry. After a while we figured out that the mouthpiece had nickel in it, and that it was a kind allergic reaction to the mouthpiece.

John stopped playing the trombone and became a percussionist. He saw immediate improvement in his rash once he stopped playing the trombone.

Zoey. Zoey had prior adverse reactions to nickel before she began playing the flute, but didn't realize what these reactions were until she discovered her nickel allergy from her flute. Zoey described her reaction as a constant "oozy rash" on her chin. This rash began to develop in the 7th grade, which was two years after she began her studies on the flute. "It itched a little bit, and then all of a sudden it just got out of control… What's this? It's never going away… Super." She first tried wiping the mouthpiece with rubbing alcohol before playing. Zoey then began to notice that the plating was wearing away on the lip plate of her flute and decided to cover it with

scotch tape. She noticed immediate relief once she did this. Zoey tried this not because she had suspected it was the nickel in her flute causing a reaction, but because the she thought the bumpy texture where the plating was wearing off could be what was causing her reaction. Once she noticed the improvement in her rash she began to realize that a nickel allergy would also explain some of the other strange reactions that she had experienced.

> That sort of made sense with some other things… watch bands would give me a rash… my glasses under my eyes would give me a rash…earrings… so all of that sort of added up together and I realized that's probably what was going on.

Teacher and Peer Interactions

I asked each participant to share their experiences regarding their nickel allergy with their teachers and peers. Generally, the story was quite similar. Four out of five of the participants shared that their teachers generally weren't helpful in discovering and helping them find solutions for their allergy. While they shared feelings of isolation or helplessness about this, it was generally acknowledged that they felt that this lack of guidance wasn't from neglect, but rather confusion and misunderstanding of nickel allergies. One participant had a very different experience than the others, and had an applied instrumental professor who worked hard to educate himself to find resources for his student and to get others involved in the process.

Elizabeth. Elizabeth described a time in her lesson when her clarinet professor noticed the reaction on her thumb:

> I think my clarinet professor at the time was like, 'Oh, your skin is cracking. You should probably put some moisturizer or something on it and maybe that'll help.' They didn't really understand… but they were never unhelpful, you know?"

Unfortunately for Elizabeth, she did not find her teacher to be a very helpful resource in

discovering or helping to adapt for her nickel allergy. She did however find members of her clarinet studio to a good resource. Although she didn't know very much about their specific situations, Elizabeth did know that two other members of her clarinet studio also had a nickel allergy to their clarinet.

It was a friend in Elizabeth's studio that initially suggested to Elizabeth that the rash on her thumb could be caused by an allergy, which is what led her to look for solutions in the first place. It was also a member of her studio suggested that she try covering her thumb rest with clear nail polish to provide a barrier. Other members of her studio also offered her suggestions about alternate thumb rests or plating alternatives that she could look for when purchasing her next instrument. When she first began looking for solutions for her reactions, Elizabeth used a finger glove on her thumb to provide a barrier between her thumb and thumb rest. This was an idea that her mom had thought of. She shared that her peers did make jokes about the shape and appearance of the finger gloves that she used, but that it was all in a light-hearted manner. These joking interactions didn't really bother Elizabeth and overall she felt well-supported by her peers about her nickel allergy.

Madison. It was Madison's private trumpet teacher in junior high who had initially suggested that Madison switch to a gold mouthpiece. This suggestion did provide a solution to Madison's reaction, but her teacher actually didn't have the possibility of a nickel allergy in mind when he suggested a gold mouthpiece to Madison. Madison's teacher had thought that perhaps the hardness of the silver-plated mouthpiece was what was causing her lips to become raw while playing and suggested that she try a gold mouthpiece because he believed that her issues could be alleviated by using a mouthpiece composed of a "softer metal." Madison's experience with her private trumpet teacher in junior high and high school was very similar to

the experience that Elizabeth shared. Her teacher wasn't really a helpful resource for her, but also didn't discredit her allergies or make any suggestions that would cause her to have a reaction. She said she didn't go to her band teacher at all about this issue and didn't remember them being involved in helping her find solutions for her allergy in any way.

When asked if her private trumpet teacher had ever suggested that her challenges could be from an allergic reaction Madison stated:

> It was honestly me that came up with most of it… because I don't think he had ever dealt with it before. I mean for a couple of years I didn't really think much of it… but then probably like eighth grade… freshman year of high school… I was like… I don't know… maybe I will try a silver mouthpiece again…. and then it was like, 'Oh, this isn't working out.' That's kind of when I for sure figured it out. My teacher didn't really do anything about it. I was just kind of… I was kind of on my own I guess."

Madison shared that she has felt more discouraged and unsupported, in regards to her allergy, by her professors in her undergraduate and graduate studies, particularly by her undergraduate professor. Her undergraduate professor clearly did not understand the severity of her allergy and would ask her to use silver-plated mouthpieces because he believed that the design of the mouthpiece would help improve her sound. Madison tried to explain that this would cause her to have a reaction and that this was not a good idea, but he did not seem to understand. Madison described a time when her professor asked for her to make a recording using a silver-plated mouthpiece:

> He gave me this mouthpiece to make me sound a little more like a flugelhorn… but I was still playing a trumpet… He said 'Hey, you need to make this recording on this,' and I was like 'I don't know if I can do that,' and he said 'Well, it's going to sound way better

> on this mouthpiece.' So, I was like, 'Um, I'll try, I guess.' But it's terrible because whenever I do that… I mean it takes like an entire… like over a day of recovery! Like trumpet does not feel the same for a while. I've done that before where I'm like, 'Okay, I'm just going to like make a quick recording on this… on this mouthpiece, it will be fine…' and then the entire following day, it's just like weird and I don't really kick back into normal playing until the following day at some point. By doing that I'm wasting an entire day of playing that I could be doing. Yeah... I don't think people like really get it. They think it just like freaks out and then goes right away or something. But that's not the case. It tends to dwell."

Madison spoke a lot about how her graduate professor speaks to her about different mouthpieces. As a trumpet player, she feels a lot of pressure to experiment with mouthpieces. She feels this pressure from both peers and professors and is very frustrated that she can't easily try mouthpieces out like her professors want her to, or like she sees her peers do. Her graduate professor has a collection of various mouthpieces for students to try, but since they're all silver, she can't play on them long enough to tell if they truly make any sort of improvement in her playing.

Madison recalled peers treating her differently because of her allergies when she was in junior high and high school. She said that many students would make fun of her, or claim that she thought she was better than them, because she used a gold mouthpiece. She felt like other students didn't understand or believe that she only played a gold mouthpiece due to medical necessity and she felt like other students shamed her for it. Since entering college, she hasn't felt this kind of criticism from peers. Because music students are all serious about their musical careers and equipment, she feels like they don't see her gold mouthpiece as anything out of the

ordinary, especially since she knows other trumpet players who play with a gold mouthpiece who don't do it for medical reasons.

Madison did share that her university's school of music was very supportive and understanding of her allergy. When she began playing baroque trumpet, she asked the university if they would be willing to buy her a gold mouthpiece to use with it, since it isn't common to own a baroque trumpet mouthpiece and she could medically prove that she could not use the silver mouthpiece that she school provided with the instrument. She didn't expect that the university would be willing to provide this for her, but she thought it was worth asking. To her surprise, they completely understood and purchased a gold-plated baroque mouthpiece out of their budget for her to use. She said that they were very understanding and that they didn't make her prove her allergy to them in anyway. This was a big relief to her, since she had to play the baroque trumpet for her studies, but didn't have the money in her budget to buy a mouthpiece for the instrument. She also knew that she wouldn't be using such a mouthpiece very often, so she felt relieved that she did not have to spend so much money on something that she knew she would get little use from.

Stuart. Stuart had a very different experience than the rest of the participants. Stuart's undergraduate trumpet professor was extremely instrumental in helping him discover and find appropriate solutions for his allergy. He also shared that the rest of the faculty at his university was also very understanding and helpful to him while he worked to find effective solutions for himself. Stuart's trumpet professor never suggested that he quit instrumental music and emphasized that he should and could continue to play the trumpet. He assured him that he would work with him to help him find a solution that would allow for him to continue playing, and he did.

When Stuart's trumpet professor suspected that Stuart was experiencing contact dermatitis from the nickel in his trumpet, he had Stuart stop playing the trumpet for two weeks, to see if his eczema would improve. This is something that really stood out to me. Never would I have expected that any applied professor would tell their student that they could not touch their instrument for two weeks. Stuart's professor also did extensive research on nickel allergies and created a step by step plan as to how he would help Stuart test for each possible problem that he could experience from playing the trumpet. Stuart said that he had steps and solutions in mind for each possible outcome.

Once Stuart stopped playing, he noticed that his reaction immediately began clearing up. After the two weeks passed, his trumpet professor transitioned him to playing on an acrylic mouthpiece and with a plastic trumpet. His trumpet professor was concerned that he could possibly react to touching or breathing in through the trumpet, so he wanted to try a plastic trumpet first as this would allow for his reaction to further clear, and would allow for them to test whether it was safe for him to safely play on some type of metal trumpet. While he knew that playing a plastic trumpet was far from ideal, Stuart's professor felt that this would be the best way to allow Stuart to safely continue playing while they were continuing to search for better solutions. Stuart's trumpet professor even conducted extensive research on every plastic trumpet available to ensure that Stuart was playing on what he felt was the best possible one.

Overall, Stuart shared a very positive outlook on how his peers and professors handled his allergy. He shared that while he obviously didn't feel lucky to be dealing with a nickel allergy, he did feel lucky that everyone in his school of music looked at it as a learning experience and did everything that they could to help him:

> I didn't have any issues with pushback by my teachers, because it happened at the college level. I went to a school where there is a great culture of continued learning, and all of the professors that helped me through my situation treated it like the learning experience it was. I was like a guinea pig. A couple fellow students were clearly frustrated that I would have a solo part in an ensemble, and it didn't sound as good as they could have played it on their "real" instrument for the first few months I had my plastic horn. Eventually I got it. So, I experienced a little weirdness between peers and stuff, but most everybody was just like, 'It's not his fault.' So, it was mostly positive.

I was really impressed by the way that Stuart's professors chose to use his situation as a learning experience. I think that that this kind of experience is something that the other participants could have gained from, and could have helped them feel much more supported while they struggling to diagnose and find proper solutions for their allergy.

It was while he was playing a plastic trumpet that Stuart experienced the most frustrating issues with teachers and peers. There was one experience that especially stood out to Stuart:

> Another professor came into band and subbed for our other professor that was out. He saw me playing on the plastic trumpet and nobody had told them about it because I wasn't in any of his ensembles. He looked at me and was like, "can we put the toy up?" All the other people were like telling him like, "No, he has to…. That's his trumpet. He can't use anything else…" and so instantly he was super apologetic.

Stuart shared that while playing his plastic trumpet, he did feel that other students judged his playing more, but that they also understood that he didn't want to have to play a plastic trumpet and that it was out of his control. Stuart said that the most frustrating issue he had with his peers while playing a plastic trumpet was that everyone was constantly wanting to try to play

his trumpet for fun. Stuart quickly realized that he was reacting to the leftover nickel that others would contaminate his trumpet with when they put down their own instrument down and try his. He said that it eventually became quite a process making his peers carefully washed their hands before touching his instrument.

John. John's experience was very different from the rest of the participants because his teacher actually helped him change to another instrument because of his allergy. John shared that he felt like he was only allowed to change to percussion because he was proficient on piano and his teacher knew that that meant that he would be able to competently play keyboard instruments. His teacher also told him that he needed to take percussion lessons over the summer so that he could play at the same level as the others percussionists in his grade. I asked John "If you hadn't played piano before, do you think there's any chance maybe you would have said 'This is too much' and just left band"? To which he responded:

> Yeah, I mean I think it's possible. You know, without… without having another valid option presented to me… like if percussion wasn't an option, because I played piano. Yeah… You know, it may have been… it may not have turned out that way. I could have just been like, 'Well, I guess I can't do this…' So yeah… it sucks when you think about it.

John didn't share any unfavorable interactions that he experienced with peers. After he switched to percussion he didn't have any other contact reactions that caused issues, so his teacher wasn't further involved in helping him with his allergies. Once he entered college as a music education major, John realized that the brass methods class could possibly cause issues for his allergies. Before he started his brass methods course at his university, he reached out to his

professor to let her know that it was possible that he may have a reaction to the brass mouthpieces, and to see if they had any ideas on what he could do if he did have a reaction:

> I hadn't really played any brass since I was in middle school…. So, at the time I wasn't sure…. That's why I was like, 'Well I've got this. What can we do about it?' You know? So just in case that it is a problem. I haven't played for a long enough period of time ever where I could maybe determine if it would still be a big issue for me. I'm assuming that since belt buckles and stuff still make me break out… I think if I was to play on a nickel-plated mouthpiece for a long time, I would still break out… I just remember I told my professor about that, and even she was like, 'Whoa, we have never had anybody say that before.'

John didn't play for long enough periods of time in brass class to cause himself any kind of reaction, but thankfully his professor did plan for him to use plastic mouthpieces as an alternative if he did have a reaction.

Zoey. Zoey couldn't recall any support from her teachers with her allergy or even a time when they even questioned or asked her about her rash or why she was putting tape on her lip plate.

> I think just no one… no one noticed. No… Or if they notice they were like 'Too bad.' Nobody ever tried switch me to a different instrument or something. I think honestly they just figured, 'Oh, you want to play the flute? Okay, cool. All right. You'll put up with this particular problem.'

Now a teacher herself, when Zoey looked back on her experience as a student she was quite astonished at how she did not receive any support, or even acknowledgment of her allergy from any of her teachers:

> I mean, I can't imagine as a teacher… I can't imagine my teachers didn't notice that there was something going on. I don't recall ever being asked about it, which is kind of weird, but true.

Eventually her teacher did suggest to Zoey's parents that they should buy her a higher quality flute, which ultimately was the solution to her reaction. However, her teacher did not recommend a new flute in regards to helping with her allergy:

> It wasn't until I was like making it into state level honors groups that finally my teacher was like, 'Oh, might want to think about…' It wasn't…. It wasn't even an open hole flute. She said, 'You might want to think about maybe getting her a new flute, because it's going make a difference.'

Zoey didn't remember her peers making fun of her in any way for her allergy. She said that the scotch tape was hard to see and she didn't think many students even noticed that she was putting it on her lip plate. Zoey did say that she felt self-conscious about the rash that her nickel allergy caused on her chin, but that her peers made fun of her for other things and didn't seem to care about her rash. "The kids that I saw like day in and day out didn't… I don't think would've even noticed… They probably had better things to make fun of me for."

Feelings of Isolation and Frustration

Each participant described ways in which their allergy made them feel isolated from the rest of the instrumental music community. Many of them shared that their teachers or peers did not fully understand their allergy and therefore could not effectively help them in properly diagnosing or finding solutions for their allergy. Others also shared feelings of confusion and frustration in finding trustworthy resources regarding nickel allergies, specifically nickel allergies in music. Most participants shared that they felt like it was ultimately up to them to

come up with their own solutions, because their teachers or peers were not aware of nickel allergies, or did not have the knowledge or resources to help them find solutions for their allergy.

Elizabeth. Elizabeth shared that there were two others in her clarinet studio that she knew had nickel allergies, but it didn't seem to be very openly discussed in her studio:

> I never talked to them really about it…. I just know one girl… she had nickel-plated clarinets and then she was also conveniently… like perfectly timed, was buying another set. So, she has silver-plated clarinets now… Then the other guy… I know he had a reaction and it was kind of like closer to his knuckle, rather than his like thumb, and his knuckles swelled up. It was huge, but I never really talked to him beyond just noticing that his knuckle was all swollen.

I found it to be quite astonishing that there were two other members of her studio that had similar allergic reactions to their clarinet. I think that this could have been a good learning experience for others in the studio. It seems like a more open discussion in the studio about these challenges could have been a good learning experience for everyone in the studio.

Elizabeth did recall that when trying to find some solutions or ideas on Google she found some information that she didn't really think was trustworthy and thought was a bit extreme:

> I do remember reading somewhere something that someone posted like, 'Oh, you have to be careful because if it (the nickel thumb rest) has contaminated the inside of your case… Or you know, if it (the nail polish on the thumb rest) touches the outside then you'll feel it and react.'

Most of Elizabeth's feelings of isolation and frustration are due to availability and manufacturing policies of clarinets, which will be discussed in the next chapter.

Madison. Madison shared that she felt that it was ultimately up to her to discover and

find solutions for her nickel allergy. While her private teacher was the one to recommend a gold-plated mouthpiece, they did not recommend it in regards to the possibility of a nickel allergy and never really effectively helped her understand her nickel allergy or how to overcome it in her studies. She shared that her none of her teachers had ever dealt with a nickel allergy before, and they didn't seem to have the resources or information needed to help her. One of Madison's comments in particular especially stood out to me: "Sometimes it's hard for people to be helpful when they don't really like know what to do, I guess." Many of the other participants shared similar thoughts. This is also something that I have experienced in dealing with my own allergy. Madison shared that while she felt like others didn't discredit that she had an allergy, she didn't feel like people understood how challenging it could be, or how to help her:

> I feel like I just get like sent off on my own a lot of the time. I mean this isn't like an incredibly…. I mean it's not rare, but it's not like super common. Not every other person has this problem. I mean, it does like get a little tough because I feel like some people just don't really like understand that it's like an actual struggle… and a very expensive one.

Like Elizabeth, most of Madison's feelings of isolation and frustration are due to the availability and cost of difference of supplies for her instrument that do not contain nickel. These will be discussed in chapter six.

Stuart. Stuart shared that both he and his professors felt frustrated when searching for reliable resources on nickel allergies:

> A lot of the websites and information and stuff are a little bit like… I don't know how to put it lightly…. Like a lot of the resources are kind of crazy people who are like 'Filter your water and you will be fine,' You know, that kind of thing… and like there's just a lot of crazy like conspiracy almost type people. So, it was hard to find reliable resources

> on it. That was the thing that we all struggled with… The professors included in this stuff. There's just not a lot out there for it.

Overall, Stuart shared a very positive experience where he felt well supported. Stuart's feelings of isolation and frustration come mostly from his frustration with certain adaptive instruments and equipment that he used. These will be further discussed in the next chapter.

John. While John's trombone career didn't last long, he still feels isolated and frustrated that knowledge of nickel allergies isn't commonplace in the world of music education.

> I think for me, having people educated in the fact that it exists and it's a problem is the best thing because, you know… I mean most directors probably don't know that that's an issue for kids, you know? And they're like, "Well, I don't know what to do about that. I didn't even know that exists."

Looking back on his experience, John feels frustrated that he wasn't offered any suggestions that would have allowed for him to continue playing trombone:

> Nobody presented a different option for the trombone that was not 'You can't play trombone anymore.' I know now there is stainless steel… There's gold. Plastic for a middle school or you know, a young kid… Nobody was able to say, 'Hey, this is an option here.' No band director said that. You know, I don't think my parents had any idea of how to go out there and find a solution, and I think that they figured "Well they didn't say anything. So, you know, I guess there's nothing we can really do about it. We just need to find something else."

Zoey. Zoey shared that she felt like she was entirely on her own in discovering and finding solutions for her nickel allergy. She shared that she felt frustrated by this and now

as a teacher, she understands that this is not something that she should have been left to solve alone:

> It means so much if you can make one less thing for the kid to feel self-conscious about. You know, it wasn't going to stop me from practicing… but God knows they (students) don't need much, you know? Yeah… It could definitely be a deterrent. It seems to me it wasn't for me, but that's because I was willing to put up with it.

I mentioned to Zoey that I have heard of many others in the flute community who have had similar reactions on their chins from the nickel in their flute. Zoey was shocked by this and said that she hasn't ever spoken to another flutist about this issue, but she also feels like most probably have solved their reaction like she has, with a higher quality flute. Since professional flutists all play on higher quality flutes it's nearly impossible to determine if a flutist has such a nickel allergy without asking them. I think that a more open conversation in the instrumental world about nickel allergies would greatly help increase awareness and understanding of this allergy. Like many others, Zoey also shared various frustrations about the availability and the prohibitive cost of materials to help with her allergy.

Feelings of Self-Consciousness

Many of the participants shared feelings of self-consciousness due to their nickel allergy, most often when they were experiencing reactions to their instruments. While these reactions did not deter any of these participants from continuing in instrumental music, they all acknowledged that these feelings of self-consciousness were not easy and could cause for less serious musicians or students to choose to end their career in instrumental music.

Elizabeth. Elizabeth recalled feeling self-conscious about the reaction that was caused by her thumb rest:

> When I finally figured out that it was… That my rash was a nickel allergy… My rash had basically taken over my thumb, and it was like basically an open wound. It was kind of gross.

I asked Elizabeth how long she experienced this "open wound like rash" on her hand, to which she replied: "Longer than I want to admit. It was probably like a year, I think." Elizabeth also recalled feeling self-conscious about the finger glove that she had to roll on to her thumb before playing for a while, especially since others often joked about the shape and appearance of the glove.

Madison. Madison remembers feeling self-conscious when she was younger because many of her peers assumed that she thought that she was superior just because she used a gold mouthpiece. She felt like others singled her out, or stayed away from her at honors bands or other events, just because they perceived her to be self-centered due to the mouthpiece that she had to use. Most of Madison's feelings of frustration and isolation are in regards to the prohibitive cost and availability of mouthpieces that she can play. She feels isolated from her other trumpet peers because of these issues. These challenges will be discussed in detail in the next chapter.

Stuart. Stuart shared that he his hands had been covered in dermatitis for quite some time before discovering his nickel allergy and that it was something that he felt self-conscious about. He had assumed that it was eczema and eventually kind of learned to ignore it. Most of Stuart's feelings of self-consciousness are in regards to the equipment that he had to use because of his allergy. Stuart shared that he felt self-conscious about playing in front of his peers and performing solos because he wasn't able to play on his plastic trumpet or with his acrylic or stainless steel mouthpiece as well as other students expected him to. He also felt very self-

conscious when he had to play a plastic trumpet for a while. He said that he felt a "nagging voice" in the back of his head whenever something didn't sound the way that he wanted it to. These issues regarding equipment will be further discussed in the next chapter.

John. John didn't really share any feeling of self-consciousness in regards to his allergy. I suspect that had he played trombone longer, he probably would have experienced similar feelings to the other participants.

Zoey. Zoey seemed to feel the most self-conscious about the dermatitis that she experienced. She even recalled trying to cover up her reaction, so that no one would notice: "I was definitely self-conscious about the fact that I had this going on. I can remember trying to cover it up with makeup, and that doesn't work because then it just gets worse." Zoey even wondered if perhaps her teachers picked up on her feelings of self-consciousness and maybe that's why they didn't address her rash: "Maybe they were like 'Oh, she Probably doesn't want to talk about her weird rash thing, I suppose.'"

Connections to Past Research

Elizabeth. Elizabeth's description of her reaction and diagnosis is very similar to the case described in Alvarez and Brancaccio (2003). In their study, Alvarez and Brancaccio (2003) described a violinist who experienced an eczema like reaction on her fingertips, where she was in the most amount of constant contact with metal. What I did find interesting in comparison from Alison to Alvarez and Brancaccio (2003), is that Alison has only experienced this type of reaction on her thumb, but not her fingertips. I worry that continued contact with nickel-plated keys could lead to a reaction such as the one that Alvarez and Brancaccio described on the each left fingertip of the violinist in their study. I do also wonder however, if the reason for Elizabeth's reaction only being on her thumb could be due to the amount of sweat that her thumb

may produce while in contact with her thumb rest. Inoue, Shoji, and Fujita (1997) noted that a reaction is much more likely to occur with the combination of sweat and friction, as these two things can increase the amount of nickel that is released. It seems to me that Elizabeth must experience both sweat and friction from her thumb rest while playing, but likely does not experience these things, or not to as high of a degree, with the keys on her instrument. Onder, et al. (1999) described a clarinetist in a professional orchestra with a history of dermatitis. Through patch testing, this clarinetist was diagnosed with a nickel allergy.

Basketter, et al. (1993) found that women are much more likely to experience a nickel allergy, due to their increased amount of exposure from jewelry. They also stated that sweat leads to an increased amount of nickel released from metallic objects onto the skin. Like Madison and Zoey, Elizabeth experienced prior reactions to jewelry, which likely increased her chances of reacting to her instrument. Additionally, the sweat produced while playing is likely part of what has caused for the reaction on her thumb.

Madison. I felt that the reactions that Madison described did not perfectly align with what is viewed as the "classic" reaction for a nickel contact allergy. Madison described that her most common reaction is that she would experience "rawness" in her lips, but not necessarily an eczema like rash. This could be partly because perhaps this "rawness" feeling occurs before an actual eczema-like reaction, but is enough to convince Madison to stop playing. I did not find such other examples listed within the literature of this type of reaction. Moller (1979) examined the likelihood of a nickel allergy when symptoms were not shown as classic eczema or dermatitis. Moller found that a number of participants without any prior type of dermatitis could still be diagnosed with a nickel allergy through patch testing. Moller's study also showed that such reactions were disproportionately common among women.

Stuart. While he did not have prior knowledge of his allergy, Stuart's reactions did align with those described in several different studies. Meding and Swanbeck (1990) observed that 19% of participants who had hand eczema were also found to have a nickel allergy. These participants were believed to have this eczema due to their occupation and the contact to nickel that was required for their occupation. This very closely relates to the development and reasoning of Stuart's hand eczema. Thomas, et al. (2000) examined a 32-year-old trumpet player who began to develop cheilitis and rashes around areas where he was in contact with his instrument. This diagnosis seemed very similar to Stuart's in the reactions exhibited, and in the fact that the participant in their study also played for many years before experiencing any type of negative reactions to their instrument.

Gottschalk (2005) described a horn played with a very severe metal allergy. The horn player in this study actually began to exhibit symptoms from breathing in from their horn, due to the nickel inside of the horn. While Stuart does not have this severe of an allergy, this type of reaction was something that his trumpet professor did consider and was part of the reason why his trumpet professor suggested that Stuart play on a plastic instrument for some time.

John. While he didn't play the trombone for very long, John did exhibit classic reactions such as those described by Nakamura, et al. (1999). Nakamura described a participant who experienced reactions after playing trumpet and wearing jewelry. This participant was patch tested and found to be allergic to nickel, but not other metals. After being asked to stop playing and wearing jewelry her reactions disappeared. This is similar to John's case. John described that he had also had past reactions to belts and watches before reacting to his trombone. Once he discontinued trombone he saw immediate improvement in his skin. He has also seen

improvement from avoiding belts and watches, or purchasing belts and watches that he knows are stainless-steel.

Zoey. Zoey's description of her reaction perfectly mimics what was observed in a flute player by Inoue, Shoji, and Fujita (1997). Inoue, Shoji, and Fujita described an eczema type rash only on the area where the flute player was in contact with their lip plate. This reaction began to appear after the participant noted reactions to earrings and other types of jewelry. Inoue, Shoju, and Fujita noted that both sweat and friction increase the amount of nickel released onto the skin and therefor increase the likelihood for a reaction. Therefore, it is likely the constant friction and contact with the lip plate that caused Zoey's reaction, especially since Zoey has never experienced a reaction on either of her hands from her flute. Similar to the participant in the study, Zoey also described that before her reaction to her flute she had experienced a few strange reactions that she wasn't quite sure of the cause of, such as reactions to various earrings or pairs of glasses.

CHAPTER V

What kind of equipment can help musicians with nickel allergies?

What can educators do to ensure success for musicians with nickel allergies?

A majority of the information shared by each participant regarded equipment and instruments that they use, have used, or would like to use as solutions for their nickel allergy. While each participant has generally found an effective and safe way to continue to play their instrument, many shared that they continue to experience challenges due to their nickel allergies. The challenges that they face in instrumental music have lessened since their original diagnosis, but these challenges are nevertheless still frustrating.

All five of the participants shared frustrations about being able to find, try, or afford equipment that would allow for them to continue to play their instrument without experiencing a reaction. I found these narratives to be especially relatable, as these are the types of challenges that I still experience in my own musical career. I think many non-allergic musicians assume that there are simple "no-fail" solutions for nickel allergies. I have learned through my own experiences, as well as through the narrative told by each participant, that finding appropriate solutions for a nickel allergy is not usually this simple.

In this chapter, I will discuss each participants' experience with trying to find effective solutions that allow them to play, despite their allergy. From what worked, to what didn't, to what they are still hoping to improve in their own solutions. I will also discuss different instruments and hypoallergenic equipment that is available for musicians with nickel allergies.

Participants' Experiences with Different Solutions

Elizabeth. When Elizabeth first discovered the rash on her thumb was due to an allergic reaction to the nickel plating on her thumb rest, her mom sent her finger gloves (that her mom

had previously used for painting) to use while she played the clarinet. She believed that this would provide a barrier between her thumb and thumb rest and would allow for Elizabeth to continue to play the clarinet without any further allergic reactions. While this worked, it also presented some challenges for Elizabeth. Elizabeth shared that her thumb would get sweaty, and that wearing the glove on her thumb was restricting and distracting. She also felt that it wasn't comfortable or ideal. I understand why she felt this way. I myself have to wear nitrile gloves while playing the clarinet, and I have also experienced this feeling. I can only imagine how much more amplified the impact would be for a serious clarinetist. While Elizabeth was relieved that it did work as a temporary solution, she knew that she needed to find a better solution that would work for her long term.

The next solution that Elizabeth tried was painting her thumb rest with clear nail polish, which is the solution that she still utilizes today. This was suggested to her by another member of her clarinet studio. Elizabeth has found this solution to work quite well for her, although it is still not ideal. Every once in a while, the nail polish begins to chip away and Elizabeth will experience a small reaction. There is also upkeep involved in this solution, as Elizabeth has to repaint her thumb rest whenever the nail polish starts to wear off or chip away. Because the nail polish is clear, it isn't always very easy to tell when it is beginning to wear or chip off. Elizabeth usually only realizes that her thumb rest needs to be repainted after she begins to develop a small reaction on her thumb.

Elizabeth has considered replacing her thumb rest with a thumb rest that would not contain nickel. Others in her studio have offered her suggestions for alternative thumb rests and offered her advice on how to explore these options. While she knows that a different thumb rest would probably be more ideal than painting her thumb rest with nail polish, she doesn't think

that the benefit of a new thumb rest outweighs the cost. The reactions that she has on her thumb when the nail polish begins to chip away aren't very severe, and she likes that the nail polish provides a relatively easy and very cost effective solution for her allergy.

One thing about Elizabeth's reaction that I found to be especially interesting was that thus far, she has only experienced a reaction on her thumb, even though all of the keys on her clarinet are nickel-plated. Elizabeth said that she has felt confused about this. She worries about the impact that she might have later on from this continued exposure to nickel, even though she has yet to see a reaction on the rest of her fingers. "I'm also curious as to why the rest of my hands don't have anything, you know... I would imagine that if my thumb has such a strong reaction, then it's probably not good for me to still be touching nickel as much as I do. But..."

Elizabeth's long term plan is to buy a set of silver-plated clarinets, but this is something that she can't quite afford to do at this point. Elizabeth is able to wear silver without any reactions, so she believes that a silver-plated clarinet should solve her problems and prevent any future reactions. She also shared that another clarinetist in her studio with similar reactions to nickel bought a set of silver-plated clarinets and has not experienced reactions since. While Elizabeth is excited to eventually purchase a silver-plated clarinet, she shared the current frustrations that she feels about the availability and cost prohibitions associated with silver-plated clarinets.

Elizabeth shared with me that European companies sell different models in the United States than they do in Europe. These companies do not offer nickel-plated clarinets in Europe. This is due to the Nickel Directive in the European Union. This directive's goal is to limit the amount of nickel exposure to individuals from jewelry or other metallic commodities that are meant for prolonged exposure to skin, and thus reduce the prevalence of nickel allergies. In order

to limit the amount of nickel that individuals are exposed to, the Nickel Directive imposes strict limits on the amount of nickel that can be used in materials that are meant for prolonged contact with skin.

Elizabeth feels most frustrated by is the difference in clarinets sold in the United States as compared to Europe: “They don't even sell nickel plated clarinets in Europe, because they know it's a common allergy. It’s dumb. They should do that here. Otherwise, I wouldn't have this problem.” I found this to be a very interesting and insightful point. I have known about the European Union’s Nickel Directive for years, but I did not realize that instruments were included in this directive, or that some companies imply these directives only for the instruments sold in Europe, while they continue to sell instruments composed of lower quality materials throughout the rest of the world. Elizabeth shared that she feels let down by these companies, because of these policies and the differences in qualities used. She doesn’t understand why these companies don’t sell the same the same models all over the world. Elizabeth feels like she, and many other others, would benefit from the instruments that these companies create that align with the Nickel Directive:

> The good thing is there is a different solution to nickel-plating for clarinets, but I wish that they wouldn't sell these… Like that that wouldn't be an option then because I mean… people don't know… I mean, what if I… at least I knew that I had a nickel allergy from this hello kitty necklace from when I was a kid, but some people might not even come in contact with that until right then.

Madison. The first alternative mouthpiece that Madison tried was a gold-plated mouthpiece. This continues to be the solution that she still uses for her nickel allergy. While this does work for Madison, she shared that she feels very frustrated by the availability and

affordability of gold-plated mouthpieces. Madison feels a great deal of pressure to experiment with different mouthpieces. This pressure comes from both professors and peers. Mouthpieces are a hot topic in the trumpet world, and Madison feels the need to experiment with mouthpieces to ensure that she is playing at her best. During her 23-minute interview, Madison said the word "mouthpiece" 28 times. I think that this number illustrates just how much of a challenge that this continues to be for Madison.

As a professional musician and graduate student in trumpet performance, Madison is always looking for ways to improve her playing. Most professional instrumentalists experiment widely with equipment to ensure that they are playing at their best and that they have the best "set up" for them. Many companies and stores have trial policies, so that musicians can experiment with equipment in this way without having to commit to purchasing to the equipment. This is something that Madison would like to do, and feels like would improve her playing, but because of her allergy she has never been able to.

> I feel good on my mouthpiece right now, but it would be nice to be able to experiment with other sizes and things like that without feeling like I have to make such a commitment…. because I have gotten mouthpieces in gold before that I thought I was going to be okay with, but when then I got it…. I'm like… 'this is not working and I just spent $200 on this…' and then… just trying to resell it to anybody is already hard. So. those are like the kinds of things… I don't feel like I dealt with it a ton when I was younger because I was just like, 'This is my mouthpiece and this is what I do…' and it was just kind of… it was what it was. I didn't know anybody else who has something like this.

Overwhelmed by the availability and cost of gold-plated mouthpieces, Madison tried

gold rim and gold cup mouthpieces. She found that the gold rim mouthpiece did not work at all, as the majority of the mouthpiece was still made of silver and she reacted quickly to the silver. Madison said that the gold cup mouthpiece was mostly okay, however she did still react from it eventually because of the silver. I asked her why she had tried these options to which she replied: "I don't even know why I tried it. I was just holding out hope. It was like a little less expensive (than a full gold-plated mouthpiece).

Another issue that Madison has experienced with gold mouthpieces is that the plating eventually wears off. The gold mouthpieces that are sold by companies are not solid gold mouthpieces, but rather are silver mouthpieces that have been gold-plated. The plating does last for quite a while, but it is not permanent and does eventually wear off. When it does begin to wear off, it leaves exposed silver that can cause a reaction. It is also quite costly to re-plate a gold-plated mouthpiece. It can be very frustrating when plating wears off of a mouthpiece and causes an allergic reaction. Sometimes it may take a while to discover that the plating is wearing off or where exactly it is wearing off.

Because more hypoallergenic mouthpieces are costly, musicians with nickel allergies are less likely to have an adequate back up mouthpiece that will allow them to continue to play without causing a reaction while they wait for their mouthpiece to be re-plated or wait for a new mouthpiece to be delivered. It is also unlikely that a nickel allergic musician could go to a music store and purchase a suitable mouthpiece, as gold-plated, stainless-steel, and titanium mouthpieces are generally considered "custom orders" and are not kept in stock in most music stores. Most of the companies who manufacture these mouthpieces don't even keep these mouthpieces in stock, meaning that there is generally a waiting period of at least one to two weeks for such mouthpieces.

I have felt the same frustrations that Madison has experienced in the availability and cost of mouthpieces. Stock mouthpieces are silver-plated and contain high levels of nickel. Gold-plated mouthpieces are not readily available due to their prohibitive cost. Madison shared that her graduate trumpet professor has a large collection of mouthpieces for students to try, but none of them are gold-plated. Because of this she is unable to really try them. If she does try one of these mouthpieces, she can only play it for a very short amount of time, which makes it hard to assess whether it makes a positive influence in her playing. Madison has tried reaching out to companies and asking for a trial period to try various gold-plated mouthpieces before committing to buying one, but has been told that this option is not available for gold-plated mouthpieces, as these are considered to be "custom ordered." She has also been told that gold-plated mouthpieces are not returnable for this same reason:

> I wish that if you provided like some sort of like medical documentation, like that this is a thing that they would be like, okay, but they're like, Nah. Yeah, I tried so hard to return one (a gold-plated mouthpiece) one time and they were like, 'Well…. Maybe… We'll talk to our manager," and I just never heard back.

I thought that Madison's idea of providing medical documentation of an allergy in order to try "custom" mouthpieces in that same way that other brass players test mouthpieces was an interesting and very logical idea. I'm sure that these companies put these policies in place so that they do not lose money, but I think that they are losing money from the nickel allergic population because of these policies. As Madison explained, and as I've experienced myself, it is very difficult to try find an appropriate mouthpiece when you are unable to test a mouthpiece before you buy it. Buying a mouthpiece, especially one made with more hypo-allergenic materials, is a

costly commitment and is not something that most musicians can afford to do unless they are sure that they will be happy with their purchase.

Like Madison, I have found the process and cost of buying a mouthpiece for myself to be extremely prohibiting and confusing. I have also reached out to manufacturers and explained my allergy and asked if I could try a few mouthpieces before committing to buying one and have been told no, because titanium mouthpieces are considered "custom orders." Because of this policy, coupled with the cost of a solid titanium mouthpiece, I spent years playing on a titanium-coated mouthpiece that was chipping for years. It wasn't until this year that I finally decided that I needed to buy a new mouthpiece. Because I wasn't able to try a mouthpiece before buying it, I spent hours comparing various mouthpiece specs and measurements before I finally ordered what I thought seemed the be the best cup size and style for me. I'm happy to say that I have not had any allergic reactions to this mouthpiece and generally like it, but I'm not as happy with the shape and style of the cup as I had hoped that I would be, but because of the cost and the fact that it cannot be returned, I don't intend to buy another mouthpiece anytime soon.

Madison shared that she has experienced some dermatitis on her hands before, but that the wrap that she tried to use to limit the nickel exposure to her hand didn't seem worth the hassle:

> I did experiment with trying out the valve casing wrap and that like helps a little bit, but it was kind of just annoying after a while… yeah, it's mostly just my mouth… and it's weird because my mouth reacts so quickly and then on my hands it takes forever.

I can understand how Madison found this solution to be a hassle, but it's too bad that she did, as this could further limit her exposure to nickel.

Stuart. Stuart's experience was quite unique and he tried many different techniques. From plastic trumpets, to gloves, and various types of mouthpieces, Stuart has tried just about every technique out there for trumpet players. Stuart shared many frustrations that he experienced while trying these alternative instruments and materials. He was lucky to have a great support system that helped him find and try different solutions, but he still felt very frustrated and overwhelmed when he was trying to find appropriate and sufficient materials that would allow him to continue to play, despite his nickel allergy.

When Stuart first found out that the eczema like rash on his hands was from allergic reaction to his trumpet, his undergraduate trumpet professor had him temporarily play a plastic trumpet. His trumpet professor believed that this was the best option to allow Stuart to continue to safely play the trumpet while they figured out the severity of his allergies and explored better options.

Stuart described his time playing this instrument: "I transitioned to a plastic horn with an acrylic mouthpiece and it sounded like garbage." Stuart shared that he did not feel like a real trumpet player when he had to play this plastic trumpet. When speaking about his bad experience in a rehearsal where a substitute director said "Can we put the toy up?" Stuart shared: "As much as it like hurt, when he said 'put the toy away,' I was like, I really want to…. like, I want nothing to do with this." Even though it was far from ideal, Stuart's professor clearly put a lot of thought into and had good reasoning for having Stuart temporarily play a plastic trumpet.

Stuart explained that his professor researched every kind of plastic trumpet that was available in the market and carefully compared them all looking for the best one. They eventually settled on plastic trumpet made by Allora. Stuart shared that he has personally played every plastic trumpet currently available on the market and does believe that Allora's is "by far the best one." I was fascinated that this was the company that they settled on, as most band

directors that I know refer to instruments made by this company as "ISOs" or "Instrument Shaped Objects." I was surprised enough to learn that his collegiate trumpet professor encouraged him to play a plastic trumpet, but upon learning this I had assumed he had likely played a P-Trumpet, or another comparable, popular brand. Stuart further explained: "It was really an odd option. It was the only one that we found that had like a functioning third valve slide."

Stuart shared that there was a "learning curve" to learning how to play on a plastic trumpet. He described that the instrument didn't behave in the same ways that a "real trumpet" would and he found the plastic trumpet to be much more difficult to play. He shared a few performance experiences where he felt that he was not able to play as well as he should have been (or could on a traditional metal trumpet), and where he felt like his peers or professors were judging him because of his performance due to his plastic instrument. After playing his plastic trumpet for about two months, Stuart's trumpet professor allowed for him to borrow his own personal instrument for a few days to see if it was possible for him to play on a lacquered instrument:

> So, I played the real trumpet…I was like, "Oh, wow." So, it was like… I played on and it was a good experience… and so it was like… Okay, so this is a possibility… we can make it work.

After this experience, it became rather clear to Stuart and his professor that a well lacquered instrument was a feasible option for Stuart to play on. Stuart said that looking for a suitable instrument was quite challenging, as each part of a trumpet can often be differently lacquered. From valve caps, to tuning slides, he had to be sure to check every part of the instrument to be sure that it was well lacquered and the lacquer was not wearing off. Eventually,

Stuart was able to find and purchase a trade show trumpet that met all of his requirements and did work for him. He said that he remembers feeling frustrated about how long it took to find a suitable trumpet:

> It's just frustrating still… I just remember thinking I would have a trumpet by now if I didn't need to meet all of my preference criteria in addition to… it has to be this (for his allergies).

Like Madison, Stuart shared a lot of the frustrations that he had felt specifically about mouthpieces.

> So, I went from an acrylic mouthpiece… like a Kelly clear acrylic mouthpiece… Kelly makes a stainless-steel mouthpiece as well… and like, it worked… but I also hated the mouthpiece. Like I could not play on it… and it sounded better… but it's just like the rim was terrible. Everything was terrible! I hated it… but I played on it for like a while… but it was just a bad mouthpiece. It was like 90 bucks for just a terrible mouthpiece. So, that was frustrating.

Stuart also felt frustrated in being able to find and try mouthpieces that would not cause him a reaction. Stuart said that it wasn't until Boston Brass came to his university for a residency that he learned about Giddings Mouthpieces. He was intrigued by these mouthpieces then, but didn't want to commit the cost of one before trying it himself. Luckily, Stuart was able to attend the Midwest Clinic in Chicago and was able to test out Giddings mouthpieces there. He shared that he was pleasantly surprised to find several options that were appropriate for his allergies that he was able to try at the Midwest Clinic, but he ultimately settled on a stainless-steel mouthpiece from Giddings, which is what he still plays today. He shared that while he likes the feel and sound from this mouthpiece, he does not like how it looks. He showed me this mouthpiece

during his interview. Its design is far from traditional, which is something that has caused him some frustration over the years:

> It's just every single time I'm playing a Gig… anytime that I'm out... anytime I play for my students… anytime I play for anyone… it's like "What is that?" … it is… it is a little frustrating but it plays well.

Stuart also shared that he was frustrated about the cost of this mouthpiece:

> This was like $200… like it was an expensive mouthpiece… That's like Tuba mouthpiece price. That should not be how much a trumpet mouthpiece costs… it's not that it's not nice, but it's not like super nice… it was just like thank gosh for my scholarship, otherwise I would have been out of luck… it's just everything is just like a little more expensive… it's frustrating.

Stuart shared that he did trying wearing gloves when playing his trumpet. Unfortunately, this simple solution did not work for him. He said that while it did provide a barrier to the nickel in his trumpet, having his hands enclosed for so long caused other issues for him and that it quickly became clear that gloves were not a viable long term solution.

John. John's solution for his nickel allergy was switching from trombone to percussion. Overall, John didn't seem to feel too upset at the time about this and considering he made it through a major university as a percussionist, everything turned out well for him in the end. John shared that he was never presented with any options that would allow for him to continue to play the trombone, such as suggestions for alternative mouthpieces. Looking back, John is frustrated that he was not offered any suggestions to be able to continue to play the trombone. John felt that he was only allowed to switch to percussion because of his prior involvement in piano, and he

felt like if he hadn't been given to option to switch to percussion than he probably would not have been able to continue in band.

While transitioning to percussion did work to resolve John's allergic issues, I don't think that this solution is a great model. There were a number of extra variables that allowed for this transition to work for John that are not available to the average student. 1) It could be heartbreaking for a student to have to discontinue playing an instrument that they love. Luckily John was interested in percussion, so he didn't feel a real loss when he switched from percussion to trombone. I know that I couldn't imagine the option of my life without playing the French horn and that switching or quitting the French horn was not a viable option for me. As a teacher, I also know many students who feel the same about their instrument. 2) John was only allowed to transition to percussion because he been playing the piano since he was six-years-old. It isn't very common for students to have this type of prior experience that would allow them to smoothly transition to percussion. In addition, most directors that I know do not allow for students to transition to the percussion section after beginning instrumental music. This is because it is very easy to get behind and difficult to catch up when you do not begin on percussion, and because percussion is a popular section that can very easily become over-balanced. 3) One of the conditions that John's teachers made in allowing for him to transition to percussion was that he had to take private lessons over the summer and show that he was playing at the same level as the other percussion students in his grade. While I understand the fairness and appropriateness of this request, there are many families who cannot financially provide, or may not be willing to financially provide private lessons for their student if they were in this situation.

John now knows that there are a variety of alternative options for hypoallergenic mouthpieces, and he believes that he would have been a good candidate for any of these options at the time. He said that he wasn't sure how available such mouthpieces were at the time of his reaction, but he did think that there were likely alternative options that could have and should have been offered to him. Since his parents weren't musicians, he felt like they depended on his teacher's advice, and therefore wouldn't have known that there could possibly have been alternative mouthpiece options that they could have purchased that would have allowed for John to continue playing the trombone. He said that since his teacher didn't mention any ways that would allow for him to continue to play the trombone, he believes his parents probably just didn't think that there were any possible alternatives that would have allowed for him to continue playing.

I expect that John's experience isn't unique in the world of instrumental music, as does John. Nickel allergies aren't uncommon and are continuously becoming more common. I wonder how many students have either, like John, been transitioned to another instrument because of their allergy, or have quit because they weren't given a valid option to continue playing the instrument of their choice. There are so many simple solutions, especially for brass players, that can allow for students to continue in instrumental music, yet it seems like educators are not aware of them. It also seems like the awareness of nickel contact dermatitis among music educators is generally low. Every participant in this study shared that they had teachers who either didn't know what to do about their allergy, weren't aware of their allergy, or did not understand the impact that their allergy had on their experience in their instrumental career.

Zoey. Zoey utilized relatively simple solutions to help with the reaction that she experienced on her chin from the nickel in the lip plate on her flute. For years, Jaqueline simply

covered the lip plate with scotch tape. This scotch tape provided enough of a barrier between Zoey's flute and her skin to allow for her to continue playing without further reactions. I currently use this same solution when I play flute with my students. Zoey said that the only problem with this solution was that the tape would eventually wear off and that she would sometimes start to react when the tape began to wear off. Since getting a sterling-silver plated flute, Zoey no longer has to place tape over her lip plate and has not had any further reactions. Luckily, Zoey did not ever experience any reactions on her hand. I suspect that if she had continued to play a nickel-plated flute long enough, she may have begun to experience dermatitis on her hands.

Zoey shared that she felt frustrated by her reaction and by the fact that she had a reaction because of the quality build of her instrument. She said that she hasn't ever had a student with a nickel allergy, but she also wonders if that's partially just because the quality of flutes that her students have access to is so much higher than the quality of flute that she first began on:

> I mean they have better flutes than I had at their ages… Like can you adopt me? Can you buy me a flute?... because that would be cool... but I've never seen that in a student… but I think again… to some extent it could be that they do have some kind of allergy going on, but they wouldn't know because they're not being exposed to it in the same way that I was.

I think that this raises an interesting point. Is it possible that students who come from a lower socio-economic background are more likely to have a nickel allergy, due to increased exposure? It's certainly likely that these students have instruments that are made with lower quality materials than their peers. I think that it's also likely that they have been exposed to more

nickel in their everyday life than their peers from general commodities and jewelry that are of lower quality, and hence likely have a higher nickel content.

What are the challenges in finding solutions for musicians with nickel allergies?

As shown in the narrative about each participants' experience in finding solutions, there are many challenges that arise for musicians with nickel allergies when looking for proper solutions. These challenges include: knowledge of options, availability, cost, continuing reactions, and quality. I will further discuss each of these challenges.

Knowledge of options. One of the biggest problems in finding solutions for a nickel allergy is that there are not many musicians who have knowledge of the hypoallergenic options available in the music world for musicians with nickel allergies. This lack of knowledge can cause for musicians with nickel allergies to feel frustrated and discouraged when looking for options. I speculate that not many music educators are aware of the various options that are available, should they ever have a nickel allergic student. Such a lack of knowledge could lead to a nickel allergic student, such as John, to quitting their instrument, or quitting instrumental music entirely. Luckily, the internet can be a great tool for musicians with nickel allergies who are looking for hypoallergenic options. However, the lack of knowledge about these materials means that even those who do find these options online may not be able to speak to a peer or teacher about the quality of such options before they purchase them.

Availability. Perhaps the area that every participant found to be most frustrating was the availability of options for musicians with nickel allergies. The lack of availability in these materials means that musicians with nickel allergies or students may be left waiting long periods for special order products in order to continue paying. Madison described in detail the frustrations that she felt with the availability of various mouthpiece issues. She has been

especially frustrated by the fact that not only are these mouthpieces not readily available, but that companies do not allow trial periods or returns for more hypoallergenic mouthpieces. Meaning that many nickel allergic brass players' only option is to purchase a mouthpiece on which they have never even seen in person, let alone played on.

Elizabeth described her frustration about the availability of plating options for keys available in the Europe as compared to the United States. She feels frustrated that nickel-free plating isn't readily available as the standard in the United States, even though it is in Europe.

What kind of equipment and materials are available for musicians nickel allergies in instrumental music? What are the challenges of these materials?

There are a variety of materials and alternative materials available the can help musicians with nickel allergies continue to play their instrument safely. I will present these options in detail, along with others that have not yet been discussed. I will discuss equipment that is available to help nickel allergic instrumentalists by instrument category: woodwind, brass, percussion, and strings. You can also find in-depth guides that list the possible reactions, challenges, materials, and solutions for each band and orchestra instrument in Appendix D-S. Below I have listed some of the general considerations and solutions appropriate for each instrument family.

Woodwind. Depending on the severity of the nickel allergy, it can be quite challenging to find effective solutions for a nickel allergic musician to play woodwind instruments. This is because most woodwind instruments require that the player is able to effectively seal the tone holes on their instrument, which can be difficult to do with gloves. Gloves can also be prohibitive in being able to play quickly, as they are restricting and can get snagged by key work. For those with very severe nickel allergies who cannot touch traditional plated keys on a

woodwind instrument, the best solution is to purchase an instrument that has been plated with a more hypo-allergenic metal, such a gold or sterling-silver. These instruments are generally more difficult to find than traditional nickel-plated instruments, and are also considerably more expensive. If purchasing a silver-plated instrument, be sure to check whether the silver is sterling silver, or nickel-silver, as nickel silver contains a very high level of nickel and is not tolerable for musicians with nickel allergies. While this is a great solution that will work in most cases, it is extremely costly and is likely not something that the average student or family can afford. While it's far from ideal, I do play woodwind instruments successfully by wearing nitrile gloves while I play.

The tautness of these gloves allows for me to completely seal each key, something that is not possible with cotton gloves. I do find that these gloves are restricting and can sometimes snag or become stuck on keys. Because they are not breathable, my hands become very sweaty when I play with nitrile gloves, and I can't imagine that this would be a very comfortable option for even an intermediate level player. I do see gloves as a great option for testing to see if the key work on a musicians' instrument is causing a reaction. I do also think that gloves are a good solution for others like me who need to be able to play secondary instruments but cannot afford or do not have access to an instrument that is properly plated for them. Thankfully, many woodwind players, such as Elizabeth and Zoey, do not experience reactions from the keys on their instrument. This is likely because: 1) they may not always be in constant contact with the keys due to movement while playing and 2) because the skin on our hands is much more callused than the skin in other areas of our bodies, and therefore generally takes longer to react to allergens.

There are many easy solutions for a musician who has a reaction such as Elizabeth did, where just their thumb reacts. Elizabeth shared the idea of painting the thumb rest with nail polish. This could work for both clarinetist and oboists who experience this kind of reaction. This is a simple and very cost effective option. Nail polish is something that is readily available and is therefore a solution that can be utilized very quickly. If used as a solution, I would actually suggest using a colored nail polish, as it will be easier to tell when the nail polish is chipping or wearing off this way. Many student clarinetists place half of a pencil grip over their thumb rest, in order to make it more comfortable, but this could also serve as a barrier for a clarinetists or oboist with a mild nickel allergy. Several companies, such as BG and Protec, also offer thumb rest cushions. These cushions are designed with comfort in mind, but their design would provide an ample barrier to the nickel in the thumb rest for musicians with nickel allergies. These are also very affordable and are available at most music stores and can easily be ordered online.

There are a number of options available for flautists that experience a reaction from their lip plate, like Zoey did. The easiest and most affordable is creating a barrier on the lip plate with tape, like Zoey did. This is an easy solution and can be done with readily available and cost-effective materials. This is a good option for musicians who may be testing to see if their rash is caused by the nickel in their lip plate or for musicians who cannot yet afford and alternatively plated flute or head joint. Yamaha and Protec make lip plate patch stickers that could provide an adequate barrier for some musicians. These can be found in music stores and online. These are certainly most costly than tape, but they come precut and are more durable. I came across several online reviews that show that musicians with nickel allergies have found these to be a successful solution for flute.

While not ideal, there are a number of companies that sell woodwind instruments that are composed of non-metallic materials. These companies include Nuvo (flutes and a C clarinet), Guo (flutes and headjoints), and vibrato (saxophones). I wouldn't consider these instruments to be a valid long term option, but they could work for nickel allergic beginners, or musicians, like Stuart, who have had a serious reaction and need a break for their skin, but also need to continue playing. These instruments are much more affordable than their sterling-silver or gold-plated counterparts, but should not be expected to play anywhere near as well as such high-quality instruments.

Brass. Nickel allergies are fairly common among brass players. Luckily, there are many alternative mouthpiece materials that can serve as great solutions for those with nickel allergies. Most nickel allergic brass players only experience reactions to their mouthpiece. Traditional silver-plated mouthpieces contain a high content of nickel and are not suitable for musicians who have a known nickel intolerance. There are several other mouthpiece material options available for nickel sensitive brass players. These include: lexan, acrylic, delrin, stainless-steel, gold-plated, titanium coated, and solid titanium. Lexan and acrylic are by far the cheapest option, but the quality of these mouthpieces is far from ideal. These mouthpieces can be a great option for young students, secondary players, or those who are testing to see whether they have a nickel sensitivity to their mouthpiece. The most recognized brand for plastic mouthpieces is Kelly. The design and material of these mouthpieces can cause some problems in range, projection, and articulation for more serious players. I use these lexan mouthpieces daily to play secondary instruments with my students, and find that they work quite well for this.

Wedge Mouthpieces offers acrylic and Delrin options that feature a weight system to help with sound projection and articulation, which are the main issues that I have experienced with

Kelly's acrylic mouthpieces. This simple weighting system helps compensate for some of the inherit issues of a plastic mouthpiece. I was able to speak with Dr. Dave Harrison, the inventor of Wedge Mouthpieces. He shared with me that their weighting system, the unique wedge rim, and more varied cup styles make Wedge Mouthpiece's Delrin or acrylic options suitable for more advanced players. He said that players note a considerable improvement in their sound and control when they add a mouthpiece weight or add a traditional shaft to an acrylic or Delrin cup. He also shared with me that many brass players with nickel allergies have found Wedge's acrylic mouthpieces to be their ideal solution.

Stainless-steel mouthpieces are generally less expensive than gold-plated or titanium mouthpieces. Unlike gold-plated mouthpieces, these also do not require re-plating. Solid stainless-steel mouthpieces are generally more hypoallergenic than any kind of plated mouthpieces, as they do not carry the risk of reaction to the player from worn plating. There are a number of notable companies that produce stainless-steel mouthpieces: Kelly Mouthpieces, Giddings Mouthpieces, and Houser Mouthpieces. It is important to keep in mind that while uncommon, some musicians may still react to surgical grade stainless-steel. Fisher (1993) noted that while stainless steel was a suitable switch for the participant in his study, it may not be for many, as stainless steel can contain as much as 20% nickel.

When I spoke to Ian Giddings (the man behind Giddings Mouthpieces) before purchasing my own titanium mouthpiece, he informed me that he has only ever had four musicians react to his surgical grade stainless-steel mouthpieces. Stuart has successfully been playing on a Giddings stainless-steel mouthpiece for years with no reaction.

Gold-plated mouthpieces are available for many traditional mouthpiece designs, such as those made by Bach and Holton. These can be a great option for musicians who wish to play on a

traditional mouthpiece but have a nickel sensitivity. This is an easy change for many musicians, as they may be able to purchase a gold-plated version of the mouthpiece that they are already using. Madison has been successful with this option, and she enjoys being able to play on standard trumpet mouthpiece models. Like gold-plating, titanium coating can wear off and may require regular maintenance. When this coating wears off, it can cause the player an allergic reaction, which is less than ideal. This is an important factor to consider when purchasing a gold-plated mouthpiece. The most hypoallergenic option available is solid titanium. While solid titanium mouthpieces are expensive, it is extremely unlikely that a musician will ever develop a reaction to a titanium mouthpiece. Titanium is a great option for those with more severe allergies, those that do not want to have to deal with the maintenance of plating a gold mouthpiece, or those who want to limit their nickel exposure as much as possible. Unfortunately, solid titanium mouthpieces are the most difficult to find. I have a solid titanium mouthpiece that I purchased through Giddings Mouthpieces that I have had no reaction, even after extensively playing for over six months now on it.

Strings. The allergic reactions that string players can experience are sometimes very easy to resolve, or sometimes extremely difficult and expensive to solve. Most of the reactions that musicians with nickel allergies experience involve the nickel in their chinrest or bow. These materials can be covered quite easily, or can be replaced with specialty chin rests, like those available from Wittner. Musicians can also continue to use their current chin rest if they utilize a chin rest cover, such as the Cozy Chin or Stad Pad. Far more challenging and expensive to resolve for, are allergic reactions to the actual strings on string instruments. Companies make strings from a wide variety of materials, including: silver, aluminum, copper, carbon steel, steel, tungsten-silver, silver, titanium, platinum, gold, chromium, tin, and hydonalium. Most musicians

with nickel allergies can tolerate several of these options, but the cost of some of these is tremendous considering the cost of typical strings. It is also important to note that not all strings are available for each instrument in these materials. String players with nickel allergies should avoid nickel, and should try to avoid: chrome, chromesteel, and Monel wound strings. String players with nickel allergies should discuss the different string materials with their allergist to ensure that they are selecting the safest option for themselves. They can also use Nickel Alert to test strings to see whether they may cause a reaction. Shar Music has a wide range of string options available. I particularly like Shar Music's website, because they clearly identify what materials each string is made of. I have noticed that many other sites do not specify enough information about the materials used in strings for musicians with nickel allergies. Shar Music also carries Wittner hypoallergenic plastic chin rests in both side and center mount for violin and viola. They also carry a couple of different options for chin rest covers.

I contacted Piastro, D'Addario, and Thomastik-Infeld and asked which strings they produce that they would recommend for musicians with nickel allergies. Piastro informed me that their violin and viola strings that are copper, gold, or silver-plated are all nickel free. For cello, they offer Oliv, Eudoxa, Gold, and Chorda gut strings that are nickel-free. Their synthetic cello strings, Synoxa, Aricore, and Flexocor also include nickel free options. It is important to note that Aricore A and D strings are wound with chrome-steel and do contain nickel. Piastro's Evan Pirazzi soft, medium, and strong strings only contain small trace amounts of nickel. Their Eudoxa and Chorda gut strings for double bass are nickel free.

D'Addario's ProArté, Helicore, Zyex, and Kaplan line strings all contain nickel free options. It's important to note that their Ascente strings are wound in Monel. I noticed that they recommend monel wound strings for nickel allergies, and found this to be quite troublesome.

Monel does contain less nickel than nickel alone. However, monel is an alloy containing nickel and copper and generally contains about 50% nickel, meaning that monel wound strings are not a good option for musicians with nickel allergies.

I was pleasantly surprised by the response that I received back from Thomastik-Infeld. When I requested information for string options for musicians with nickel allergies they went so far as to ask me how many parts per million (ppm) rate I was looking for. They do produce silver strings that contain zero ppm nickel. They also work individually with musicians to make custom sets of strings that do not contain any of their allergens. Thomastik-Infeld suggests that musicians with nickel allergies directly contact them to ensure that the materials in each string does not cause any reactions.

Percussion. I expect that most nickel allergic percussionists will find themselves to be like John and will have minimal to no issues with their nickel allergy in percussion, as contact time with metal in percussion is very limited. Those that do experience issues with contacting nickel in the percussion section may find some of the following solutions to be helpful.

Grover, Weiss, and Danmar all sell triangle beaters that have coated ends where the player holds the triangle beater. I have found these to be safe for my own needs. These are available from Steve Weiss Music. Long-sleeved shirts can be used as a barrier when playing cymbals. Thankfully, most other percussion equipment does not require constant skin contact.

CHAPTER VI

Summary and Conclusions

Purpose Statement

The purpose of this multiple case study was to illustrate the challenges that five musicians with nickel allergies have faced in instrumental music.

Research Questions

(a) What narratives do musicians with nickel allergies share regarding their awareness of their allergy and its impact on their instrumental music experience?

(b) How do musicians with nickel allergies describe efforts to find appropriate solutions for their allergy?

(c) What narratives do musicians with nickel allergies share in regards to their experiences with peers and teachers understanding their allergy?

(d) How do participants describe their motivations to continue in instrumental music, regardless of allergies?

Past Research

Past research shows that nickel allergies are not uncommon in the general population, especially among women. Shafer, et al. (2001) estimated that as much as 9.9% of the overall population may have a nickel allergy. In their study, Shafter et al. found that 13.1% of participants reacted to nickel. Overall, 20.4% of women were found to be allergic, while only 5.8% of men were found to be allergic. Meding and Swanbeck (1990) observed that 21.9% of women who reported having hand eczema were found to be allergic to nickel through patch-testing. In this same study, only .3% of men were found to have the same result. In their study of a professional orchestra, Onder, et al. (1999) found that over 12% of musicians in the

Presidential Symphony Orchestra had some form of dermatitis that could be linked to their instrument. Gambichler, et al. (2008) surveyed German university students studied instrumental music. They reported that 19.1% of participants reported having contact dermatitis. Many of these participants were able to link this dermatitis directly to their instrument, while others were not certain of the cause of their dermatitis. There are many case studies of specific musicians who have experienced allergies to their instrument (Machácková & Pock, 1986; Marshman & Kennedy, 1992; Fisher, 1993; Inoue, Shoji, & Fujita, 1997; Nakamura, et al. 1999; Thomas, et al., 2000; Alvarez & Brancaccio, 2003; Gottschalk, 2005).

Design and Analysis

This is a multiple case study (Merriam & Tisdall, 2016). Each case was defined as one musician and bound by current reflections on participants' experiences since their diagnosis. Five musicians with nickel allergies currently serving as teachers, graduate students in music, or professional musicians served as the case study subjects. This study aimed to highlight the experiences and challenges that these individuals have overcome to continue to pursue their passion. Each case was first analyzed within-case, and later cross-case. Analyzing in this way ensured that the narrative described by each participant were effectively shared, but also highlighted the themes that arose in data among all five participants. These themes highlighted some of the challenges that musicians with nickel allergies face. Themes found during cross-case analysis included: family involvement, solutions, challenges to finding solutions, teacher interactions, school, feelings of self-consciousness, symptoms, equipment issues, cost of equipment, feelings of isolation, feelings of misunderstanding, peer interactions, doctor involvement, and knowledge of outside research and resources.

Summary of Findings

The participants in this study had varied levels of reactions to nickel and perform on varied instruments, yet they all shared many similar experiences. The narratives from these participants illustrate many of the challenges that many musicians with nickel allergies face. Participants shared challenges in first diagnosing and finding solutions for their allergy. Even though some of the participants had prior knowledge or a nickel allergy, or prior reactions to nickel, they still experienced difficulties in diagnosing the cause of their reactions and finding appropriate solutions to allow for them to continue playing.

Most participants shared that they continue to face challenges from their allergies, even after diagnosing and finding proper solutions for their allergy. These continued challenges include finding and affording solutions for their allergy while allowing them to play at their best. The participants also shared that they continue to feel like colleagues and professors doubt or do not understand their allergies. All of the participants shared that they felt that there is a low level of awareness of and understanding of nickel allergies in the instrumental music world. All participants shared that they felt like they, and other musicians with nickel allergies, would greatly benefit if nickel allergies were better understood in instrumental music. The participants also shared how they felt that various companies could help support musicians with nickel allergies.

Elizabeth shared that different plating materials are used and sold for clarinets in Europe than in the rest of the world. This is due to the Nickel Directive that was put in place by the European Union in 1994. The Nickel Directive places strict limits on the amount of nickel that can be used in materials that are meant for long-term exposure with skin. This directive was put in place to limit nickel exposure, in hopes of lowering nickel allergies and contact. Elizabeth

suggested that since these companies know that nickel is a common allergen, they should sell their instruments that align with the Nickel Directive throughout the world. She shared that if these companies sold these instruments in the United States, then she may never have even experienced an allergic reaction to her instrument. She also shared that she believes that this would be especially beneficial for musicians with nickel allergies who may not have prior knowledge of a nickel allergy.

I think that this is an interesting and valid point. Even though Elizabeth had prior knowledge of a nickel allergy, it still took her over a year to realize that the rash on her thumb was an allergic reaction to the nickel in her clarinet. It's likely that it would have taken her considerably longer to reach this conclusion, and therefore find proper solutions for it, if she did have prior knowledge of a nickel allergy. One of the other participants, Zoey, experienced this when she first discovered that the rash on her chin was an allergic reaction to the nickel in her flute in middle school. It wasn't until college that Stuart, another participant, realized that he had a nickel allergy. Like Elizabeth, Madison and John had both been diagnosed with a nickel before they began playing and instrument, but I think it's very likely that they would not have ever experienced an allergic reaction to their instrument or mouthpiece if their equipment did not contain high levels of nickel.

All five of the participants in this study could greatly benefit from instruments and supplies that align with the European Union's Nickel Directive. In fact, they may not have ever experienced allergic reactions to their instrument at all, if they had they had access to such instruments in the first place. Which makes one wonder, why aren't we following these guidelines in the United States? Even without such a directive in the United States, European instrumental manufacturers could easily sell the instruments that they manufacture to follow

these guidelines throughout the world. Such an influence from these companies could encourage other companies to follow suit. If enough companies were to adopt such a policy in the manufacturing of instruments, the number of musicians with nickel allergies could decrease, and the number of instrumentalist could increase. It is too bad that these European companies have not seen the potential for leadership and change that they could bring to the music world in this area.

Madison and John both described their frustrations in buying hypoallergenic mouthpieces. I have experienced the same frustrations in this area as they have. They both shared that the mouthpieces that are appropriate for their allergies are far more expensive than those used by their colleagues. They both find this to be frustrating, but what they find to be most frustrating is that companies do not have these types of mouthpieces readily available or are not subject to trial periods or returns. This means that most nickel allergic brass players are forced to buy a mouthpiece at a much higher cost and generally do not have the option of even seeing the mouthpiece in person before purchasing it, much less trying it on their instrument. Madison shared that she believes that companies could help musicians with nickel allergies by allowing trial periods or returns of such mouthpieces for musicians who can provide documentation of a nickel allergy. I think that this is a great idea and I think that mouthpiece companies would actually see an increase in sales if they were to do this.

The motivation for continuing, despite a nickel allergy, was similar among all participants. Most participants shared that because of their love of music, they did not ever consider quitting to be an option. The two participants who discovered their allergy later, Elizabeth and Stuart, shared that they were already music majors and felt that they did not have any option but to find a solution for their allergy. Although he did quit the trombone, John

continued in music because of his love of music. He shared that he felt like he was only able to transition to percussion because of his past experience with piano and that it was very possible that he may have quit music altogether if percussion was not presented as an alternative option for him. Because all of the participants are professional musicians and music educators, I feel that they all have an increased motivation for continuing, despite their allergy, than the average nickel allergic musician. All participants shared that they felt that if they were less serious about music than their allergy may have led them to leave instrumental music.

Implications for Teaching Practice

Every participant in this study shared that they felt that they and other musicians with nickel allergies would greatly benefit from an increased awareness and understanding of nickel allergies and appropriate solutions for these allergies in the music field. Educators can help musicians with nickel allergies by understanding the signs and symptoms of a nickel allergy and the impact that a nickel allergy has on an allergic musician. They can also help allergic musicians by being aware of the various solutions available for musicians with nickel allergies. I have created a website that includes resources with solutions for each instrument on my website: instrumentallergysolutions.com. Educators can find ideas and solutions here that they can share with their students and their family. Educators can also use their own knowledge and possible experience with nickel allergies to educate others. Each participant shared feelings of isolation because of a lack of understanding of their allergy from their teachers and peers. By working closely with nickel allergic students and their families, educators can ensure success.

What can educators do to help musicians with nickel allergies succeed in instrumental music?

The participants who shared their story for this study are only a few of the musicians with nickel allergies who exist. All of the participants would have benefited if their teachers, professors, and peers were more educated on the impact of nickel allergies in music and the medical solutions available. In this chapter, I will discuss what teachers can do to help ensure success for all students, including those who they already know are nickel allergic, or those who may develop nickel allergies later in their instrumental music career.

What can be done before choosing an instrument to help ensure success?

When they first selected their instrument prior to beginning band, none of the participants were asked whether they had a prior knowledge of a nickel allergy. I have never heard of this question being asked prior to beginning studies in instrumental music, but I think that this simple question could help ensure success for musicians with nickel allergies. It would be very easy to put such a question on the form for signing up for band. Information such as this would allow for a music teacher to reach out to a nickel allergic student's family to discuss the severity of their allergy and the risks that they might face with each various instrument. Several of the participants had prior knowledge of a nickel allergy before beginning band, but they assumed that the metal used for instruments would be of high enough quality that they would not contain nickel or cause them any reaction. I think that this is an assumption that many families make. It would be great to be able to discuss options for instruments or solutions for instruments before a nickel allergic student even begins their instrumental studies.

Perhaps some families would choose the instrument that their child plays based on the availability or cost of the adaptive materials needed for them. Maybe prior knowledge of the challenges of some instruments would encourage others to select percussion for the same reason that John did. I think that many students and families would feel much less overwhelmed and

frustrated if they were able to go into instrumental music with a clear picture of how their nickel allergy might impact them. This could also possibly eliminate any sort of reaction for some of these students, as solutions could be found for these students before they even begin their instrument.

What can you do if you suspect a student may have a nickel allergy?

Should you expect that a student may have a nickel allergy, the first thing that you should do is contact their family with your concern, and encourage them to see an allergist. If a school nurse is available, it would be a good idea to discuss your concerns with them, so that they can examine the student and reach out to their family with their own concerns about this. Unfortunately, it often takes months to get scheduled for allergy testing. This means that you will likely need to try to find solutions for a nickel allergy before you have confirmation of a diagnosis from an allergist. It is important that you immediately find a way to provide a barrier or some kind of solution for the student that limits their contact with nickel.

If you find that the student's reaction improves when using alternative materials, it is very likely that they do indeed have a nickel allergy and that their allergy is the cause of their reaction. However, it is still important to encourage them to get allergy testing done. Allergy testing will allow for a confirmation of this diagnosis and will also give the student, parents, and you a better understanding of what materials are safe for the student.

What are the steps to take after finding out that one of your students has a nickel allergy?

Speak with the student and their family and ask them what materials their allergist said are safe for them. There is a wide range of severity of nickel allergies. Some people can withstand higher nickel contents than others. Because of its use as an alloying agent, some nickel allergic patients are allergic to more metallic materials than others. It is important to understand

what materials are safe in order to be able to help a student with a nickel allergy. Once you understand what materials are safe, examine the safe options with the student and their family. Perhaps you already found some safe adaptive techniques for your student while waiting for an official diagnosis. You can find various solutions for each instrument in Appendix D-Q. These resources are also on instrumentalallerysolutions.com. It is important to note that it may take a while to find the best adaptive materials. Hopefully you will be able to find the best possible solution without any further reactions, but it is possible that some materials that may seem safe, such as gold, may cause reactions for some students. If a reaction does occur, contact the student's family, suggest that they see their allergist, and help the student find a new solution immediately.

Your student may need to try different adaptive techniques and materials as their musical skills continue to advance. For example, an acrylic mouthpiece is a great, affordable option for a student who you may suspect has a nickel allergy or who is young. These mouthpieces are easily affordable and do not contain any metal, ensuring that your student will not have a reaction. However, these mouthpieces are generally not suitable for more advanced players and may cause playing frustrations in the long run for your student. Be sure to keep an open line of communication with the parents and student. If you think that the student might be experiencing a reaction still, be sure that their family knows and suggest another alternative to try.

What are the recurring challenges that this allergy will cause for this student? How can we ensure their success?

The narratives from the participants in this study illustrated many of the recurring challenges that nickel allergic instrumentalists face. It seems like most non-allergic musicians assume that the challenges of a nickel allergy stop once a solution is found. As I have

experienced on my own, and as described from the participants in this study, this is far from the truth. These recurring challenges can include further reactions from the wearing of alternative materials, such as the wearing off of gold-plating or lacquer. Some musicians with nickel allergies may also find that their allergies further develop as they continue to play. This is not uncommon, as many patients find that their allergies further develop due to continued exposure to nickel. Musicians who experience this will likely need to find different solutions that contain even less nickel than their last solution, or no nickel at all.

Madison and Stuart both brought up the challenges of finding and affording mouthpieces. While they both currently have a mouthpiece that they can safely play, they both shared that they are interested in other mouthpiece options. Buying a new mouthpiece is not an uncommon thing for brass players to do at any point in their career, but this simple thing can be much more challenging and much less affordable for musicians with nickel allergies.

A challenge that I have personally noticed over the past few years is that cotton marching band gloves, which I use as a solution to play my horn, have become increasingly more difficult to find and more expensive. I used to be able to order a box of one dozen gloves from Woodwinds and Brasswinds for around twenty-five dollars. Woodwinds and Brasswinds no longer carries these types of gloves. For the past few years I've been having to order these same gloves through marching band supply sites at a much greater cost. Since these sites cater to entire marching bands, they often require that you purchase gloves in ridiculous quantities, or they charge outrageous amounts for shipping. Additionally, these types of gloves are not readily available and so I have to plan far in advance to order these, so that I am sure that I will not run out and be unable to play my instrument.

Musicians with nickel allergies will likely experience doubts and possibly hurtful or strange comments from fellow musicians who do not understand their allergy or solutions. Madison and John both shared experiences with professors and peers who drew attention to their solutions and made comments that they found to be hurtful because they did not understand their allergy or solutions. Madison shared that in the past, peers have judged her and been stand-offish towards her because of her gold-plated mouthpiece. She also shared that her professors haven't always taken her allergy seriously and have even made her do things that she knew would cause a reaction, because they were doubtful of the impact of her nickel allergy. Stuart shared that he was called out by a professor in front of an entire ensemble for his solution, because the professor did not have an understanding of his allergy or the need for his solution. I have also experienced similar situations. I remember an experience at a solo festival in high school where a director that I did not know asked my father "Are you going to make her wear gloves when you buy her a car too?" He did not understand my solutions or the reason for them. He also continued to joke with the judge in my solo room about this. This made me feel hurt and since this occurred before I began my solo performance, I did not feel like I was being set up for success.

How can you help guard your student from these types of experiences or what can you do to support them, should they experience such situations? The best way that you can help your student through these recurring challenges is by making sure that they know that you are there to support them and will listen to and help them through their concerns. It is likely that your student will experience some kind of comments that are doubtful or hurtful from peers or maybe even fellow directors. You can help your student through these by creating a culture in your program where such comments are not tolerated. You can also educate your other students and colleagues about the challenges that your student and musicians with nickel allergies face. Doing so may

even eliminate such comments all together. Should your student ever experience such comments, make sure they know that you would like to know about such comments. If you hear about such comments, find the person who said them and help them understand nickel allergies and solutions for nickel allergies. More than likely they did not mean to be hurtful and don't realize that what they said was hurtful. It is likely that they just have a lack of understanding of the situation. Educating these individuals will help not only your student, but will also help to develop a culture in the music world where musicians with nickel allergies can feel understood and supported.

Suggestions for future Research

I believe that a study that focuses on current K-12 musicians with nickel allergies and involves their parents and teachers would help provide a better understanding of the impact that nickel allergies have on the average student. This would also provide more information on the motivations to continue and challenges that musicians with nickel allergies face during their K-12 music education. Additional research focusing on an increased number of musicians with nickel allergies and including an increased number of instruments would also be beneficial. While woodwind, brass, and percussion were involved in this study, no string players were involved. Additionally, this study only involved the following instruments: flute, clarinet, trumpet, trombone, percussion. Nickel allergies in instrumental music might be better understood if musicians for all instruments were studied.

While nickel is likely the most common allergen among musicians, there are also a number of other allergens that impact musicians. These allergens include: propolis, various woods, lacquers, and cane. Research in each of these areas would help raise awareness of these allergies and the impact of such allergies.

Final Thoughts

It is not easy to find solutions for a nickel allergy in instrumental music. Like the participants in this study, I have often felt alone and frustrated by the availability and cost of appropriate medical solutions. I consider myself to be very lucky because my family and teachers were very supportive and did all that they could to help me find appropriate solutions for my allergy, but I wonder what where I would be if I hadn't been so lucky. There is a general lack of understanding and awareness of nickel allergies in instrumental music. This lack of understanding and awareness could easily lead musicians with nickel allergies to quit, or maybe never even begin their studies in instrumental music. Allergies are currently at the forefront of education in all areas. It's time that music educators focus on the specific allergies that can impact their students daily. I believe that an increased awareness and understanding of nickel allergies will help current musicians with nickel allergies and will encourage others to join or continue their studies in instrumental music.

Appendix A

IRB Approval

Health Sciences and Behavioral Sciences Institutional Review Board (IRB-HSBS) • 2800 Plymouth Rd., Building 520, Room 1170, Ann Arbor, MI 48109-2800 • phone (734) 936-0933 • fax (734) 998-9171 • irbhsbs@umich.edu

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To: Grace Demerath

From: Thad Polk

Cc:

Colleen Conway

Grace Demerath

Subject: Initial Study Approval for [HUM00149772]

SUBMISSION INFORMATION:
Study Title: Nickel Allergic Contact Dermatitis in Instrumental Music: A Multiple Case Study
Full Study Title (if applicable):
Study eResearch ID: HUM00149772
Date of this Notification from IRB:10/8/2018
Review: Expedited
Initial IRB Approval Date: 9/13/2018
Current IRB Approval Period:**9/13/2018 -**
Expiration Date: Approval for this expires at **11:59 p.m. on**
UM Federalwide Assurance (FWA): FWA00004969 (For the current FWA expiration date, please visit the UM HRPP Webpage)
OHRP IRB Registration Number(s): IRB00000246

Approved Risk Level(s):

Name Risk Level HUM00149772 No more than minimal risk

NOTICE OF IRB APPROVAL AND CONDITIONS:
The IRB HSBS has reviewed and approved the study referenced above. The IRB determined that the proposed research conforms with applicable guidelines, State and federal regulations, and the University of Michigan's Federalwide Assurance (FWA) with the Department of Health and Human Services (HHS). You must conduct this study in accordance with the description and

information provided in the approved application and associated documents.

APPROVAL PERIOD AND EXPIRATION:
The approval period for this study is listed above. Please note the expiration date. If the approval lapses, you may not conduct work on this study until appropriate approval has been re-established, except as necessary to eliminate apparent immediate hazards to research subjects. Should the latter occur, you must notify the IRB Office as soon as possible.

IMPORTANT REMINDERS AND ADDITIONAL INFORMATION FOR INVESTIGATORS

APPROVED STUDY DOCUMENTS:
You must use any date-stamped versions of recruitment materials and informed consent documents available in the eResearch workspace (referenced above). Date-stamped materials are available in the "Currently Approved Documents" section on the "Documents" tab.

RENEWAL/TERMINATION:
At least two months prior to the expiration date, you should submit a continuing review application either to renew or terminate the study. Failure to allow sufficient time for IRB review may result in a lapse of approval that may also affect any funding associated with the study.

AMENDMENTS:
All proposed changes to the study (e.g., personnel, procedures, or documents), must be approved in advance by the IRB through the amendment process, except as necessary to eliminate apparent immediate hazards to research subjects. Should the latter occur, you must notify the IRB Office as soon as possible.

AEs/ORIOs:
You must inform the IRB of all unanticipated events, adverse events (AEs), and other reportable information and occurrences (ORIOs). These include but are not limited to events and/or information that may have physical, psychological, social, legal, or economic impact on the research subjects or other.

Investigators and research staff are responsible for reporting information concerning the approved research to the IRB in a timely fashion, understanding and adhering to the reporting guidance (https://az.research.umich.edu/medschool/guidance/adverse-events-aes-other- reportable-information-and-occurrences-orios-other), and not implementing any changes to the research without IRB approval of the change via an amendment submission. When changes are necessary to eliminate apparent immediate hazards to the subject, implement the change and report via an ORIO and/or amendment submission within 7 days after the action is taken. This includes all information with the potential to impact the risk or benefit assessments of the research.

SUBMITTING VIA eRESEARCH:
You can access the online forms for continuing review, amendments, and AEs/ORIOs in the eResearch workspace for this approved study (referenced above).

MORE INFORMATION:
You can find additional information about UM's Human Research Protection Program (HRPP) in the Operations Manual and other documents available at: http://research-compliance.umich.edu/human-subjects.

Thad Polk

Chair, IRB HSBS

Appendix B

Participant Consent Form

Consent to be Part of a Research Study

Title of the Project: Nickel Allergic Contact Dermatitis in Instrumental Music: A Multiple Case Study
Principal Investigator: Grace Demerath, MM Music Education Student, University of Michigan
Faculty Advisor: Dr. Colleen Conway, Professor of Music Education, University of Michigan

Invitation to be Part of a Research Study

You are invited to participate in a research study. In order to participate, you must have a nickel contact allergy to a part of your instrument and be involved currently, or have been involved in the study of instrumental music. Taking part in this research project is voluntary. Please review the interview questions that have been sent to you with this form before agreeing to take part in this study.

Important Information about the Research Study

Things you should know:

- The purpose of the study is to provide narratives of those who experience a nickel contact allergy to their instrument, in order to raise awareness of the allergy and appropriate accommodation techniques. If you choose to participate, you will be asked to participate in an interview where you will be asked to describe your experiences in instrumental music with a nickel contact allergy and how you have made accommodations for this allergy. This will take approximately one hour.
- There are no expected risks or discomforts from this research.
- The study will most likely not provide any direct benefits to you, although you may learn of new accommodation techniques for your allergy through participating in this study. This study will however raise awareness of the issues that you have faced due to your allergy and hopefully help future students with such allergies in instrumental music.
- Taking part in this research project is voluntary. You don't have to participate and you can stop at any time.

Please take time to read this entire form and ask questions before deciding whether to take part in this research project.

What will happen if you take part in this study?

If you agree to take part in this study, you will be asked to participate in an interview where you will be asked to describe your experience in instrumental music education with a nickel allergy. We expect this to take about one hour.

While we will be asking you questions about your allergies and health because of your allergies, we will not be examining any of your medical data or files and will only be using the information that you provide to us.

How could you benefit from this study?

Although you will not directly benefit from being in this study, others might benefit because of the narrative and information that you provide about your experience in instrumental music. You might benefit from being in this study because you may learn about new adaptive techniques for your allergy from the primary investigator or from reading the findings.

What risks might result from being in this study?

To protect confidentiality the data will be de-identified with a pseudonym for each participant. A master list will be maintained and will provide the link between the participant names and the pseudonym. When data collection is completed this master list will be destroyed.

How will I protect your information?

I plan to publish the results of this study. To protect your privacy, I will not include any information that could directly identify you. Pseudonyms will be used in the published paper, to further protect your identity.

I will protect the confidentiality of your research records by keeping them password protected and by making sure that I am the only one who has access to these records. Your name and any other information that can directly identify you will be stored separately from the data collected as part of the project**.**

What will happen to the information I collect about you after the study is over?

Your name and other information that can directly identify you will be kept secure and stored separately from the research data collected as part of the project.

I will not share your research data with other investigators.

All data will be destroyed, once my thesis paper has been completed. My thesis will be completed by September of 2019.

Your Participation in this Study is Voluntary

It is totally up to you to decide to be in this research study. Although your parent has already given consent for you to participate in this study, you may choose not to participate. Even if you decide to be part of the study now, you may change your mind and stop at any time. You do not have to answer any questions you do not want to answer. If you decide to withdraw before this study is completed, all data and collected from you will be destroyed. This interview may take place over using the video conferencing platform BlueJeans, or it may take place over the phone. It would be preferred that you allow for the interview to be recorded, however it is not required in order to participate in this study. I would prefer a recorded interview so that I can be sure that I have correctly transcribed your exact wording so that your narrative with be clear to others in my findings. If you choose not to consent to a recorded interview, I will type your responses during our interview. I expect the interview to take about one hour.

Contact Information for the Study Team and Questions about the Research

If you have questions about this research, you may contact

Principal Investigator: Grace Demerath, grace.r.demerath@gmail.com, (734)474-6844

Faculty Advisor: Dr. Colleen Conway, conwaycm@umich.edu, 734-615-4105

Contact Information for Questions about Your Rights as a Research Participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the following:

University of Michigan
Health Sciences and Behavioral Sciences Institutional Review Board
2800 Plymouth Road
Building 520, Room 1169
Ann Arbor, MI 48109-2800
Phone: (734) 936-0933 or toll free, (866) 936-0933
Email: irbhsbs@umich.edu

Consent

By signing this document, you are agreeing to participate in this study. Make sure that you understand what the study is about before you sign this form. I will give you a copy of this document for your records. I will keep a copy with the study records. If you have any questions about the study, you can contact the study team using the information provided above.

I understand what the study is about and my questions so far have been answered. I agree to take part in this study.

_____
Printed Subject Name

_____
Signature Date

Consent for interview
I agree to an interview with the principal investigator. Please select the type of interview that you prefer.

***Video*_____ *Phone*_____**

_____
Signature Date

Consent to be Audio/video Recorded
I agree to be audio/video recorded, so that the data can be readily available for examination by the principal investigator.

***YES*_____ *NO*_____**

_____
Signature Date

Consent to be Contacted for Participation in Future Research
I give the researchers permission to keep my contact information and to contact me for future research projects.

***YES*_____ *NO*_____**

_____
Signature Date

Appendix C

Interview Protocol

1. Describe how you first found out about your nickel allergy.
    a. Did you know about your nickel allergy prior to choosing your instrument?
    b. If so, did anyone encourage you to select another instrument that wouldn't impact your nickel allergies?
2. Describe how solutions were made that allowed you to continue playing.
    a. Who took responsibility for making these solutions?
    b. What resources did you find that were helpful?
    c. Who found solution to continue playing and how did they find them?
    d. Were you able to find a solution that worked right away?
3. Did any challenges arise while searching for effective solutions?
    a. Did you have any reactions while you were testing different techniques or solutions?
    b. Did you find any alternative materials to be too expensive or too difficult to find?
    c. Were any doctors or teachers unwillingly to help in your search for solutions?
4. What motivated you to continue in instrumental music, despite your nickel allergy?
5. Do you feel that other students or musicians ever treat you differently because of your nickel allergy? If so, please describe how.

Appendix D

Flute/Piccolo Solutions

Possible Reactions

- Rash on or around chin
- Rash on hands or fingertips
- Green chin
- Burning or tingling sensation on chin or hands

Possible Reaction Points

- Chin (most common)
- Right thumb or left index finger (more likely than fingertips, due to constant contact)
- Hands and fingertips

Suggested Solutions:

For chin only reactions

- Cover lip plate lip plate patch or tape
- Different head joint or flute with sterling-silver or gold-plated lip plate

For right Thumb reactions

- Plastic thumb port or thumb rest

For left Index Finger reactions

- Plastic thumb guide or rest

For hand and fingertip reactions

- Gloves (must be nitrile for open-holed flutes)
- Sterling-silver or gold-plated flute models

Piccolo Specific Solutions

- Composite or wooden models eliminate need to cover lip plate

Flute Lip Plate Patches

Company	Model	Number in package
Protec	LP1	12
Yamaha	YAC 1089P2	15

Other alternatives you might have on hand:

- Scotch Tape
- Electrical Tape
- Contact Paper

Flute Thumb and Finger Ports, Rests, and Guides

Company	Model	Placement	Colors	Instruments Available
Bo-Pep	Flute Thumb Guide	Right Thumb	Black	F
Bo-Pep	Finger Saddle	Left Index Finger	Black	F
Bo-Pep	Flute Finger Rest	Left Index Finger	Black	F
Faxx	Flute Thumb Guide	Right Thumb	Black	F
Thumbport	Thumbport	Right Thumb	Black Green Blue Grey/White Grey Copper Pink Purple	F P
Thumbport	Piccolo Thumbport	Right Thumb	Black/Grey	P
Thumbport	Thumbport II	Right Thumb	Black Green Blue Grey/White Grey Copper Pink Purple	F
Thumbport	Fingerport	Left Index Finger	Black Green	F

			Blue Grey/White Grey Copper Pink Purple	

Gloves for Closed-Whole Flutes

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Nitrile Gloves for Open-Holed Flutes

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix E

Oboe/English Horn Solutions

Possible Reactions

- Rash on or around right thumb
- Rash on hands or fingertips
- Burning or tingling sensation on thumb, fingertips, or hands

Possible Reaction Points

- Right thumb (most common, due to constant contact)
- Fingertips or hands

Suggested Solutions:

For right thumb reactions

- Cover thumb rest with thumb rest cover or pencil grip
- Cover thumb rest with nail polish
- Replace thumb rest with a nickel free thumb rest

For hand and fingertip reactions

- Gloves (must be nitrile)
- Oboe or English Horn models with sterling-silver or gold-plated keys

Nickel-Free Thumb Rest Options for Oboe and English Horn

Company	Model	Material	Style	Colors	Instruments
BG	Thumb Rest Cushion	Rubber	Cushion	Black	Oboe English Horn
Canomo	Thumb Rest Cushion Protector	Rubber	Cushion	Black	Oboe English Horn
Duo	Thumb Rest	Silicone	Cushion	Black Blue Green Pink Purple	Oboe English Horn
Protec	Thumb Cushion	Rubber	Cushion	Black	Oboe English Horn
Protec	Thumb Cushion with Extension	Rubber	Cushion	Black Grey	Oboe English Horn
Kooiman	Etude 3	Rubber	Thumb Rest/Extension	Black	Oboe
Ridenour	Thumb Rest Saddle	Plastic	Saddle	Black	Oboe
Yamaha	Thumb Rest Cushion	Rubber	Cushion	Brown Black Pink	Oboe English Horn

Other alternatives you might have on hand:

- Pencil Grips
- Nail Polish (bright color suggested, so that you can clearly see when it's wearing off)

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix F

Bassoon Solutions

Possible Reactions

- Rash on thumbs, hands, or fingertips
- Burning or tingling sensation on thumb, fingertips, or hands

Possible Reaction Points

- Fingertips, thumbs, or hands

Suggested Solutions:

For hand and fingertip reactions

- Gloves (must be nitrile)
- Bassoon models with sterling-silver or gold-plated keys

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix G

Clarinet Solutions

Possible Reactions

- Rash on or around right thumb
- Rash on hands or fingertips
- Burning or tingling sensation on thumb, fingertips, or hands
- Rash or burning on lower chin

Possible Reaction Points

- Right thumb (most common, due to constant contact)
- Fingertips or hands
- Rash or burning on lower chin (due to contact with ligature)

Suggested Solutions:

For right thumb reactions

- Cover thumb rest with thumb rest cover or pencil grip
- Cover thumb rest with nail polish
- Replace thumb rest with a nickel free thumb rest

For hand and fingertip reactions

- Gloves (must be nitrile)
- Clarinet models with sterling-silver or gold-plated keys

For chin reactions

- Non-metallic or gold or sterling-silver plated ligatures

Nickel-Free Thumb Rest Options for Clarinet

Company	Model	Material	Style	Colors	Instruments
BG	Thumb Rest Cushion	Rubber	Cushion	Black	Clarinet
Canomo	Thumb Rest Cushion Protector	Rubber	Cushion	Black	Clarinet
Duo	Thumb Rest	Silicone	Cushion	Black Blue Green Pink Purple	Clarinet
Protec	Thumb Cushion	Rubber	Cushion	Black	Clarinet
Protec	Thumb Cushion with Extension	Rubber	Cushion	Black Grey	Clarinet
Kooiman	Etude 3	Rubber	Thumb Rest/Extension	Black	Clarinet
Ridenour	Thumb Rest Saddle	Plastic	Saddle	Black	Clarinet
Yamaha	Thumb Rest Cushion	Rubber	Cushion	Brown Black Pink	Clarinet

Other alternatives you might have on hand:

- Pencil Grips
- Nail Polish (bright color suggested, so that you can clearly see when it's wearing off)

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix H

Saxophone Solutions

Possible Reactions

- Rash on or around right thumb
- Rash on hands or fingertips
- Burning or tingling sensation on thumb, fingertips, or hands
- Rash or burning on lower chin
- Rash on or around mouth or lips (if using metal jazz mouthpiece)

Possible Reaction Points

- Right thumb (most common, due to constant contact)
- Fingertips or hands
- Rash or burning on lower chin (due to contact with ligature)
- Mouth or lips (if using metal jazz mouthpiece)

Suggested Solutions:

For right thumb reactions

- Cover thumb rest with thumb rest cover (if there isn't one already)
- Cover thumb rest with nail polish
- Replace thumb rest with a nickel free thumb rest

For hand and fingertip reactions

- Gloves (marching band gloves suggested)
- Saxophone models with sterling-silver or gold-plated keys

For chin reactions

- Non-metallic or gold or sterling-silver plated ligatures

For mouth or lip reactions

- Use plastic mouthpiece
- Use stainless-steel or gold-plated metal mouthpiece

Saxophone Thumb Rest Covers

Company	Model	Material	Style	Colors
Protec	Thumb Rest Gel Cushion	Gel	Cushion	Black
Runyon	Thumb Saver Rest	Plastic	Cushion	Black
Selmer	Thumb Saver	Rubber	Cushion	Black

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix I

Trumpet Solutions

Possible Reactions

- Rash on or around lips
- Rash on hands
- Burning or tingling sensation on lips or hands
- Feeling like your lips are “raw” after play short amounts of time

Possible Reaction Points

- Lips or area around mouth (most common reaction)
- Hands

Suggested Solutions:

For lip reactions

- Buy a gold-plated mouthpiece, or have mouthpiece plated in gold
- Replace mouthpiece with one made with one of the following materials:
    - Acrylic
    - Lexan
    - Delrin
    - Titanium
    - Stainless-steel

For hand reactions

- Trumpet valve guard
- Gloves (marching band gloves suggested)
- Sterling-silver, or newly lacquered trumpet models

Trumpet Mouthpieces

Company	Lexan	Acrylic	Delrin	"Warbonite" Hard Rubber	Stainless-steel	Gold-plated	Titanium-coated	Solid Titanium
Bach						T C F		
Best Brass						T		
BuzzRite Mouthpiece						T		
Conn						T		
Curry						T C F P		
DEG						T		
Dennis Wick						T C F		
Giddings Mouthpieces					T C F			T C F
Houser Mouthpiece					T		T	
Kelly Mouthpieces	T C B F				T UKSC F			
King						T		
Marcinkiewicz						T C F P		
Noteworthy Mouthpieces						T		
Parduba						T F		
Pickett Brass						T C		
RS Berkeley						T		
Rudy Muck						T F		
Schilke						T C F P		
Stork						T C F P		
Warburton	T		T	T	T			
The Wedge Mouthpiece		T ASC UKSC F	T ASC UKSC F					
Yamaha						T C F		

T- Trumpet
C- Cornet
F- Flugelhorn
P- Piccolo
B- Bugle

Trumpet Valve Guards

Company	Model	Material	Instrument
Bach	Valve Guard	Vinyl	T
Dennis Wick	DWA010	Leather	T
KGU Brass	Valve Guard	Leather	T
Leather Specialties	Deluxe Valve Guard	Leather	T C P
Neotec	Trumpet Brass Wrap	Neoprene	T
ProTec	6-Point Leather Guard	Leather	T
Protec	Leather Guard	Leather	T C
Yamaha	Valve Guard	Vinyl	T
Zachary Music	ZeuS Valve Guard	Leather	F

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix J

French Horn Solutions

Possible Reactions

- Rash on or around lips
- Burning or tingling sensation on lips or hands
- Feeling like your lips are "raw" after play short amounts of time
- Rash on right hand (where hand is in contact with bell)

Possible Reaction Points

- Lips or area around mouth (most common reaction)
- Rash on right hand (more common than rest of hands due to contact and unlacquered area inside of bell)
- Left hand or fingertips
- Thighs (particularly the right thigh)

Suggested Solutions:

For lip reactions

- Buy a gold-plated mouthpiece, or have mouthpiece plated in gold
- Replace mouthpiece with one made with one of the following materials:
    - Acrylic
    - Lexan
    - Delrin
    - Titanium
    - Stainless-steel

For right hand reactions

- Gloves (marching band gloves suggested)
- Newly lacquered horn/see if company will lacquer further inside bell

For left hand reactions

- Horn hand guard
- Gloves (marching band gloves suggested)
- Valve pads/key risers

For reactions on thighs

- Be sure to wear longer pants/or use a cloth when setting horn on your leg

French Horn Mouthpieces

Company	Lexan	Acrylic	Delrin	Stainless-steel	Gold-plated	Titanium-coated	Solid Titanium
Bach					FH M AH		
Dennis Wick					FH AH		
Giddings Mouthpieces				FH			FH
Holton Farkas					FH	FH	
Houser Mouthpieces				FH	FH		
Kelly Mouthpieces	FH M			FH			
L'olifant Paris					FH		
Osmun					FH		
Schilke					FH		
Siegfried's Call Custom					FH		
Stork					FH		
Warburton					FH		
The Wedge Mouthpiece		FH	FH		FH		
Yamaha					FH M AH		

FH- French Horn
M- Mellophone
AH- Alto Horn

Horn Hand Guards

Company	Model	Material	Strap?
Conn	Hand Guard With Lace	Leather	No
Conn	Hand Guard With Velcro	Leather	No
Holton	Hand Guard	Leather	No
Horn Guard	By Horn Model	Vinyl/Satin	No Yes
Leather Specialties	By Horn Model	Leather	No
Leather Specialties	Fhrap	Leather	Yes
M&N Booth	Hand Guard	Leather	Yes
Neotech	Horn Hand Guard	Neoprene	No
Protec	Hand Guard	Leather Neoprene	No
Yamaha	Hand Guard	Leather/Nylon	No

Horn Valve Pads/Risers

Company	Material	Notes
Faxx	Rubber	Made for horn. Shorter than sax palm key risers.
Protec	Rubber	Made as saxophone palm key risers
Runyon	Rubber	Made as saxophone palm key risers

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix K

Trombone Solutions

Possible Reactions

- Rash on or around lips
- Burning or tingling sensation on lips, left side of neck, or hands
- Feeling like your lips are "raw" after play short amounts of time
- Rash on left side of neck, hands, or fingers

Possible Reaction Points

- Lips or area around mouth (most common reaction)
- Left Side of neck
- Hands
- Fingertips

Suggested Solutions:

For lip reactions

- Buy a gold-plated mouthpiece, or have mouthpiece plated in gold
- Replace mouthpiece with one made with one of the following materials:
  - Acrylic
  - Lexan
  - Delrin
  - Titanium
  - Stainless-steel

For neck reactions

- Neck guard
- Wear scarf while playing trombone

For hand reactions

- Hand guards
- Gloves (marching band gloves suggested)

Trombone Mouthpieces

Company	Lexan	Acrylic	Delrin	"Warbonite" Hard Rubber	Stainless-steel	Gold-plated	Solid Titanium
Bach						SS LS/B CB	
BuzzRite Mouthpieces						SS LS/B	
Conn						SS LS/B	
Curry						SS LS/B	
DEG						SS LS/B	
Dennis Wick						SS LS/B MS	
Giddings Mouthpieces					SS LS/B		SS LS/B
Kelly Mouthpieces	SS LS/B				SS LS/B		
Marcinkiewicz						SS LS/B CB	
Parduba						SS	
Rudy Muck						SS	
Schilke						SS MS LS/B	
Stork						SS	
Warburton				SS LS/B MS		SS LS/B MS	
The Wedge Mouthpiece		SS LS/B	SS LS/B				
Yamaha						SS LS/B	

SS- Small Shank
MS- Medium Shank
LS/B- Large Shank/Bass
CB- Contrabass

Trombone Grips and Guards

Company	Model	Materials Available
Curtis	Trombone Guard	Neoprene Leather
Griego	Hand Grip Set	Leather
Griego	Neck Guard	Leather
Leather Specialties	Hand Grip	Leather
Protec	Trombone Neck Guard	Neoprene Leather
Neotech	Hand Grip Kit	Neoprene

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix L

Euphonium and Baritone Solutions

Possible Reactions

- Rash on or around lips
- Burning or tingling sensation on lips, left side of neck, or hands
- Feeling like your lips are "raw" after play short amounts of time
- Rash on arms (particularly the left), hands, or fingers

Possible Reaction Points

- Lips or area around mouth (most common reaction)
- Arms (particularly the inside of left arm)
- Hands
- Fingertips

Suggested Solutions:

For lip reactions

- Buy a gold-plated mouthpiece, or have mouthpiece plated in gold
- Replace mouthpiece with one made with one of the following materials:
    - Acrylic
    - Lexan
    - Delrin
    - Titanium
    - Stainless-steel

For arm reactions

- Wear long-sleeved shirt or sweater while playing
- Newly lacquered instrument models
- Wrap arm or instrument in sports or vet wrap

For hand reactions

- Newly lacquered instrument models
- Gloves (marching band gloves suggested)

Baritone/Euphonium Mouthpieces

Company	Lexan	Acrylic	Delrin	"Warbonite" Hard Rubber	Stainless-steel	Gold-plated	Solid Titanium
Bach						SS LS/B CB	
Conn						SS LS/B	
Curry						SS LS/B	
DEG						SS LS/B	
Dennis Wick						SS MS LS/B	
Giddings Mouthpieces					SS LS/B SB		SS LS/B SB
Kelly Mouthpieces	SS MS LS				SS MS LS		
King						SS LS	
Marcinkiewicz						SS LS/B CB	
Schilke						SS MS LS/B	
Warburton				SS MS LS/B		SS MS LS/B	
The Wedge Mouthpiece		SS MS LS/B	SS MS LS/B				
Yamaha						LS/B	

SS- Small Shank
MS- Medium Shank
LS/B- Large Shank/Bass

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix M

Tuba Solutions

Possible Reactions

- Rash on or around lips
- Burning or tingling sensation on lips, left side of neck, or hands
- Feeling like your lips are "raw" after play short amounts of time
- Rash on arms (particularly the left), hands, or fingers

Possible Reaction Points

- Lips or area around mouth (most common reaction)
- Arms (particularly the inside of left arm)
- Hands
- Fingertips

Suggested Solutions:

For lip reactions

- Buy a gold-plated mouthpiece, or have mouthpiece plated in gold
- Replace mouthpiece with one made with one of the following materials:
  - Acrylic
  - Lexan
  - Delrin
  - Titanium
  - Stainless-steel

For arm reactions

- Wear long-sleeved shirt or sweater while playing
- Newly lacquered instrument models
- Wrap arm or instrument in sports or vet wrap

For hand reactions

- Newly lacquered instrument models
- Gloves (marching band gloves suggested)

Tuba Mouthpieces

Company	Lexan	Acrylic	Delrin	Stainless-steel	Gold-plated	Solid Titanium
Bach					SS	
Canadian Brass					SS	
Conn					SS	
Curry					SS	
Dennis Wick					SS	
Giddings Mouthpieces				SS ES BT		SS ES BT
Kelly Mouthpieces	SS XS			SS AS ES KS		
King					SS	
Marcinkiewicz					SS	
Parduba					SS	
Schilke					SS	
Warburton					SS	
The Wedge Mouthpiece		SS	SS			
Yamaha					SS	

SS- Standard Shank
AS- American Shank
ES- European Shank
KS- Kaiser Shank
XS- Extra Small Shank
BT- Bass Tuba

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix N

Percussion Solutions

Possible Reactions

- Burning or tingling sensation on arms, hands, or fingertips
- Rash on arms, hands, or fingers

Possible Reaction Points

- Arms
- Hands
- Fingertips

Suggested Solutions:

For arm reactions

- Wear long-sleeved shirt or sweater while playing crash cymbals
- Wrap arms in sports or vet wrap before playing crash cymbals

For hand reactions

- Triangle beats that are stainless-steel/or coated
- Wear gloves while playing small metallic instruments
- Buy stainless-steel or non-metallic versions of small hand instruments

Triangle Beaters

Company	Model	Non-Allergic Material
Grover	TB-TD TB-TS SV-TB	Stainless/Rubber Coating
Treeworks	Professional Beaters-Set of 3	Stainless/Rubber Coating

Crash Cymbals

Alternatives you might have on hand:

- Marching Band Gloves
- Have student wear sweater or long-sleeve shirt
- Have student wrap arts with sports wrap or vet wrap

Gloves

Company	Colors Available	Sizes Available	Wrist Length	Palm Grip?	Material
Dinkle's	Black White Pink	S-XL	Standard Extra Long	Yes	Cotton/PVC
Dinkle's	Black White	S-XL	Standard Extra Long	No	Cotton
Dinkle's	Black White	OS	Standard	No	Nylon
Director's Showcase International	Black White Pink	XS-XL	Extra Long	No	Cotton
Director's Showcase International	Black White	XS-XL	Standard	No	Cotton
Director's Showcase International	Black White	OS	Standard Extra Long	No	Polyester
Director's Showcase International	Black White	S-XL	Extra Long	No	Cotton- Winter Weight
Director's Showcase International	Black White	XS-XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	Yes	Cotton/PVC
StylePlus	Black White	XS-2XL	Standard Extra Long	No	Cotton
StylePlus	Navy Yellow Maroon Royal Green Red Black Purple Orange Pink	Women's OS	Standard	No	Polyester
StylePlus	Navy-White Maroon-White Green-White Yellow-White Black-White Red-White Orange-White	Women's OS	Standard	No	Polyester
Vivace by DeMoulin	Black White Pink	S-2XL	Standard	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	No	Cotton
Vivace by DeMoulin	Black White	S-2XL	Extra Long	Yes	Cotton/PVC

Appendix O

Violin Solutions

Possible Reactions

- Rash on or around neck
- Rash on hands or fingertips (particularly left hand or fingertips)
- Rash on right hand or fingers
- Burning or tingling sensation on neck, hands, or fingers

Possible Reaction Points

- Neck (most common)
- Left fingertips or hands
- Right hand or fingers

Suggested Solutions:

For neck only reactions

- Place cloth or something over metallic part of chin rest
- Place a chin rest cover over chin rest
- Replace neck rest with hypoallergenic version

For reactions on left fingertips or hand

- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)

For reactions on right hand or fingers

- Cover any metallic parts near bow hold with electrical tape
- Buy a bow that does not have exposed metal near bow hold
- Nitrile gloves (far from ideal, but works short term or for secondary player)

Hypoallergenic Violin Chin Rests

Company	Model	Material	Mount Options	Instruments Available	Sizes Available	Height/Tilt Adjust?
Wittner	Augsburg	Composite	Center	Violin	1/8-4/4	Yes
Wittner	Hypoallergenic Plastic Chinrest	Composite	Side	Violin	1/16-4/4	No
Wittner	Hypoallergenic Plastic Chinrest	Composite	Center	Violin	1/16-4/4	No
Wittner	Zuerich Chin Rest	Composite	Side	Violin	1/2-4/4	Yes

Chin Rest Covers

Company	Model	Material	Colors	Sizes Available
Chin Cozy	Kinder-Chinder	Foam/Corduroy	Brown	1/16-4/4
Chin Cozy	Chin Cozy	Foam/Chamois	Black Blue Brown Purple Red	4/4
Cushy	Cushy	Foam/Faux Velvet	Blue	Small Medium Large
Meisel	Chin Amigo	Foam/Ultrasuede	Black	1/16-4/4
Sattler	Strad Pad	Latex Foam	Black Rosewood Walnut	Standard Medium Large

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Violin Strings

Company	Model	Winding Material	Core Material	Sizes Available
D'Addario	Helicore	E: Steel A: Aluminum D: Titanium G: Silver	E: Steel A: Steel D: Steel G: Steel	4/4
D'Addario	Kaplan Amo	E: Tin A: Aluminum D: Silver G: Silver	E: Carbon Steel A: Synthetic D: Synthetic G: Synthetic	4/4
D'Addario	Kaplan Vivo	E: Tin A: Aluminum D: Silver G: Silver	E: Carbon Steel A: Synthetic D: Synthetic G: Synthetic	4/4
D'Addario	ProArté	E: Steel A: Aluminum D: Aluminum G: Silver	E: Steel A: Nylon D: Nylon G: Nylon	4/4
D'Addario	Zyex	E: Carbon Steel A: Aluminum D: Aluminum G: Silver	E: Carbon Steel A: Synthetic D: Synthetic G: Synthetic	4/4
Pirastro	Evah Pirazzi	E: Carbon Steel A: Aluminum D: Silver G: Silver	E: Carbon Steel A: Synthetic D: Synthetic G: Synthetic	1/2-3/4
Pirastro	Obligato	E: Gold A: Aluminum D: Silver G: Silver	E: Steel A: Synthetic D: Synthetic G: Synthetic	4/4
Piastro	Violino	E: Carbon Steel A: Aluminum D: Silver G: Silver	E: Carbon Steel A: Synthetic D: Synthetic G: Synthetic	4/4
Thomastik-Infeld	Infeld Vision	E: Tin A: Aluminum D: Aluminum G: Silver	E: Steel A: Synthetic D: Synthetic G: Synthetic	1/16-4/4
Thomastik-Infeld	Vision-Titanium Solo	E: Stainless A: Aluminum D: Silver G: Silver	E: Stainless A: Synthetic D: Synthetic G: Synthetic	4/4

Appendix P

Viola Solutions

Possible Reactions

- Rash on or around neck
- Rash on hands or fingertips (particularly left hand or fingertips)
- Rash on right hand or fingers
- Burning or tingling sensation on neck, hands, or fingers

Possible Reaction Points

- Neck (most common)
- Left fingertips or hands
- Right hand or fingers

Suggested Solutions:

For neck only reactions

- Place cloth or something over metallic part of chin rest
- Place a chin rest cover over chin rest
- Replace neck rest with hypoallergenic version

For reactions on left fingertips or hands

- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)

For reactions on right hand or fingers

- Cover any metallic parts near bow hold with electrical tape
- Buy a bow that does not have exposed metal near bow hold
- Nitrile gloves (far from ideal, but works short term or for secondary player

Hypoallergenic Viola Chin Rests

Company	Model	Material	Mount Options	Height/Tilt Adjust?
Wittner	Augsburg	Composite	Center	Yes
Wittner	Hypoallergenic Plastic Chinrest	Composite	Side	No
Wittner	Zuerich Chin Rest	Composite	Side	Yes

Chin Rest Covers

Company	Model	Material	Colors	Sizes Available
Chin Cozy	Chin Cozy	Foam/Chamois	Black Blue Brown Purple Red	Small Medium Large
Cushy	Cushy	Foam/Faux Velvet	Blue	Small Medium Large
Meisel	Chin Amigo	Foam/Ultrasuede	Black	Small Medium Large
Sattler	Strad Pad	Latex Foam	Black Rosewood Walnut	Standard Medium Large

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Viola Strings

Company	Model	Winding Material	Core Material	Sizes Available
D'Addario	Helicore	A: Aluminum D: Titanium G: Silver C: Tungsten-Silver	A: Steel D: Steel G: Steel C: Steel	15-17 inch
D'Addario	Kaplan Amo	A: Aluminum D: Silver G: Silver C: Tungsten-silver	A: Steel D: Synthetic G: Synthetic C: Synthetic	16-16.5 inch
D'Addario	Kaplan Forza	A: Aluminum-titanium D: Silver G: Silver C: Tungsten-silver	A: Steel D: Steel G: Steel C: Steel	16-16.5
D'Addario	Kaplan Vivo	A: Aluminum-titanium D: Silver G: Silver C: Tungsten-silver	A: Steel D: Synthetic G: Synthetic C: Synthetic	16-16.5 inch
D'Addario	ProArté	A: Aluminum D: Aluminum G: Silver C: Silver	A: Nylon D: Nylon G: Nylon C: Nylon	16-16.5 inch
D'Addario	Zyex	A: Aluminum D: Aluminum G: Silver C: Tungsten-silver	A: Synthetic D: Synthetic G: Synthetic C: Synthetic	16-17 inch
Piastro	Tonica	A: Aluminum D: Aluminum G: Silver C: Tungsten-silver	A: Synthetic D: Synthetic G: Synthetic C: Synthetic	15-16.5 inch
Thomastik-Infeld	Dominant	A: Aluminum D: Aluminum G: Silver C: Silver	A: Perlon D: Perlon G: Perlon C: Perlon	14 inch

Appendix Q

Cello Solutions

Possible Reactions

- Rash on hands or fingertips (particularly left hand or fingertips)
- Rash on right hand or fingers
- Burning or tingling sensation on hands or fingers

Possible Reaction Points

- Left fingertips or hands
- Right hand or fingers

Suggested Solutions:

For reactions on left fingertips or hand

- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)

For reactions on right hand or fingers

- Cover any metallic parts near bow hold with electrical tape
- Buy a bow that does not have exposed metal near bow hold
- Nitrile gloves (far from ideal, but works short term or for secondary player)

Cello Strings

Company	Model	Winding Material	Core Material	Sizes Available
D'Addario	Helicore	A: Titanium D: Titanium G: Tungsten-silver C: Tungsten-silver	A: Steel D: Steel G: Steel C: Steel	4/4
D'Addario	ProArté	A: Aluminum D: Aluminum G: Silver C: Tungsten-Silver	A: Nylon D: Nylon G: Nylon C: Nylon	1/2
Thomastik-Infeld	Belcanto Gold	A: Multialloy D: Multialloy G: Multialloy C: Tungsten-multialloy Listed as 100% nickel-free, on their website	A: Steel D: Steel G: Steel C: Steel	4/4

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix R

Double Bass Solutions

Possible Reactions

- Rash on hands or fingertips (particularly left hand or fingertips)
- Rash on right hand or fingers
- Burning or tingling sensation on hands or fingers

Possible Reaction Points

- Left fingertips or hands
- Right hand or fingers

Suggested Solutions:

For reactions on left fingertips or hand

- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)

For reactions on right hand or fingers

- Cover any metallic parts near bow hold with electrical tape
- Buy a bow that does not have exposed metal near bow hold
- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)

Double Bass Strings

Company	Model	Winding Material	Core Material	Sizes Available
D'Addario	Kaplan	E: Tungsten G: Titanium	E: Steel G: Steel	3/4
D'Addario	Zyex	G: Titanium A: Tungsten E: Tungsten	G: Synthetic A: Synthetic E: Synthetic	3/4
Piastro	Eudoxa	Sheep Gut	Silver Wound	3/4
Piastro	Chorda	G: Sheep Gut D: Sheep Gut A: Sheep Gut E: Sheep Gut	G: Sheep Gut D: Sheep Gut A: Silver Wound E: Silver Wound	3/4

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

Appendix S

Guitar Solutions

Possible Reactions

- Rash on hands or fingertips (particularly left hand or fingertips)
- Rash on right hand or fingers
- Burning or tingling sensation on hands or fingers

Possible Reaction Points

- Left fingertips or hands
- Right hand or fingers

Suggested Solutions:

For reactions on left fingertips or hand

- Replace strings with strings that contain less nickel
- Nitrile gloves (far from ideal, but works short term or for secondary player)
- If possible, paint over or cover any exposed frets

For reactions on right hand or fingers

- Be sure to always play with a pick
- Nitrile gloves (far from ideal, but works short term or for secondary player)

Guitar Strings

Company	Model	Material	Core Material
D'Addario	ProArté	Silver-plated	Nylon
D'Addario	EXP16	EXP Coating	Phosphor Bronze
D'Addario	EJ40	Silver-plated	Copper/Silk
Elixir	Nanoweb	Nanoweb Coating	Phosphor Bronze
Savarex	Red Card	Nylon	Nylon

Nitrile Gloves

Company	Colors Available	Sizes Available	Count Per Box
Ammex	Black Blue Purple	S-XL	100 1000
Curad	Blue Purple	S-XL	200 600
MedPride	Purple	S-XL	100 1000
Pink Paws	Pink	S-L	100
ProCure	Purple	XS-XL	200 2000

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