

UNIVERSITY OF OKLAHOMA
GRADUATE COLLEGE

PIANO INSTRUCTORS' EXPERIENCES IN AND PERCEPTIONS OF
PREPARATION, SUCCESS, AND CONFIDENCE
TEACHING STUDENTS WITH NEURODEVELOPMENTAL
DISABILITIES

A DISSERTATION

SUBMITTED TO THE GRADUATE FACULTY

in partial fulfillment of the requirements for the

Degree of

DOCTOR OF PHILOSOPHY

By

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Norman, Oklahoma
2023

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A DISSERTATION APPROVED FOR THE
SCHOOL OF MUSIC

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Acknowledgements

This dissertation would not have been possible without the help, love, and support of many people throughout the course of my doctoral studies. I would first like to thank my dissertation advisor, Dr. Christopher Baumgartner. Thank you, Dr. Baumgartner, for your mentorship, expertise, tireless encouragement, and support. From my first research course to the completion of this document, you have been a constant source of inspiration—I am lucky to know you. I would also like to thank my primary advisor in the piano pedagogy program, as well as my dissertation co-chair, Dr. Barbara Fast. Your role in my growth as a pedagogue and scholar cannot be overstated. I am forever indebted to you for your help and feedback on my research projects and teaching, as well as your encouragement to present research and become a part of the larger piano pedagogy community.

To my other committee members, I am eternally grateful for your contributions to this document, as well as to my studies and work at the University of Oklahoma. Dr. Magrath, studying piano pedagogy with you was incredibly gratifying, and I have learned so much from your guidance both in and out of the classroom. To Dr. Ellis, you were a bright light in the music theory department, and I feel honored to have worked for you. I learned a lot from you about pedagogy, as well as empathy for the everyday struggles of students. To the outside member of my committee, Dr. Corey Peltier, I am extremely grateful for your expertise and perspectives from the field of Special Education, as well as your assistance with analyzing the data from this study.

Thank you also to my professors who inspired and shaped me both artistically and academically over the years: Dr. Igor Lipinski, Dr. Eric Pennello, Dr. Eva Mengelkoch,

Dr. Carl Schmidt—thank you for sharing your art, wisdom, and time. I am especially grateful to Dr. Jenna Klein, my predecessor in the piano pedagogy program. Thank you, Jenna, for being a voice of reason, inspiration, and for your endless advice and guidance as I completed this dissertation.

I am forever indebted to my many students who have taught me as much as I ever taught them. Embarking on my doctoral studies as well as the current dissertation study was a direct result of learning from my students, who inspired me to be the best version of myself and to ask the difficult questions about how to best meet my students' needs.

To my friends and family: thank you for the laughs and unending support. Whether in person, on zoom, or on the phone, your love and friendship kept me going through the difficult times. Most importantly, thank you to Adam Yeargin, my partner in life and love. This Oklahoma adventure was a leap of faith, and your willingness to move across the country to support my dream is a gift I can never repay. Without your love and support, none of this would be possible. I love you.

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Abstract

The purpose of this study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with neurodevelopmental disabilities. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with neurodevelopmental disabilities. Specifically, I wanted to examine (a) how confident and successful piano instructors believed themselves to be in teaching students with neurodevelopmental disabilities, (b) to what extent did piano instructors include students with various neurodevelopmental disabilities in their piano studios, (c) which neurodevelopmental disabilities did piano instructors have familiarity and experience with, and to what degree, and (d) in what contexts did piano instructors learn to teach students with neurodevelopmental disabilities.

Historically, these exceptional students have been marginalized in educational practice, and while movements in classroom education have sought to ameliorate many issues, research and practice in applied music instruction has not kept pace. To date, there are no requirements for special education coursework for piano pedagogy or applied piano majors at any level, according to the National Association of Schools of Music standards. With millions of people affected by neurodevelopmental disabilities, it is likely that piano teachers will teach students diagnosed with neurodevelopmental disabilities, whether they are prepared or not.

Non-collegiate piano instructors were recruited from the Music Teachers National Association and from social media sites to complete the survey and data were collected from $N = 749$ piano instructor respondents in the spring of 2023. Findings indicated that

(a) respondents were willing to teach students with neurodevelopmental disabilities in at least some circumstances, (b) most teachers had taught or were currently teaching at least one student with a neurodevelopmental disability, and (c) that they felt underprepared to do so. Findings also showed that confidence was higher when the respondent had taken at least one course addressing neurodevelopmental disabilities. Implications for piano instructors, future or “pre-service” piano instructors, and piano pedagogy professors are discussed.

CHAPTER 1: Introduction

Within the field of piano pedagogy, there has been growing discourse since the early 2000's regarding teaching piano lessons to students diagnosed with or exhibiting symptoms of neurodevelopmental disabilities. Following the trends in education of “mainstreaming” in the 1970s to “inclusion” in the 1990s and 2000s (Gfeller et al., 1990; Hourigan, 2007; VanWeelden & Whipple, 2014), piano teachers who may or may not have appropriate training often find themselves being asked to teach students with disabilities (Dumlavwalla & Bugaj, 2020; Martiros, 2012; Mullins, 2017; Tracia, 2016). However, while curricula in music education programs in higher education have expanded to include special education coursework (Dumlavwalla & Bugaj, 2020; VanWeelden & Whipple, 2014), at the time of this writing, the National Association of Schools of Music (NASM) did not currently require any curricular elements regarding teaching students with special education needs for music performance or music education majors (NASM, 2021). Thus, outside formalized education programs that lead to teacher certification, musicians who teach piano lessons likely have little to no exposure to instructional techniques for teaching music to individuals with disabilities.

Despite the lack of formal special education coursework in university music programs, the inclusion of students with neurodevelopmental disabilities has become a pressing issue in the field of piano pedagogy. Professional organizations within the field such as the Frances Clark Center (2022) and Music Teachers National Association (MTNA, 2023) promote professional development opportunities as well as provide a platform to explore issues of disability inclusion in piano lessons in the form of practitioner articles (Bauer, 2019; McAllister, 2012; Melago, 2014; Price, 2020),

webinars (Bauer, 2020; Price, 2018, 2019; Steck-Turner, 2017), stand-alone coursework (The Frances Clark Center, 2022; The Lotus Centre, 2023), and original research. Professional development for piano instructors can help teachers fill gaps in their expertise and grow in their understanding of pedagogical principles, separate from courses in higher education.

In addition to inclusive resources for practicing pedagogues, initiatives for student inclusion have emerged at institutions of higher education. For example, The Carolina Lifesong Initiative at the University of South Carolina explicitly offers piano instruction to those with neurodevelopmental disabilities, while offering hands-on training to piano pedagogy students at the university (Kim, 2021). The Celebrating the Spectrum festival at Michigan State University promotes awareness about autism and provides performing and masterclass opportunities for pianists on the autism spectrum (Polischuk, 2018). These resources remain niche, however, and independent piano instructors must seek them out on their own (Mullins, 2017).

Neurodevelopmental Disabilities (NDs)

Neurodevelopmental disabilities are disorders of the brain that affect cognitive and/or behavioral function at varying levels in children and adults, and manifest during the developmental period (APA, 2022; Harris & Greenspan, 2016). These disabilities are associated with the functioning of the brain, and can affect behavior, cognition, motor skills, speech, and language development. NDs also can impair a person's social, emotional, academic, and occupational abilities (APA, 2022). Cases of neurodevelopmental disorder diagnoses in children have been steadily rising since 2000, with roughly 17% of children in the United States diagnosed with some form of

neurodevelopmental disability as of 2017 (Zablotsky et al., 2019). For the purposes of this study, I will use terminologies found in the Diagnostic and Statistical Manual of Mental Disorders (DSM 5-TR), published by the American Psychiatric Association in 2022. This is an important diagnostic tool for clinicians but is also used by researchers and educators as the most current resource for understanding neurodiversity (Cooper, 2017). While there is some discrepancy between vocabulary used in the DSM 5-TR and special education legislation, I have chosen to use the DSM 5-TR as the reference for terminology due to its accessibility. The primary difference in terminology between special education legislation and the DSM 5-TR is that the term “disability” often replaces the term “disorder” in education contexts. These terms are used interchangeably in scientific literature at the time of this writing.

Throughout the twentieth and early twenty-first century, terminology describing neuro disabilities and disorders has evolved with the goal of de-stigmatization (Fox et al., 2021). Terms like “mental retardation,” “attention deficit disorder,” or “Asperger’s syndrome” are examples that can be found in earlier extant scientific literature (and in casual usage) but are no longer preferred in the 2020s. Therefore, I will use the term “neurodevelopmental disability” or “neurodevelopmental disorder” to refer to combined developmental disorders and cognitive impairments that are most often seen in children and adults. Additionally, within the disability advocacy community, descriptors relating to neurodiversity (e.g., neurotypical and neurodivergent) are often preferred to common medical terminology (Dwyer, 2022; Dwyer et al., 2022). Thus, I will use *neurotypical* and *neurodivergent* or *neurodiverse* where appropriate.

Neurodevelopmental Disorders in the DSM 5-TR

For the purposes of this study, I will use terminologies found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR), published by the American Psychological Association (2022) to define various neurodevelopmental disorders.

There are seven categories of NDs found within the DSM 5-TR, with specific criteria for diagnosing neurocognitive disabilities in children. This manual not only defines the parameters and behavioral aspects associated with each disorder, but also provides information about prevalence and which disorders are likely to present in tandem with one another, (i.e., comorbidities). Each entry within the manual details the diagnostic criteria, what behaviors are likely to manifest, and how the disability should be assessed by clinicians. The DSM-5-TR manual is an important diagnostic tool for clinicians, but also can be used by researchers and educators as the most current resource for understanding mental disorders (Cooper, 2017). The seven categories of neurodevelopmental disorders described in the DSM-5-TR are:

- Intellectual Developmental Disorders (IDD) (e.g., intellectual disability, Down syndrome, global cognitive delay, fetal alcohol syndrome, formerly referred to as “mental retardation”)
- Communication Disorder (e.g., speech, hearing, oral function disorders such as stuttering, audio processing disorder, language impairments)
- Autism Spectrum Disorder (ASD) (now inclusive of Asperger’s syndrome, high and low functioning autism under the umbrella of ASD)
- Attention-Deficit/Hyperactivity Disorder (now inclusive of attention deficit disorder, combined into a single diagnosis of ADHD with three

subcategories (a) primarily inattentive, (b) primarily hyperactive, and (c) combined)

- Specific Learning Disorder (e.g., impairments in reading, written expression, and/or mathematics, also referred to as dyslexia, dyscalculia)
- Motor Disorders (e.g., dyspraxia, developmental coordination disorder)
- Tic Disorders (e.g., Tourette's syndrome)
- Other and Unspecified Neurodevelopmental Disorders (disorders that impair social, occupational, and/or educational areas but do not meet specific criteria of any particular disorder)

Special Education in Context

The idea that children with disabilities were entitled to an education was not widespread in the United States prior to 1970. Millions of children were denied enrollment in public schools because of mental, physical, and emotional disabilities until that time (Weintraub et al., 1977). The battle for disabled individuals to gain the right to a public education occurred in local, state, and national legislative bodies in the United States (Martin et al., 1996). Between 1950 and 1975, local and state legislators began to piecemeal legislation that granted educational rights to people with disabilities, in addition to legal cases argued in the judicial system (Weintraub et al., 1977). In 1975, the US Congress passed The Education for All Handicapped Persons Act (EAHCA), which guaranteed a “free, appropriate, public education” (FAPE) for all children regardless of disability (Williams & Katsiyannis, 1998). This act was renamed in 1990 as the Individuals with Disabilities in Education Act (IDEA), and reauthorized with additional stipulations in 1986, 1990, 1997, and 2004 (Jones, 2015; Martin et al., 1996).

The term “appropriate education” has been open to interpretation by stakeholders but is loosely defined as an education that is “(1) related to the child’s learning capacity, (2) specially designed for the child’s unique needs and not merely what is offered to others, and (3) reasonably calculated to confer educational benefit” (Martin et al., 1996, p. 34). In addition to a FAPE, IDEA mandated that students have access to the general education curriculum in the least restrictive environment (LRE) (US Department of Education, 2023). The LRE clause led to the creation of Individual Education Plans (IEPs) for children identified or evaluated as having a disability covered under IDEA. An IEP is a written document that details the individual’s limitations and goals, and it is created in collaboration with parents, physicians, and educators (Lo, 2012). As a result of the stipulations present in IDEA, the field of special education evolved to meet the new responsibilities of public-school districts.

Special education is defined as “instruction that is designed specifically to respond to the learning needs of an individual with disabilities regardless of environment, whether in a classroom, home, or hospital” (Individuals with Disabilities Education Act, 20 U.S.C. § 1400, 1975). Though IDEA mandated that special education students have access to the general education curriculum in the LRE, before the 1990’s many schools struggled to meet that criterion (Damer, 2001; Handler, 2007). With subsequent revisions and reauthorizations of IDEA, greater emphasis has been placed on the now pervasive concept of “inclusion” of disabled students into general education classrooms (Bicehouse & Faieta, 2017). In addition to services for students, the EAHCA made provisions for ensuring that special education and general education teachers have access to training, as well as professional development for administrators to help them comply with the law

(Bicehouse & Faieta, 2017). The expectations for high quality teaching have only grown with the passage of the No Child Left Behind (NCLB) act of 2001, the reauthorization of IDEA in 2004 (Harvey et al., 2010), and the most recent reauthorization of NCLB, the Every Student Succeeds Act (ESSA, 2015). As trends in general and special education have evolved since the passage of IDEA in 1975, special education teacher education programs in higher education were designed to prepare teachers to best meet the needs of their students. (Blanton et al., 2018; Brownell et al., 2005; Lloyd & Hallahan, 2005).

Special Education Pedagogy and Teacher Education

Special Education Specialists. Special education teacher education programs evolved throughout the twentieth century, aided by the adoption of national and local policy (Weintraub et al., 1977). Before the reauthorization of IDEA in 1997 and the passage of NCLB in 2001, content area expertise was not highly emphasized in special education programs, instead favoring general pedagogy (Brownell et al., 2005). At the time of this writing, in order to become a special education teacher at a public school in the US, an individual must have a minimum of a bachelor's degree and a state-issued license which usually includes passing a general teaching certification test as well as a specific subject area test (Bureau of Labor Statistics, 2022). A special education teacher's undergraduate degree may be concentrated in special education, or it may be a general education or subject specific degree, depending on individual state requirements (Bureau of Labor Statistics, 2022). While teachers with general education can and often do teach students with disabilities, these students have higher achievement when their teacher has a special education certification (Feng & Sass, 2013).

General Teacher Education. Like special education teachers in public schools, general education teachers must have a minimum of a bachelor's degree in education or in a specific subject area in addition to a license granted by the state (Bureau of Labor Statistics, 2022). In response to the mainstreaming and inclusion initiatives set forth by IDEA (1997), NCLB (2001), and related research in the field, many teacher preparation degree programs now include components of special education within general education coursework to aid instructors in reaching all of their students, regardless of ability (Harvey et al., 2010). The current trend in pre-service preparation to teach students with disabilities is integration of general education with special education, though this is not always the case in practice (Hourigan, 2007).

Music Teacher Education. Music teachers in public schools have similar requirements for employment as special education and general education teachers. They must have a minimum of an undergraduate degree in music education and must pass state licensure exams in their subject area (Bureau of Labor Statistics, 2022). While trends in general education teacher education have been moving toward the integration of special education coursework within teacher preparation programs, music education programs have struggled to incorporate coursework for special education (Hourigan, 2007). Gfeller et al. (1990) found that in-service music teachers in Iowa and Kansas were expected to teach students with disabilities but had no preparation from either their higher education or from their administration. By 1998, states had begun to require elements of special education in the music education curriculum (Atterbury, 1998). Despite there being no requirement for special education coursework from NASM, as of the year 2000, approximately 80% of accredited music education degree granting institutions required at

least one special education course for music education majors (Colwell & Thompson, 2000). However, the same study revealed that the majority of the required special education courses were taught with a general education focus, and not with the unique needs of the music classroom taken into consideration.

Difficulty in implementing reforms in music education lies primarily in the course-intensive music education curriculum. This is partially due to the performance and subject matter requirements of the discipline (Hourigan, 2007; NASM, 2021). In addition to education and music education courses, music education students must become proficient on their instrument or voice, as well as taking core music classes alongside music performance majors (e.g., music theory, aural skills, music history, class piano). Including additional coursework focused on special education may present an onerous task for faculty members when revising music education curricula in higher education programs (Colwell & Thompson, 2000).

Salvador (2010) found that while consistency in special education offerings for music education majors was lacking, many music education programs had incorporated elements of special education in several different ways: making special education coursework available as electives, requiring special education courses as part of the degree program, and integrating special education components through existing music education courses (Hourigan, 2006; 2007). Such integrated experiences often manifest in the inclusion of special education topics as lectures and/or class activities/projects. In addition to instruction in university classroom settings, field experience opportunities have afforded music education students valuable exposure to individuals with disabilities in “self-contained special education classrooms” (VanWeelden & Whipple, 2007). Both

VanWeelden & Whipple (2007) and Hourigan (2008) found that field experiences within special education classrooms produced more positive effects on the outlook of music education students when compared with classroom instruction alone.

Professional Development for Practicing Teachers. In addition to programs in higher education preparing pre-service teachers to navigate the inclusion of students with disabilities, the burden of aiding in-service teachers falls largely on administrative support for professional development opportunities (Moshe, 2017). Though in-service training can be useful, multiple researchers found that the most successful special education teachers had inclusive experiences during their undergraduate and graduate education (Feng & Sass, 2013; Kisbu-Sakarya & Doeniyas, 2021). These findings present challenges for veteran teachers, who completed university teacher education programs *before* the initiatives of inclusion were pervasive in university degree plans across the US.

Piano Teacher Education

Music instruction in P-12 public schools adheres to curricular standards set forth by individual state departments of education, and thus reflected in music teacher education coursework that leads to state certification. Conversely, pre-college piano instruction has no such standardization. There is no degree requirement or state licensure necessary for piano instructors to teach private piano lessons. Piano instructors may choose which students they wish to teach, where and how they wish to teach, what areas of music content to focus on, and what materials to use. Private piano lessons may occur in individual or group settings, and they may take place in the student's or teacher's home, a rented studio space, online, or any other setting the entrepreneurial piano

instructor can make use of (Duke, 1997; Dumlavwalla, 2017). Unless they are part of a professional cooperative or institution, most private piano teachers need to engage in the recruitment of students in order to maintain a successful teaching studio (Wan, 2014). With a variety of methods for effectively teaching piano, tracking trends in instructional delivery for piano instructors is difficult.

Additionally, the level of education and preparedness to teach piano varies from one teacher to another, due to the unregulated nature of private piano lessons (Duke, 1997). The type of education that piano teachers receive is as varied as the types of contexts in which they may teach. While researchers have examined the types of degrees pianists obtain at the undergraduate and graduate levels (Fincher, 2020; Fu, 2007; Grausam, 2005; Gray, 1998; Johnson, 2002; Milliman, 1992), there is little published information regarding what education level active teachers in the field actually possess (Duke, 1997; Sumpter, 2008). Such a lack of information makes it difficult to determine the level of education of active piano instructors.

For pianists who choose to pursue higher education, there are many possible degree paths. Standard undergraduate offerings for pianists are in piano performance or music education, while some universities have niche offerings at the undergraduate level such as piano pedagogy or a more generalized liberal arts degree with a piano focus (NASM, 2021). Graduate programs often include options to major in performance, pedagogy, performance and pedagogy, and collaborative playing at both the master's and doctoral levels. Pianists graduating from these programs entertain a variety of career options, but many choose to teach private piano lessons (Cheng, 2016; Duke, 1997; Fredrickson, 2007; Gray, 1998; Sturm et al., 2000; Walker, 2008). Jiang (2022) found

that most students in piano performance degree programs intended to teach in some fashion. Besides music education and piano pedagogy concentrations, piano instructor education is not emphasized in degree programs in higher education (NASM, 2021), though most piano performance degrees include at least one pedagogy course (Johnson, 2002). Thus, even with the primary career goal of *teaching* piano, many graduates of applied piano degree programs have little to no education/pedagogy background. Additionally, NASM does not require any accredited programs to include components of special education instruction, though piano teachers are likely to encounter students with neurodevelopmental disabilities throughout their careers (Davis, 2019; Dumlavwalla & Bugaj, 2020; Martiros, 2012; Mullins, 2017; Ostrosky, 2023; Tracia, 2016). Given the wide variety of piano instructor backgrounds, both formal and informal, there is no standard method or “promising practice” for navigating teaching students with NDs for piano instructors.

Self-efficacy

Self-efficacy (SE) is a person’s belief in their own ability to choose actions that result in a desired outcome (Bandura, 1997). SE is the main construct resulting from psychologist Albert Bandura’s social cognitive theory (SCT)—a three part “reciprocal causation model” where a person’s behavior, characteristics, and environment are each inherently linked and predictive of the choices they will make (Bandura, 1977; 1986). When a person organizes the components of their behavior, characteristics, and environment, they are able to exercise control over the events that affect their lives (Van der Bijl & Shortridge-Baggett, 2001). A person’s perception of their efficaciousness at exercising this control is called SE (Bandura, 1977).

The level of an individual's SE indicates how successful they feel they will be in a particular endeavor. A person with a strong sense of SE will feel confident and successful, which in turn influences their desire to undertake challenges (Bandura, 2010). Conversely, a person with a weaker sense of SE will believe themselves to be incapable and unconfident in their abilities to achieve a certain outcome, viewing challenges as threats that should be avoided (Bandura, 2010). If a person doesn't possess a belief that they can make a difference with their actions, they have little motivation to become successful.

The construct of SE reflects an individual's *perception* of one's abilities rather than an objective assessment of those abilities (Bandura, 1986). Levels of SE are situation dependent, and a person may possess high SE in one area and low SE in another. "People differ in the areas in which they cultivate their efficacy and in the levels to which they develop it even within their given pursuits" (Bandura, 2006 p. 307). For instance, a pianist may have high SE for performance, but low SE regarding their teaching abilities. As a result, SE must be examined in a context-specific manner, rather than as part of person's inherent character.

Bandura theorized that SE is comprised of four domains, and that these sources culminate in a person's overall sense of SE (Bandura, 1997). The most impactful source of SE is enactive mastery experiences, which are a person's previous experiences completing a task, positive or negative (Hendricks, 2016). As a person gains successful experiences with a task their confidence grows, however the inverse is also true (Bandura, 1997). The other three domains are vicarious experiences (observing others completing a task), verbal persuasion (verbal feedback, positive or negative), and

psychological or affective states (the body's physical or emotional reaction to a situation). Each of these domains interact towards a person's holistic sense of SE, with enactive mastery experiences as the most influential (Hendricks, 2016; Regier, 2019; Tutt, 2019; Van der Bijl & Shortridge-Baggett, 2001).

SE has been studied in various disciplines, including psychology, health sciences, as well as education. Exploring SE in the context of education is particularly relevant for this inquiry. It has been examined in many areas of general education, including special education (e.g., Hopman et al., 2018; Jordan et al., 2019; Kisbu-Sakarya & Doenyas, 2021; Love et al., 2019; Park et al., 2016) and music education (e.g., Burak, 2019; Hendricks, 2016; Özmenteş, 2011; Prichard, 2017; Regier, 2019, 2021), but only minimally in the field of piano pedagogy (Chmurzynska, 2009; Ekinci, 2014; Klein, 2021). Learning about how piano teachers perceive their efficacy related to various professional responsibilities may be important for addressing gaps in piano teacher education and experience.

Need for the Study

With millions of children diagnosed with NDs in the United States alone (Zablotsky et al., 2019), it is important to learn how educators in the field navigate these teaching situations to determine how to better meet the needs of individual students. Piano teachers must learn when and how to adapt a lesson for a ND student (Dumlavwalla & Bugaj, 2020; Mullins, 2017). An increasing amount of research literature exists regarding the inclusion of students with disabilities in school music classrooms (e.g., Altun & Eyüpoğlu, 2018; Atterbury, 1998; Colwell, 2002; Cooper, 1999; Darrow, 1999; Darrow & Adamek, 2018; Gfeller et al., 1990; Gilbert & Asmus,

1981; Hammel & Hourigan, 2011; Hoffman, 2011; Hourigan, 2007; Salvador, 2010; Sideridis & Chandler, 1995; VanWeelden & Whipple, 2007), however there are comparatively few studies conducted in the field of piano pedagogy.

The self-efficacy of music educators teaching neurodevelopmentally disabled students in public schools has increased significantly in the years between 1990 and 2014, as special education coursework, field experiences, and professional development opportunities in special education became more commonplace in music education degree programs (Colwell & Thompson, 2000; VanWeelden & Whipple, 2014). The music educators in Grimsby's (2020) collective case study were eager for any training opportunities for teaching ND students in the music classroom. Similarly, findings from extant qualitative case studies in piano pedagogy showed that teachers believed that piano lessons should be available for students with disabilities, but they felt that their preparation to teach said students was insufficient (Martiros, 2012; Tracia, 2016). The participants in Mullins' (2017) collective case study felt that experience working with students with ADHD was more important than teacher training or professional development experiences.

Dumlavwalla & Bugaj's (2020) study investigated the tools, training, and resources applied string and piano teachers have at their disposal for teaching ND students and found that those with music education degrees were far more likely to have encountered special education training in higher education. Dumlavwalla and Bugaj's research represents the only published quantitative study related to the preparation of piano instructors in teaching neurodevelopmentally disabled students. This research highlights the discrepancies between the training needed for string pedagogy versus piano

pedagogy, demonstrating the need for an inquiry specific to piano pedagogy.

Additionally, in order to make generalizations to the field at large, a large sample is necessary for understanding the challenges faced by piano instructors of all education levels—a research approach that has not yet occurred within the field of piano pedagogy.

Purpose of the Study

The purpose of the study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with neurodevelopmental disabilities through the framework of self-efficacy. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with neurodevelopmental disabilities.

Research Questions:

1. Which neurodevelopmental disabilities do piano instructors have familiarity and experience with, and to what degree?
2. To what extent do piano instructors include students with various neurodevelopmental disabilities in their piano studios?
3. In what contexts do piano instructors learn to teach students with neurodevelopmental disabilities?
4. How confident and successful do piano teachers believe themselves to be in teaching students with neurodevelopmental disabilities?

Definitions of Terms

The following operational definitions were used in this study:

- Inclusion/Inclusive Education – In public school settings, inclusion refers to the placement of students with special support needs in general education classrooms,

where the academic and social needs of all students are met in the same classroom (Krischler et al., 2019). In piano lessons, inclusive teaching means that a piano instructor is willing to teach a student with special education needs.

- Neurodevelopmental Disability (ND) – The term neurodevelopmental disability refers to a disorder of the brain that manifests during childhood and that can impair “...personal, social, academic, or occupational functioning.” (APA, 2022) The term neurodevelopmental disability will be used interchangeably with neurodevelopmental disorder as both terms are used thusly in scientific literature.
- Piano Instructor – Since this research is focused on pre-collegiate piano instruction, the term piano instructor will refer to anyone who teaches private or group piano lessons in a pre-collegiate or recreational setting.
- Professional Development (PD) – Professional development is education or training designed to help individuals maintain or gain new skills after their initial education or training in a particular discipline (Parsons, 2022). PD is used in the field of education to aid in-service teachers in developing and maintaining the pedagogical tools needed to address students’ learning challenges (Mizell, 2010). Piano instructors may engage in PD via conference attendance, webinars, or through journal articles.
- Self-efficacy (SE) – Self-efficacy is a person’s belief in their own ability to choose actions that result in a desired outcome (Bandura, 1997).
- Special Education – Special education is “specially designed instruction” that meets the unique needs of children with disabilities (Individuals with Disabilities Education Act, 20 U.S.C. § 1400, 1975). In public education, special education

for individuals is mandated by the government. In private piano lessons, piano instructors may devise “specially designed instruction,” though it is not a legal mandate.

Delimitations

1. Study participants were limited to piano instructors who teach non-collegiate piano lessons. Participants who teach both collegiate and non-collegiate piano lessons will be allowed to respond, but they will be asked to refer to their non-collegiate teaching when choosing their responses.

CHAPTER 2: Review of Related Literature

Purpose of the Study

The purpose of this study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with neurodevelopmental disabilities. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with neurodevelopmental disabilities.

Neurodevelopmental Disabilities

Neurodevelopmental disabilities (NDs) are a broad category of disorders of the brain that manifest during a person's development (i.e., childhood) (APA, 2022). It is estimated that 15–17% of the US population is diagnosed with one or more ND (Boyle et al., 2011; Zablotsky et al., 2019). Symptoms of NDs may range from isolated differences in a particular aspect of social or cognitive ability but also can result in global impairments in executive function, intellectual ability, or social skills (APA, 2022). NDs can exhibit a range of severity, and clinicians make diagnoses based on the presented symptoms/behaviors in conjunction with the limitations on individuals' daily life (Thapar et al., 2017). It is common for many NDs to present in tandem with one another. For example, attention-deficit/hyperactivity disorder (ADHD) often presents with developmental coordination disorder (DCD); with approximately 50% of those diagnosed with ADHD also diagnosed with DCD (Puyjarinet et al., 2017).

Most NDs are caused by a combination of genetic, biological, psychosocial, and environmental factors, though NDs such as Down syndrome are the result of a chromosomal abnormality (APA, 2022; EPA, 2015). Environmental risk factors that increase an individual's chances of being affected by a ND include preterm birth or low

birthweight (Aarnoudse-Moens et al., 2009; Behrman & Butler, 2007; Bhutta et al., 2002), exposure to alcohol and/or tobacco in utero (Banerjee et al., 2007; Linnet et al., 2003), and exposure to contaminants such as lead, methylmercury, and PCBs (EPA, 2015; National Toxicology Program, 2012). In addition to environmental risk factors, NDs such as ADHD and autism spectrum disorder (ASD) have a strong hereditary link (Butler, 2017; Linnet et al., 2003; Mpoulimari & Zintzaras, 2022). While risk factors for NDs are complex and causes of NDs are not entirely understood, using what is known can help inform policymakers to mitigate risks where possible (EPA, 2013).

The Diagnostic and Statistical Manual of Mental Disorders (DSM). The DSM is a publication of the American Psychological Association widely considered to be the “gold standard” for diagnosing and categorizing neurodiversity (Horwitz, 2021). First published in 1952, the DSM has gone through five major revisions, with the most current edition (DSM-5) published in 2013 (APA, 2013). As paradigms shift, so do diagnostic criteria, necessitating the continual assessment of how mental disorders are diagnosed, treated, and classified (Greco, 2016). In addition to major rewrites of the text, there have been limited text revisions (TR) in between major editions, with the DSM 5-TR being the most recent revision at the time of this writing (APA, 2022).

Like the earlier editions, the DSM 5-TR was written by a cohort of clinicians, scientific researchers, and other stakeholders (APA, 2013). There were more than 160 members of the DSM-5 Task-force, with psychiatrists making up the bulk of contributors, and psychologists and other health professionals included at a lower frequency (APA, 2013). Within the manual, mental disorders are placed into large categories (e.g., neurodevelopmental disorders, bipolar and related disorders, trauma- and stressor-related

disorders, personality disorders) that are further classified down to the specific disorders where specific behaviors, symptoms, comorbidities, and treatment are described in detail for each individual disorder (APA, 2022). While controversy over the manual has existed since its inception in 1952, it remains the dominant diagnostic and educational tool for diagnosing and learning about mental disorders for clinicians, researchers, policy makers, and laypeople (Greco, 2016). Past controversies have involved the initial inclusion, and later exclusion of homosexuality as a disorder (Spitzer, 1981), as well as the current framing of conditions such as ASD and ADHD as “disorders,” instead of either disabilities or neurodiversities, which are preferred within advocacy communities and those in the education sector (Vidyadharan & Tharayil, 2019).

Classification of NDs in the DSM 5-TR

In the DSM 5-TR, NDs make up one of the large diagnostic classifications, accounting for disorders of the brain with onset during the developmental period (i.e., childhood) (APA, 2022). NDs result in “developmental deficits or differences in brain processes that produce impairments of personal, social, academic, or occupational functioning” (APA, 2022). The DSM 5-TR classifies NDs into seven major categories, divided by type of impairment. In addition to the seven categories, the DSM 5-TR includes an eighth category for “Other or Unspecified ND.” In this section, all of the criteria for a particular disorder (listed in the previous 7 categories) are not met, but impairments cannot be better explained by another disorder (APA, 2022). For all categories of NDs, symptoms and examples of behaviors are provided along with comorbidities and prevalence. The following sections detail the NDs as classified in the DSM 5-TR.

Intellectual Developmental Disorders (IDDs). These disorders include common disorders such as global cognitive delay, intellectual disability (ID), Down syndrome (DS), and fetal alcohol spectrum disorders (FASD). They are classed as disorders that affect and impair an individual's mental capacity and adaptive functioning (APA, 2022; Harris, 2013). Terminologies used during the first half of the twentieth century include imbecility, idiocy, and moronity, while the preferred term in scientific literature during the second half of the twentieth century was mental retardation (Harris & Greenspan, 2016). ID replaced mental retardation in all public literature and public institutions in the US in 2006 after the passage of Rosa's Law by the US Congress with goals of de-stigmatization (Public Law 111 - 256 - Rosa's Law, 2010). In the US, about 1 in every 100 children is diagnosed with ID (Maulik et al., 2011; Wittchen et al., 2011).

ID is classified by severity in four categories: mild, moderate, severe, and profound (APA, 2022). More than 85% of persons with an ID diagnosis fall within the mild category, while most diagnoses of severe to profound ID are the result of genetic conditions, like trisomy-21 (Down syndrome) (Patel et al., 2020). Individuals with mild ID have difficulty with academic tasks such as reading comprehension, mathematics, and written expression, though they are often able to reach a fourth or fifth grade academic level (Schalock & Luckasson, 2015), as well as manage household and self-care activities with support services (Patel et al., 2020; Schalock & Luckasson, 2015). Moderate cases constitute approximately 10% of all ID diagnoses; they affect individuals' abilities to acquire basic academic skills. Persons with moderate ID usually require ongoing support into adulthood but can live independently (Harris & Greenspan, 2016; Patel et al., 2020; Schalock & Luckasson, 2015). Individuals with severe and profound IDs may attain a

mental age of three to five years old and need substantial, ongoing support for their lifetime (APA, 2022; Patel et al., 2020). They are not able to live independently and often need full-time nursing care. Persons with severe and profound IDs may have limited capacity for verbal communication (Patel et al., 2020). IDs are covered under the Individuals with Disabilities Education Act (IDEA), and as such are entitled to special education and related services in public schools in the US (*Sec. 300.8 Child with a Disability*, 2018).

Communication Disorders. Communication disorders affect speech production, language processing, and/or communication (verbal and non-verbal) (APA, 2022). These disorders may impair speech, hearing, and oral motor function, and are often associated with other neuropsychiatric disorders such as autism spectrum disorder and selective mutism (Dattner & Ravid, 2018). The most common communication disorders are language disorder, central auditory processing disorder (where hearing is not impaired, but decoding of meaning from speech is), and childhood onset fluency disorder (stuttering) (APA, 2022; Dattner & Ravid, 2018). Individuals with speech or language disorders are entitled to protections and services under IDEA (*Sec. 300.8 Child with a Disability*, 2018).

Language disorder affects a person's ability to comprehend or produce elements of language such as vocabulary, grammar, and sentence structure (APA, 2022). In order to be classified as a language disorder, deficits cannot be caused by other NDs such as intellectual disability, or hearing impairment (APA, 2022). Language disorders may affect expressive (productive) and/or receptive abilities (APA, 2022; Sharp & Hillenbrand, 2008). For instance, an individual may be able to comprehend spoken

language, but not produce the speech sounds necessary to express it themselves, resulting in a speech disorder. The reverse may also occur, when a person has the physiological tools to create speech sounds, but where breakdowns in the auditory processing or comprehension exists (Sharp & Hillenbrand, 2008). There is evidence linking language disorders to learning disabilities such as dyslexia, where oral deficits may affect the ability to comprehend written language in addition to spoken language (Snowling & Stackhouse, 2006). Because this link is evident in approximately 50% of individuals with dyslexia, it can be challenging for teachers and clinicians to discover where and how the disability lies (Bishop & Snowling, 2004).

Autism Spectrum Disorder (ASD). ASD is characterized by social communication deficits and “repetitive sensory-motor patterns of behavior, interests, or activities” (APA, 2022). Impairment in three domains is typically present: (1) communication, (2) social interaction, and (3) stereotypic repetitive behaviors (Genovese & Butler, 2020). When it was first described as autism in 1943, there was a great stigma associated with the disorder, where individuals would often be institutionalized for most of their lives (Lord et al., 2018; Wolff, 2004). Understanding of the disorder has improved greatly since the early 20th century, and many individuals now lead normal lives within their communities, instead of in institutions (Lord et al., 2018; Wolff, 2004).

The autism spectrum is wide and the effects on people with the disorder can vary from mild to profound (APA, 2022). Non-verbal communication is often difficult for people on the autism spectrum to decode, and routines and repetitive behaviors are all characteristic of ASD (Lord et al., 2018). ASD has many potential comorbidities, and often presents alongside intellectual disability, language disorders, motor disorders,

ADHD, and other psychiatric conditions such as major depressive disorder and anxiety disorders (Hollocks et al., 2019). Asperger's syndrome, high or low functioning autism, infantile or childhood autism are all among historical diagnoses that would now fall under ASD (APA, 2022). Asperger's and high/low functioning autism remain in use informally, but are no longer utilized in scientific literature or clinical settings (Oberman & Kaufmann, 2020).

Prevalence of ASD has been estimated to be between 1–3% of the US population (Christensen et al., 2019; Xu et al., 2018). Disparities in diagnosis exist based on race, ethnicity, and gender, with fewer diagnoses in African American or Latinx individuals (Constantino et al., 2020). In addition to ethnoracial disparities, Loomes et al. (2017) has estimated the male:female ratio of ASD diagnoses is 3:1, resulting in a diagnostic gender bias where girls and women who meet the diagnostic criteria for an ASD diagnosis being at risk for not receiving a clinical diagnosis (APA, 2022; Loomes et al., 2017).

Attention Deficit/Hyperactivity Disorder (ADHD). ADHD is the most prevalent neurodevelopmental disability, with 8.4% of children aged 2–17 diagnosed with the disorder as of 2016 (Danielson et al., 2018; Ercan et al., 2022). It is characterized by “persistent patterns of inattention and/or hyperactivity that interferes with functioning or development” (APA, 2022). There are two types of presentation for ADHD: inattentive and hyperactive/impulsive. The inattentive type may casually be referred to as Attention-Deficit Disorder, or ADD, though ADD has not been recognized in the DSM since 1987 (Epstein & Loren, 2013). It is possible to primarily align with one type or the other, or to exhibit symptoms of both. The inattentive variety is characterized by careless mistakes in assignments or schoolwork, disorganization, inability to keep

track of one's belongings, and forgetfulness. Individuals with the hyperactive type of ADHD present behaviors such as fidgeting, inability to remain seated, excessive talking, as well as the tendency to interrupt or take over another person's activities (Center for Disease Control, 2022). These are the symptoms associated with ADHD that make scholastic success (and later, professional success) difficult to achieve for those with this disorder (Galéra et al. 2012).

ADHD has many common comorbidities with NDs and other psychological disorders (APA, 2022). Possible reasons for the substantial overlap of many neuropsychiatric disorders and ADHD is that disorders may share a genetic or environmental cause or that one disorder may be an early presentation of another (Sadek, 2014). Anxiety and depression are common comorbidities with ADHD, with a lifetime prevalence of 33–50% anxiety comorbidity, and 26–45% depression comorbidity (Sadek, 2014). Developmental Coordination Disorder (DCD) overlaps with ADHD at a rate of 50% (Puyjarinet et al. 2017). ASD and ADHD are common comorbidities with 78% of individuals with ASD diagnoses receiving public mental health support meeting criteria for an ADHD diagnosis as well, but only 13% of those with ADHD being diagnosed with comorbid ASD (Antshel & Russo, 2019; Brookman-Frazee et al., 2018).

A relevant symptom of ADHD for musicians is a deficit in temporal awareness, or how the passage of time is experienced. Such a symptom is the result of the overlap of neural networks needed for processing temporal duration and the part of the brain affected by ADHD (Slater & Tate, 2018). Temporal deficits are often framed in terms of procrastination or being late for events, rather than how one perceives time in a micro-sense. However, the effects of this deficit have been extrapolated to students' rhythmic

abilities, and their capability to become rhythmically entrained to different durations of sound (Carrer, 2015; Puyjarinet et al., 2017; Slater & Tate, 2018). The results of one study suggest that this impairment affects roughly 70% of those diagnosed with ADHD (Puyjarinet et al. 2017). This has obvious implications for teaching music, which necessitates multi-modal processing of sound and pitch in time.

Specific Learning Disorder (SLD). Learning disorders (LDs) affect the acquisition of skills in academic areas, primarily affecting reading, writing, and math (Moll et al., 2014). In contrast with ID where deficits are holistic, LDs do not necessarily involve cognitive impairments. SLDs may be diagnosed specific to reading, math, or written expression but may also be diagnosed using alternative terminology such as dyslexia (affecting word recognition), dyscalculia (affecting numerical processing), dysgraphia (affecting written expression), and dysnomia (affecting word recall) (APA, 2022; Draper, 2022; Maricle, 2011). An individual with a SLD is entitled to special education services under IDEA (*Sec. 300.8 Child with a Disability*, 2018), though many individuals with SLDs do not need these services (Moats & Dakin, 2014).

The most common SLD is in reading or dyslexia (APA 2022). While the effects of SLD in reading can vary greatly between individuals, typical difficulties include word recognition, reading fluency, spelling, and writing (Moats & Dakin, 2014). In addition to skills of reading comprehension, a person with SLD in reading may have a slower verbal processing speed than an unaffected individual (Moll et al., 2014; Nukari et al., 2020). Common learning strategies for those with SLD in reading include allowing the student extra time to complete assignments, creating individualized sequential, methodological

approaches for reading, as well as technological aids, such as audiobooks or word processing programs (US Department of Health and Human Services, 2018).

Motor Disorders. Motor disorders impair an individual's abilities to move fluently and in a coordinated manner. The most common motor disorder is developmental coordination disorder (DCD), which affects motor skills to the point of interfering with social and academic success (Blank et al., 2019). Both fine and gross motor skills may be affected, as well as hand-eye coordination. Pianists with DCD struggle to accurately and precisely regulate their fine motor movements in their fingers, and often develop extreme tension in hands and wrists to compensate for the lack of control (Tseng et al., 2022). Despite this symptom, piano training has been shown to be an effective tool to help develop fine motor skills for those with DCD (Lampe et al., 2015). ADHD and DCD are common comorbidities, with approximately 50% of those with ADHD also presenting symptoms of DCD (Dewey et al., 2002).

Tic Disorders. "A tic is a sudden, rapid, recurrent, nonrhythmic motor movement or vocalization" (APA, 2022). Motor tics can take many forms including rapid blinking, eye-twitching, tensing of muscles, and more complex movement like tapping. Vocal tics may be words, grunts, chirps, and throat clearing, with many other variations (APA, 2022; Kurlan, 2010). Tourette's syndrome is a common tic disorder characterized by chronic vocal and/or motor tics (Kurlan, 2010). Even though tic disorders often have a motor component, purposeful movements are not typically affected. People with Tourette's have become surgeons, professional athletes, and professional pianists (Neuner et al., 2012).

Twice Exceptional (2e)

Twice exceptional (2e) students are students with disabilities who are also gifted (Amran & Majid, 2019; King, 2022). 2e students may be difficult to identify partially because the giftedness masks the disability; or the converse—where the disability masks the student’s giftedness (Amran & Majid, 2019). For instance, an individual may create strategies to compensate for deficits until complexity of the task outstrips the coping mechanism (National Joint Committee on Learning Disabilities, 2011). According to extant literature at this time, the most common NDs associated with giftedness are Learning Disorders, ADHD, and ASD (Foley Nicpon et al., 2011; Foley-Nicpon & Teriba, 2022). While many 2e students receive services under IDEA due to its federal mandate, programs and services for gifted students are left to individual state departments of education (Foley-Nicpon & Teriba, 2022).

Education for Individuals with Neurodevelopmental Disabilities

As psychiatrists and psychologists made advances regarding understanding of neuropsychiatric disorders during the twentieth century, advocacy for inclusion of individuals with disabilities both mental and physical in educational settings increased (Skiba et al., 2008). At the time of this writing, many local, state, and federal laws protect disabled individuals’ rights to a free and appropriate public education (FAPE), which includes access to the general education curriculum in the least restrictive environment (LRE) (Francisco et al., 2020; Williams & Katsiyannis, 1998). Due to these laws, most teachers in public schools will have contact with students receiving special education services, including special education specialists, general education teachers, and special

subject area teachers (e.g., music teachers, physical education teachers, visual art teachers).

The History of Special Education in the US. Special education in the US began in the early to mid-nineteenth century (1800–1860), as advances in science, psychology, as well as philosophical enlightenment led to reforms in attitudes and treatment of disabled individuals (Spaulding & Pratt, 2015). Spaulding and Pratt (2015) refer to this as the “Early Reform” period, where attitudes shifted from thinking of disabled individuals as deviant and deserving of abuse or cruel treatment to individuals with illnesses. The second era of the history of special education occurred from 1860–1950, and occurred the same time as the burgeoning public school system that mandated compulsory education for all states (Frizzell, 2018; Horn & Tynan, 2001). However, compulsory education did not apply to children with disabilities, and most disabled students were not admitted to public schools (Bain De Los Santos & Kupczynski, 2019; Weintraub et al., 1977), often either being hidden by their families due to shame, or institutionalized (Bicehouse & Faieta, 2017; Frizzell, 2018). Due to the exclusion of individuals with disabilities from public life and education, Spaulding and Pratt (2015) used the term “Stagnation and Regression” to describe the second era of special education history. Many educators did not believe that public schools were appropriate for students with disabilities during this era, believing that these students would be too difficult to teach, or present disruptions in the classroom (Nelson, 2018; Spaulding & Pratt, 2015).

The era of “Contemporary Reform” began in 1950 and continues to the present day, marked by massive shifts in attitudes towards disabled individuals as well as major advances in the diagnosis and treatment of mental disorders (Spaulding & Pratt, 2015;

Winzer 1993). This era coincides with the first publication of the DSM in 1952 (APA, 1952). In addition to scientific advances, parents of individuals with disabilities formed advocacy groups to change perceptions about people with disabilities as well as to adopt legislation in support of individuals with disabilities (Spaulding & Pratt, 2015). This post-WWII era saw societal shifts away from Eugenics practices, as well as the Civil Rights era—both of which had a profound effect on attitudes regarding people with disabilities (Skiba et al., 2008; Spaulding & Pratt, 2015).

Between 1950 and 1975, local and state legislators (as well as the courts) began to piecemeal legislation that granted educational rights to people with disabilities in the United States (Weintraub et al., 1977). The watershed moment for this movement came in 1975 when Public Law 94-142 (1975), called The Education for All Handicapped Children Act (EAHCA) was passed by the US Congress. The law required all public schools in the US to educate all children, regardless of mental or physical disability, and required all children to have access to a FAPE. (Bain De Los Santos & Kupczynski, 2019; US Department of Education, 2023). Schools had an obligation to identify and evaluate students that needed special education services, and provide them with appropriate resources, ensuring that disabled students had “rights to the same access and opportunities as their peers without disabilities” (Francisco et al., 2020, p. 6). In addition to a FAPE, the law stipulated that students with disabilities must have access to the general education curriculum in the least restricted environment (LRE) possible (Frizzell, 2018; Skiba et al., 2008). Before the passage of EAHCA, special education classes were typically completely isolated from the general education curriculum (Hicks-Monroe, 2011). However, despite the provision for the LRE within the EAHCA, special education

students were frequently segregated from their normally developing peers without access to the general curriculum, even if the disability was not severe (Handler, 2007; Petersen, 2016). Hicks-Monroe (2011) refers to this as the “integration phase,” where, in order to satisfy the LRE stipulation, the practice of “mainstreaming” occurred. Special education students would attend specified classes within the general education curriculum alongside typical students—most often music, physical education, and art classes (Damer, 2001). Music, physical education, and art classes were viewed as the simplest way to include students with special education needs in the general education community. This “inclusion” phase began in the 1980’s, with greater acceptance of special education students as being deserving attending classes with their neurotypical peers (Hicks-Monroe, 2011).

The EAHCA law was renamed the Individuals with Disabilities in Education Act (IDEA), and reauthorized with additional stipulations in 1986, 1990, 1997, and 2004 (Jones, 2015; Martin et al., 1996). Other revisions to IDEA have continued to occur, without full scale reauthorization—the most recent revision written in 2017 (US Department of Education, 2023). An important addition to the reauthorization of IDEA in 1990 was the implementation of Individual Education Plans (IEPs) for all students receiving special education services. (Frizzell, 2018; Skiba et al., 2008; Spaulding & Pratt, 2015). In addition to granting greater access to the general education curriculum, the creation of IEPs for students identified as being eligible to receive special education services enabled parents, clinicians, teachers, and administrators to collaborate in tailoring educational goals to each individual’s unique needs (Bain De Los Santos & Kupczynski, 2019; Bicehouse & Faieta, 2017; Lo, 2012). The disabilities covered under

IDEA as of 1990 are learning disabilities, speech or language impairment, intellectual disability, emotional disturbance, autism, hearing impairment, visual impairment, deaf-blindness, orthopedic impairment, traumatic brain injury, other health impairment, multiple disabilities, and developmental delay (Bicehouse & Faieta, 2017). Additionally, circuit courts ruled in 1991 that individuals with ADHD and ADD are eligible for special education services under IDEA, as well as preschool-aged children with any of the above disabilities (Horn & Tynan, 2001).

The passage of the EAHCA, and later IDEA, has ensured that millions of children receive special education services, with ever increasing numbers of students served. After initial passage in 1975, IDEA has served approximately 3.5 million children, with numbers growing steadily through the next 40 years to a recent count of nearly 8 million children during the 2018/19 school year (US Department of Education, 2023). The drastic increase is not only attributed to growth in the general population, but also to additions of disorders covered under IDEA over time (e.g., the addition of autism and traumatic brain injury in the 1990 reauthorization) (Bicehouse & Faieta, 2017; Horn & Tynan 2001). The increase of students in need of services necessitates more teachers (US Department of Education, 2023), as well as bringing visibility to disabled students now included in general education classrooms more than ever before (Hicks-Monroe, 2011). Successful inclusion has led to improvements in the lives of individuals with disabilities, especially in terms of improved academic and social gains for special education students, as well as helping typical students develop a positive attitude towards individuals with disabilities (Begeny & Martens, 2007).

Music Therapy in Special Education Settings. Music therapy (MT) is a field in the behavioral sciences in which practitioners aid individuals in accomplishing therapeutic goals through the use of music. Music therapists use clinical and evidence-based musical interventions in many different contexts, helping clients with physical and mental impairments (American Music Therapy Association, 2023). While there is often overlap between MT and music classes/lessons, the goals of MT are typically therapeutic in nature, as opposed to traditional music education, where the goals are to learn a musical skill (Michel, 1985).

While music therapists are typically not employees of public schools, music therapy services may be provided under IDEA as part of the school day when a student's IEP indicates a need for music-related services (American Music Therapy Association, 2021; US Department of Education, 2010). MT sessions may occur in small group or individual settings, where the therapist uses music to support IEP goals such as speech or movement. A music therapist may also consult with special education teachers, general education teachers, and music teachers, aiding them in the development of strategies for effectively using music to help students achieve academic, social, and behavioral goals (American Music Therapy Association, 2021).

Special Education Students in the Music Classroom. Due to the requirements of IDEA, students with disabilities are entitled to participate in music classes and ensembles with their peers, if their disability allows (Damer, 2001). This means that students with IEPs are participating in general music classes as well as music ensemble-centric music courses at the elementary, middle, and high school levels (Darrow, 2017; Hoffman, 2011). The LRE stipulation led to the process of “mainstreaming” students into

general education classes as much as possible; however, before the 1990's special education students were often segregated into special education classrooms in their core academic subjects while “mainstreamed” into music, physical education, and art classes (Damer, 2001).

From the implementation of EAHCA onward, research in special music education has shown that music teachers are continually expected to teach students with a wide range of disabilities, regardless of training, preparation, or classroom support (Atterbury, 1998; Cooper, 1999; Frisque et al., 1994; Gfeller et al., 1990; Gilbert & Asmus, 1981; Shehan, 1977; Shelfo, 2007; Sideridis & Chandler, 1995). A study published soon after the implementation of EAHCA showed that 76% of Ohio school districts practiced mainstreaming in their music classes, while only 6% of districts practiced mainstreaming throughout the entire curriculum (Shehan, 1977). Additionally, Shehan (1977) found that the most common disabilities found in Ohio music classrooms were educable mental retardation, learning disabilities, emotional/behavioral disturbances, physical handicaps, and hearing or visual impairments. These findings were similar to a 1981 nationwide survey of elementary and secondary general music and choral/instrumental ensemble teachers, where music teachers were asked about their familiarity with new legislation regarding disabled students, as well as the extent of their involvement in teaching disabled students (Gilbert & Asmus, 1981). Out of 789 responses, approximately 90% of general music teachers reported teaching disabled students in mainstreamed classes, while ensemble teachers reported lower numbers—60.5% of choral instructors and 55.8% of instrumental instructors reported having taught disabled students in their classes (Gilbert & Asmus, 1981). In a study of music teachers ($N = 233$) in New Jersey, Cooper

(1999) also found that although mainstreaming occurred across all types of music classes/ensembles at the elementary and secondary level, students with disabilities were more likely to participate in general music classes (44.6%) than in choral (7.7%) or instrumental (24.9%) ensembles. In all studies surveyed, there was a gap between the expectations of teachers to teach students with disabilities and their level of preparation (Atterbury, 1998; Cooper, 1999; Frisque et al., 1994; Gfeller et al., 1990; Gilbert & Asmus, 1981; Shehan, 1977; Shelfo, 2007; Sideridis & Chandler, 1995). More recently, Hoffman (2011) studied the rates of participation of disabled students in instrumental performing ensembles in Idaho, Mississippi, Nebraska, Nevada, New Mexico, and Rhode Island, finding that 6.8% of all instrumental ensemble students were receiving special education services, and that 97% of teachers surveyed ($N = 166$) were teaching students with disabilities at the time, while only 42% had any formal special education training (Hoffman, 2011).

Special Education in Music Teacher Education

Given the mandate for inclusion of students with mental and physical disabilities into the school classroom, the issue of teacher preparation becomes an important area of study. Preparation to teach in public schools typically requires pre-service coursework in pedagogy and the content area, as well as practicum experiences in the field (Conway, 2022; Flores, 2016). However, preparation to teach music to students with disabilities is inconsistent and outside of the curricular standards for music teacher education (NASM, 2021; Nixon May et al., 2020). Despite the lack of mandate, preparing music teachers to teach special education students has been explored by researchers in music education with regard to music teacher attitudes towards mainstreaming and inclusion (Atterbury,

1998; Darrow, 1999; Gfeller et al., 1990; Gilbert & Asmus, 1981; Sideridis & Chandler, 1995; VanWeelden & Whipple, 2007) as well as teacher education for mainstreaming/inclusion in music classes (Atterbury, 1998; Colwell & Thompson, 2000; Cooper, 1999; Frisque et al., 1994; Gilbert & Asmus, 1981; A. Hammel & Hourigan, 2011; A. M. Hammel & Gerrity, 2012; Heller, 1994; R. Hourigan, 2007a, 2007b, 2009; Linsenmeier, 2004; Salvador, 2010; VanWeelden & Whipple, 2007).

Special Education Course Offerings in Music Teacher Education Programs.

Soon after the passage of EAHCA in 1975, Shehan (1977) examined the status of mainstreaming in music classes in Ohio school districts, concluding that music teacher education programs needed to address teaching music to exceptional students in order to meet the growing needs of students entitled to special education services. Still, at the time of this writing, there is no requirement for pre-service music teachers to take any special education courses from the either National Association of Schools of Music (NASM) or from individual state's department of education licensing bodies (NASM, 2021; Nixon May et al., 2020). Although NASM suggests that students may take a special education course as a portion of the "Professional Education" course sequence, it does not explicitly require it (NASM, 2021, p. 120).

Despite the lack of explicit requirements for special education coursework for pre-service music teachers, out of 109 NASM-accredited institutions surveyed, 29.6% required a special education course for undergraduate music education majors, 38.9% made a special education course available but not required for undergraduate music education majors, and 59.8% purposefully included special education components throughout their coursework (Salvador; 2010). A replication and expansion of this study

was published in 2021 to include not only preparation to teach exceptional learners, but diverse learners of all kinds including those with different cultural backgrounds (Culp & Salvador, 2021). In the updated study, 529 NASM accredited institutions were contacted, and programs included graduate music education degrees as well as undergraduate degrees (bachelor's $n = 519$; master's $n = 215$; doctoral $n = 50$), with 156 usable responses (bachelor's $N = 156$, master's $n = 85$, doctoral $n = 29$) (Culp & Salvador, 2021). The authors found that 10.2% of graduate programs required a course on teaching exceptional learners, while 20.5% of undergraduate programs made a special education course available but not as a requirement. For undergraduate music teacher education programs, 36.5% of institutions surveyed required a special education course, and an equal number of programs made a course available without requiring one. In addition to quantitative data, this study also utilized qualitative data, which allowed the researchers to examine the wide variety of ways pedagogy for diverse learners was incorporated at the program level as well as the individual instructor level (Culp & Salvador, 2021). Findings indicated that special education content integration occurred in both undergraduate and graduate music teacher education programs, albeit inconsistently. Approximately 62% of undergraduate and 39% of graduate programs engaged in integration of diverse learner pedagogy in four ways, (a) throughout all coursework, (b) fieldwork and guest experts, (c) in one course or less, and (d) structural integration at the program level (Culp & Salvador, 2021). The consistency of integrating diverse learner pedagogy (including special education topics) was that integration of said topics often relied on a single instructor and was not codified at the program level. The largest issue

(as presented by the authors) was that 44% (undergraduate) and 69% (graduate) of programs did not offer music-specific special education coursework.

Field Experiences. Field experiences for pre-service teachers are an important, but often overlooked aspect of learning to teach music to students with disabilities. VanWeelden and Whipple, (2005) investigated the effects of field experiences on music education majors' perceptions of music instruction for students with disabilities, finding that field experiences were the most important component in fostering a positive attitude regarding both the ability to teach students with special education needs as well as positive attitudes about people with mental and physical disabilities. Hourigan (2007) examined field assignments with pre-service music education students teaching students with disabilities and found that a hands on, longitudinal experience (one semester) provided pre-service teachers with multiple opportunities to reflect, develop strategies under the guidance of an in-service teacher, and improve their attitudes and confidence regarding teaching students with disabilities. Hourigan replicated this study in 2009 and reported similar findings.

Piano Teacher Education. Like music teacher education programs in the US, degree programs in applied piano in higher education may vary widely in their course offerings (NASM, 2021). Despite the variance between institutions and across different degree types (e.g., piano performance, piano pedagogy, collaborative piano), most undergraduate and graduate degree programs in piano require at least one course in piano pedagogy (Grausam, 2005; Johnson, 2002). Individual piano pedagogy instructors may structure the course however they wish, and as a result offerings are inconsistent as to what concepts are covered within the course. That said, many piano pedagogy courses do

share common threads of major areas that are typically covered (Elgersma, 2012). These topics include pre-school methods, beginning methods, adult/hobby methods, teaching literature, selecting teaching repertoire, studio management, lesson planning, teaching philosophy, learning theories, group teaching, teaching technical skills, music technology, and the history of piano pedagogy (Johnson, 2002; Milliman, 1992).

Previous researchers (Cheng, 2016; Elgersma, 2012; Grausam, 2005; Johnson, 2002; Milliman, 1992) did not report pedagogy for students with mental or physical disabilities as topics within undergraduate piano pedagogy courses

Professional Development (PD) for Music Educators. Ongoing PD in regard to teaching special education students has been beneficial to general education teachers, especially when the PD offerings align with teachers' content area of expertise (Petersen, 2016). Given that only 44% and 69% (undergraduate and graduate, respectively) of special education coursework was available to music education majors (Culp & Salvador, 2021), the need for music-specific PD is ever more important. PD for music and arts disciplines is important for in-service music educators to understand how their classes fit into the LRE for students with special education needs (Hammel & Hourigan, 2011).

The types of PD offered can play a role in how effective in-service music educators believe themselves to be. Short-term experiences such as single-day school or district-wide in-service days and instruction not related to music have been viewed as ineffective by in-service teachers (Hammel & Gerrity, 2012). In-service music teachers valued PD when it included opportunities for informal interaction with peers, long-term experiences, leadership opportunities, and interaction between student teachers and administrators (Conway et al., 2005). Hammel & Gerrity, (2012) explored the perceived

effectiveness of PD for music teachers teaching for inclusion in their classes and found that after engaging in PD for music special education, teachers rated themselves as being more competent, more aware of students' needs, more aware of their personal role, and having better classroom management.

Research in Special Education in Piano Pedagogy

The passage of EAHCA signaled a shift in educational policy, which forced public schools to open their doors to students of all abilities. This legislation as well as its subsequent reauthorizations has been the catalyst for almost 50 years of research regarding the inclusion of exceptional students into music classrooms. Because the field of piano pedagogy lies outside the purview of such legislation, research in this area has lagged significantly. At the time of this writing, there are no extant studies regarding the prevalence of students with NDs taking piano lessons. There are few studies examining the educational opportunities in special education for piano instructors. Those that do exist are qualitative case studies, and by their methodological nature, reflect a narrow scope of generalizability (Martiros, 2012; Mullins, 2017; Tracia, 2016).

Researchers of each of the three case studies on special education in piano pedagogy examined elements of piano instructors' perceptions of teaching students with a range of disabilities. Martiros' (2012) qualitative multiple case study explored piano instructors' perceptions of their abilities to teach students with mental and physical disabilities. With eight participants, interviews provided the bulk of the data, but observations of teaching also were used. All participants in this study believed that individuals with disabilities should have access to piano instruction, but they felt unconfident in their ability to teach such lessons due to lack of experience and education.

A similar study was conducted by Tracia (2016), who examined the experiences of three piano teachers who taught lessons to at least one student with mental or physical disabilities. The findings from this study were similar to Martiros (2012), in that each participant had a positive view of teaching students with disabilities, despite citing a lack of preparation or training to do so. Mullins (2017) focused on piano instructors' experiences in teaching students with ADHD, as well as instructors' training and promising practices. Using interviews as the data collection tool, Mullins (2017) found that the six teachers who responded viewed gaining knowledge about teaching students with ADHD through coursework, professional development, or reading journal articles as being important to their success with their students. However, participants from both Mullins' (2017) and Tracia's (2016) studies viewed experience as a more important source of success and confidence when teaching students with disabilities—supporting mastery experience as the most influential factor in self-efficacy (Bandura, 1997).

Despite the lack of empirical data concerning the prevalence of students with disabilities enrolled in piano instruction, or how piano instructors learn to teach said students, as well as the perceptions on how successful piano instructors believe themselves to be at teaching disabled students, there are indications within the field that this type of teaching is important and worth studying. For instance, the two major national conferences on piano pedagogy—the MTNA National Conference (MTNA.org) and the National Conference for Keyboard Pedagogy sponsored by the Frances Clark Center (Pianoinspires.com)—each provide an “inclusive teaching” track, dedicated to professional development and teaching strategy sessions on pedagogy involving students with mental and physical disabilities. The demand for these conference sessions

combined with the many extant webinars and practitioner articles for inclusive teaching subject matter demonstrate that like music teachers in public education, piano instructors are in need of resources to aid in their teaching of students with disabilities.

Self-efficacy

Self-efficacy (SE) is a person's belief in their ability to choose actions that result in achieving specific goals (Bandura, 1997). As the central construct in Bandura's social cognitive theory, SE plays an important role in an individual's decision making, agency, and choices made in all situations (Bandura, 1982). A person with high SE has a strong belief in their ability to be successful, viewing challenges as opportunities for mastery, while a person with low SE views challenges as threatening obstacles that highlight skills they lack (Bandura, 2010). A high sense of SE has been correlated with higher achievement and effectiveness than a low SE (Schwarzer, 1998), and is the most "...powerful influence on both the initiation of a behavior and persistence in the face of frustration or failure" (Maddux & Stanley, 1986, p. 250).

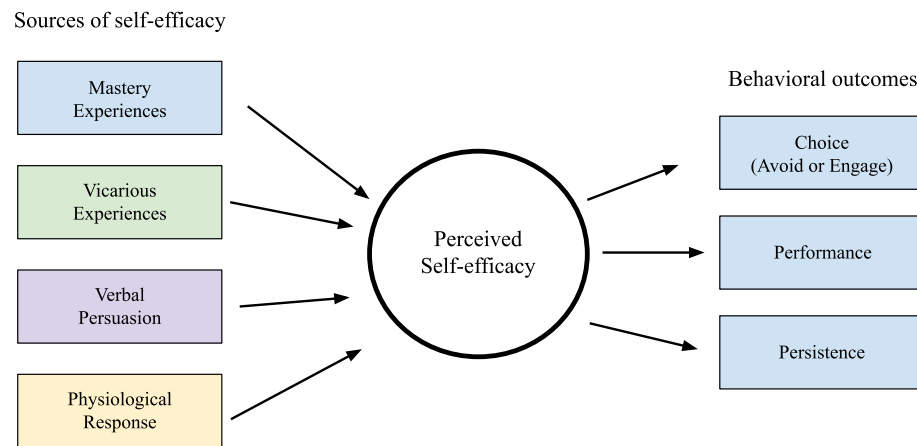
SE is different from self-esteem in that levels of SE are situation-dependent. Similarly, SE reflects a person's perceived ability to reach specific goals, where self-esteem mirrors one's perception of their overall self-worth (Pajares, 1996). SE is adaptable, meaning that a person's levels of SE in a given situation may change based on the positive or negative experiences they have doing a particular activity (Bandura, 1982). It is easier for children and young adults to develop greater SE, as they are less likely to have a fixed mindset, although adults who possess a growth mindset can increase their sense of SE (Dweck, 2016; Regier, 2019).

Sources of Self-efficacy

According to Bandura (1997), there are four sources of a person's SE: (1) mastery or enactive experiences (performing accomplishment), (2) vicarious experience (modeling or observation), (3) social persuasion (verbal feedback, positive or negative), and (4) physiological factors (the body's physical or emotional reaction to a situation) (Bandura, 1997). These sources contribute to the positive or negative belief in one's ability to be successful in a particular endeavor, and in turn influence the choices, behaviors, and performance of an individual. (See Fig. 2.1, adapted from Richardson, 2019).

Figure 2.1

Sources of Self-efficacy



Note. This diagram was adapted from Richardson in 2019 summarizing the four sources of self-efficacy. From “Developing Self-efficacy in the Physics Classroom through Hands-on Projects,” by A. Richardson, 2019, *AIP Conference Proceedings*.

Mastery or enactive experiences have been shown to be the most influential of the four domains in contributing to a person's sense of SE (Bandura, 1997; Maddux & Stanley, 1986; Pajares, 2002). Successes build belief in one's sense of efficacy, while failures undermine it (Bandura, 1997, p. 80). The impactful nature of mastery experience—as compared to vicarious experience, verbal persuasion, and physiological arousal—have been demonstrated by Bandura (1977), but also by other researchers (Burak, 2019; Klein, 2021; Regier, 2019). An example of this type of enactive experience is a field placement under the guidance of mentor teachers as seen in Hourigan's 2007 and 2009 study regarding field placements for music education majors with students with special education needs. Guided enactive experiences are important for helping to create and strengthen SE beliefs in pre-service educators so they may develop strong beliefs in their abilities to achieve positive outcomes in challenging situations, thus creating positive outcomes for students at all ability levels.

Self-efficacy in Education

While the ubiquitous nature of SE means that it can apply in all disciplines involving human behavior, it has been studied extensively in the field of education (Ashton et al., 1982; Dembo & Gibson, 1985; Tschannen-Moran & Hoy, 2001; Woolfolk Hoy & Davis, 2006). A teacher's efficacy belief is their belief that their actions and abilities can produce desired results from their students (Armor, 1976; Bandura, 1977; Tschannen-Moran & Hoy, 2001). The importance of teachers developing a high sense of SE cannot be overstated, as several studies have shown a strong correlation with a teacher's sense of SE and the achievements of their students (Dembo & Gibson, 1985). In a 1976 study of reading teachers in Los Angeles, findings showed that where teachers

held greater beliefs in their SE, the higher their students achieved (Armor, 1976). Ashton et. al (1983) found that teachers with high SE maintained high academic standards, developed a warm and welcoming classroom environment, and that their students' achievement test scores were higher than students of teachers demonstrating low SE scores in their pedagogical abilities. Additionally, special education teachers with higher SE were more likely to try different methods to reach their individual students, as well as be more confident and enthusiastic about teaching (Allinder, 1994).

Self-efficacy in Special Education. Because the skillset for teaching neurotypical students and neurodivergent students is different, SE for teaching students with disabilities has been studied separately from general education. Differences exist between how general and special education teachers view the implementation of inclusion in their classrooms, largely due to the lack of pre-service experiences in their degree coursework. Thus, general education teachers tend to display lower levels of SE as compared to teachers with degrees and certifications in special education pedagogy (Kilanowski-Press, Foote, & Rinaldo, 2010; Kindzierski et al., 2013). Teachers also tended to view their teaching efficacy beliefs regarding NT and ND students as separate entities (Love et al., 2019). If teachers do not have strong SE beliefs for inclusive practices, then inclusion as a construct may fail, leaving students in need of special education services without effective instruction (Hopman et al., 2018).

Self-efficacy in Music Education. Developing a robust sense of SE early in teachers' careers is essential for creating motivated, enthusiastic teachers that create strong bonds with their students, and provide instruction at high levels (Armor, 1976; Dembo & Gibson, 1985). In music education, this means providing guided mastery

experiences at the pre-service level through teacher education coursework such as a variety of course experiences, peer teaching, individual mentoring, and field experiences (Prichard, 2017). Outside of educational experiences, skillfulness in applied music, high academic achievement, previous positive experiences in music ensembles, and general regard for the discipline of music education helped to create a high sense of SE in pre-service music teachers (Kaleli, 2020; Thornton & Bergee, 2008).

For in-service music teachers, one of the strongest predictors of effective teaching is a high SE, as well as strong nonverbal communication and leadership skills (Steele, 2010). Another common attribute of effective music teachers is in their pedagogical approaches, where successful music teachers use activity-based instruction, as well as cooperative and collaborative learning (Regier, 2021; Riggs & Enochs, 1990). Effective music teachers are also more likely to try new pedagogical strategies to best meet individual student needs (Cousins & Walker, 2000).

Self-efficacy in Piano Pedagogy. While SE has been explored far more extensively in general, special, and music education, it also has begun to be examined by researchers in the field of piano pedagogy (Chmurzynska, 2009; Ekinci, 2014; Klein, 2021). Chmurzynska (2009) investigated how piano instructors in Poland self-evaluated their professional competencies and how their self-evaluations compared with their teaching supervisors, using a framework of SE as well as teacher SE. Interestingly, the findings indicated that the piano instructors' SE was often high, which contradicted their supervisors' assessments. This was most often true in psychological competencies, rather than musical competencies. For instance, most piano instructors rated themselves highly in the ability to create a warm, welcoming, and positive environment for their students,

while music psychologists and education experts rated the piano instructors poorly in that area. This highlights an important difference between the teacher–student dynamics found in classroom music instruction versus private piano instruction. Because private piano students are often dependent on their teacher, they are not likely to reveal negative opinions to their teacher (Chmurzynska, 2009). In private piano lessons, the piano instructor plays an important role in keeping the student interested and motivated to learn (Ekinci, 2014). While being a piano instructor necessitates many competencies such as musical skills (both theoretical and performance based), knowledge of repertoire, technique, as well as inspiring the love of music, it also requires pedagogical abilities not often addressed in applied programs of piano study (Ekinci, 2014). In addition to general SE regarding the teaching of piano, piano instructors’ levels of SE have been measured with reference to the selection and teaching of repertoire by women and BIPOC composers (Klein, 2021). However, piano instructors’ SE relating to their confidence and perceived success in teaching students with neurodevelopmental disabilities has yet to be explored.

CHAPTER 3: Methodology

Purpose of the Study

The purpose of this study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with neurodevelopmental disabilities. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with neurodevelopmental disabilities.

Research Questions

1. Which neurodevelopmental disabilities do piano instructors have familiarity and experience with, and to what degree?
2. To what extent do piano instructors include students with various neurodevelopmental disabilities in their piano studios?
3. In what contexts do piano instructors learn to teach students with neurodevelopmental disabilities?
4. How confident and successful do piano teachers believe themselves to be in teaching students with neurodevelopmental disabilities?

Research Design

Following recent qualitative studies in piano pedagogy regarding piano instructors' perceptions of teaching piano to students with various disabilities (Martiros, 2012; Mullins, 2017; Tracia, 2016), a quantitative approach was necessary to learn about common experiences and challenges faced by a wide population of teachers in the field. Survey research is a "highly effective method of measurement in social and behavioral science research" (Ruel et al. 2016, p. 2) and can effectively collect data regarding respondents' backgrounds, attitudes, and beliefs (Miksza & Elpus, 2018). Additionally,

survey research is well-suited for generalizing findings across a large population by questioning a smaller, representative sample of that population (Rea & Parker, 2005). Web-based surveys have become an increasingly common research tool in the 21st century, demonstrating an ability to efficiently collect data over a wide geographical area (Andrews et al., 2003; Hai-Jew, 2019; Ruel et al., 2016). Because my desired sample was not local to me, I used a web-based survey as the vehicle for data collection.

The design of the survey was based on extant studies in piano pedagogy (Dumlavwalla & Bugaj, 2020; Martiros, 2012; Mullins, 2017; Tracia, 2016), music education (Altun & Eyüpoğlu, 2018; Heller, 1994; Hourigan, 2007; Özmenteş, 2011), and special education (Daniels, 2018; Sharma et al., 2012; Vent, 2021), as well as my own previous research (Ostrosky, 2023). I used the Qualtrics (2022) platform to create and distribute the questionnaire due to its ease of accessibility and use on mobile and desktop platforms (Hai-Jew, 2019; Fink, 2017), as well as its availability to students and faculty through the University of Oklahoma.

Participant Selection

My target population was piano instructors who taught in a non-collegiate setting. For the purposes of this study, I have defined “piano instructors” as anyone who teaches private or group piano lessons. This includes collegiate piano instructors who also teach non-collegiate lessons outside of the university setting as well as piano instructors with different types of educational backgrounds (e.g., a piano instructor with no university education, or a person with a degree in a non-musical discipline). Participants from Martiros (2012), as well as my own preliminary research (Ostrosky, 2023) came from widely varied backgrounds that did not necessarily involve studying piano or even music

in higher education. Some participants had no higher education background at all.

Therefore, this research did not exclude piano instructors who did not have piano-specific degrees to reflect the reality of different types of teachers within the field.

Access to Potential Participants

I used purposive sampling techniques as the primary method of reaching members of my desired population (Hibberts et al., 2012). Purposive sampling is a nonrandom method for locating participants with specific qualities for study (Hibberts et al., 2012; Nardi, 2018; Ruel et al., 2016). Though random samples are considered to yield the most unbiased results in survey research (Fink, 2017; Hibberts et al., 2012), the specific nature of the criteria of my target population (non-collegiate piano teachers) necessitated the use of nonrandom sampling strategies. I used a two-pronged approach to access a large number of potential respondents by (a) sharing information to members of the Music Teachers National Association, a professional music teacher organization, and (b) soliciting members of piano teacher groups via social media.

Participant Recruitment

Potential participants were recruited from the Music Teachers National Association (MTNA, 2022)—the most prominent association of piano teachers in the United States with 13,053 piano instructor members. Organization of the MTNA is divided into seven geographic regions: Eastern, East Central, Northwest, Southwest, South Central, Southern, and West Central. See Figure 1 for a map of MTNA regions across the US.

Figure 3.1

Divisions of MTNA



Additionally, I recruited participants through communication in piano teacher groups on the social media site (SMS), Facebook. Recruitment for research in the health sciences and social sciences using SMS has emerged as an important tool for reaching desired populations given these platforms' ubiquitous access since 2011 (Darko et al., 2022). Of the various SMSs available, Facebook was the most commonly used in extant research, due to its large user base and accessible interface designed for promoting discussions (Darko et al., 2022). There were several active groups of piano instructors on Facebook, and utilizing the pre-existing infrastructure allowed me to reach a greater number of potential participants than the MTNA member database alone. The following Facebook groups were highly active (>10 posts per day) with large memberships. They acted as private groups that admitted members through a vetting process to ensure that members were instructors of piano. I contacted members of the following active piano instructor groups on Facebook:

- [The Art of Piano Pedagogy](#) (>24,000 members)
- [Piano Teacher Central](#) (>17,000 members)
- [Piano Teacher Support: Students with Disabilities or Special Needs](#) (>3,000 members)

In addition to purposive sampling, I also used snowball sampling, which helped to reach potential respondents within the target population that were not reached through the first wave of purposive sampling (Nardi, 2018; Ruel et al., 2016). Respondents were invited to share the survey invitation with their colleagues, which potentially aided in reaching piano instructors who do not use SMSs or are not members of the MTNA.

Research Questionnaire

Because I wanted to collect data on the current perspectives of piano instructors teaching students with neurodevelopmental disorders (NDs), I utilized a cross-sectional survey design (Fink, 2017). I designed the questionnaire, adapting prompts from related quantitative studies in special and general education (Daniels, 2018; Sharma et al., 2012; Vent, 2021), music education (Heller, 1994; Özmenteş, 2011), and piano pedagogy (Dumlavwalla & Bugaj, 2020). In addition to the quantitative studies listed, I adapted questions from interview prompts and findings from qualitative case studies in piano pedagogy (e.g. Martiros, 2012; Mullins, 2017; Tracia, 2016). Finally, my experiences as a piano instructor in the field, informal and academic conversations with colleagues, as well as my own previous research on this topic (Ostrosky, 2023) informed the design of the current questionnaire.

The opening section of the questionnaire included four screening questions designed to ensure that the respondent fit the criteria for participation (Stalans, 2012).

The first screening question was a consent to participate question. The second screening question asked respondents to confirm that they were 18 years of age or more. The third screening item was a reCAPTCHA to prevent bots from accessing the survey (Griffin et al., 2022); respondents were asked to check the CAPTCHA box in order to proceed to the rest of the survey. The final screening question asked respondents to disclose whether or not they were piano teachers in a non-collegiate setting. If the answer to any of these was “No,” they were directed to the final page of the survey and thanked for their time. Only an affirmative answer to all of these questions resulted in access to the rest of the survey. After affirming their non-collegiate teacher status, I included a final informational prompt detailing how piano instructors who teach both collegiate and non-collegiate lessons should respond. The prompt read, “You may participate if you teach both collegiate and non-collegiate lessons, however, please answer all prompts in regard to your non-collegiate students and experiences.” The questionnaire was then divided into four sections: (1) demographic information and educational background, (2) familiarity with NDs, (3) preparation to teach and experience in teaching students with NDs, and (4) confidence and perceived success in teaching students with NDs.

Section 1: Demographic Information and Educational Background. In section 1, I gathered demographic information about respondents which enabled comparative analysis across different subgroups (Cox & Cox, 2008). For this study, the subgroups were categorized primarily based on respondents’ level and type of education, as well as length of time teaching, however data on gender identity, racial and ethnic identity, location in the United States, as well as age were utilized. Demographic questions used multiple choice and short answer prompts to promote accurate data collection of varied

individual respondent backgrounds (Fernandez et al., 2016). I collected the following demographic information from respondents:

- Gender identity (survey item 6)
- Ethnicity (survey item 7)
- Racial identity (survey item 8)
- Age (survey item 9)
- Number of years teaching piano lessons (survey item 10)
- Location of teaching studio (state) (survey item 11)
- Approximate number of piano students (with and without NDs) (survey item 12)
- Piano teaching environment (survey items 13)
- Degree level (survey items 14-17)
- Certifications outside of degree coursework (survey item 18 and 19)

Collecting data on piano instructors' gender identity, racial and ethnic identity, location, length of time teaching, and age allowed me to determine if and how much these factors had bearing on how piano instructors feel about teaching students with NDs. Gender Identity information (survey item 6) were collected using a combination of multiple choice and open-ended response options—the latter allowing respondents to provide their gender identity using their own words. This was be done to balance the ease of data analysis (multiple choice) with inclusivity of multiple gender identities (open ended response) (Fraser, 2018). The response options were:

- Female
- Male

- Non-binary
- I prefer not to answer
- Other (please describe)_____

The language used to collect racial and ethnic identity data was based on recommendations from Fernandez et al., (2016) and the US Census Bureau (2021). They recommended separate questions for ethnicity (Hispanic, Latino, or Spanish origin) (survey item 7) and five categories for race (American Indian or Alaska Native, Asian, Black or African American, Native Hawaiian or Pacific Islander, White) (survey item 8). In an effort to promote ethnic inclusivity, I also provided an option for an open-ended response, allowing respondents to self-identify (Fernandez et al., 2016).

Survey items 14-17 pertained to participants' educational background, specifically to do with higher education. For survey item 14, respondents were asked to indicate their highest degree earned, with the following response options:

- high school diploma
- associate's
- bachelor's
- master's
- doctorate

Piano instructors may teach without an undergraduate degree in piano or piano teaching, so including options outside of higher education was necessary to accurately capture the backgrounds of potential respondents. Depending on how participants responded to survey item 14, they were directed to survey items 15–17, which included questions about the primary field of study in participants' undergraduate, master's, and doctoral

degrees. Closed response options for field of study were centered on piano study (piano performance, music education with concentration in piano, piano pedagogy, and combined piano performance and pedagogy) with open ended options for both musically oriented degree concentrations and other non-musically oriented degree concentrations. I chose to include non-piano options because in my preliminary research (Ostrosky, 2023), I found that, in addition to piano concentrations, piano teacher participants had both non-piano music degrees (e.g., sacred music, instrumental music education) and non-musical degrees (e.g., accounting, education).

To account for the many ways in which piano instructors learn and practice their craft, survey item 18 provided an opportunity for participants to disclose other non-degree certifications they may hold (e.g., Kodály certification, Dalcroze Professional Certificate). Earning such certificates often requires the completion of rigorous pedagogical coursework (Kodály Music Institute, 2023; Dalcroze Society of America, 2023). Another non-degree certification is the National Certified Teacher of Music (NCTM) program through MTNA which requires teachers to complete five projects that generally align with a basic piano pedagogy course (Music Teachers National Association, 2023). Respondents were asked if they hold any non-degree certifications using a dichotomous response (yes or no). If they answered affirmatively, they were prompted to list their certifications via an open-ended response to allow for accurate collection of a wide variety of additional options. Examining the varied ways piano teachers acquire knowledge and skills was done to help illuminate how piano teachers navigate challenging teaching situations.

Section 2: Familiarity with Neurodevelopmental Disorders. The purpose of section 2 was to examine respondents' level of familiarity and awareness of behaviors of NDs. I used a 5-point Likert-type scale for all prompts in this section, with anchors based on levels of familiarity and awareness (Vagias, 2006). Respondents were first asked about their familiarity with a list of NDs (survey item 20), and secondly regarding their awareness of behaviors associated with the same NDs (survey item 21). I developed this list using the DSM 5-TR (APA, 2022) as a guide. The DSM 5-TR is the most recent revision of the APA's Diagnostic Statistical Manual for Mental Disorders used by clinicians as a diagnostic tool, as well as by researchers, policy makers, and educators. Additionally, I included colloquial vocabulary and examples for each ND to make the list accessible to lay people who do not possess a background in special education or psychology. The list of NDs is as follows:

- Intellectual Disability (e.g., Down syndrome, global cognitive delay, fetal alcohol syndrome, formerly referred to as “mental retardation”)
- Communication Disorder (e.g., speech, hearing, oral function disorders such as stuttering, audio processing disorder, language impairments)
- Autism Spectrum Disorder (formerly inclusive of Asperger's syndrome, high and low functioning autism)
- Attention-Deficit/Hyperactivity Disorder (formerly inclusive of Attention Deficit Disorder)
- Impairments in reading, written expression, and/or mathematics (e.g., dyslexia, dyscalculia)
- Motor Disorders (e.g., dyspraxia, developmental coordination disorder)

- Tic Disorders (e.g., Tourette's syndrome)

In survey Item 22, respondents were asked in what contexts they have had exposure to a person with a ND, *outside* of the teaching studio. The response options were:

- Family/home life
- As a peer
- As a caregiver
- As a colleague
- Other social contexts

I chose a frequency scale for each response option rather than a *check all that apply* list because participants responding to web surveys have been shown to engage prompts for a longer amount of time when each option is listed individually (Smyth, 2006). I used a 5-point Likert-type scale for this question with the anchors: never (0), rarely (1), occasionally (2), a moderate amount (3), and a great deal (4) (Vagias, 2006). In addition to greater engagement of each element, asking about the level of frequency of experiences with individuals with NDS allows a finer level of experience to be measured than a *check all that apply* list (Smyth, 2006).

Section 3: Preparation and Experience in Teaching Students with NDs. The purpose of section 3 was to gather information about how piano instructors are prepared to teach students with NDs, and how much experience they have teaching students with NDs. In survey items 23–28, respondents were asked about formal coursework they have taken that addressed teaching students with NDs. These questions were asked in regards to specific to degree type (e.g., undergraduate or graduate), with a trichotomous response

option (yes/no/not applicable). Additionally, if “yes” was selected, an open-ended prompt appeared, requesting further explanation. Sample questions included:

Survey items 23/25: Did you take coursework that addressed teaching students with neurodevelopmental disorders in your undergraduate/graduate education?
(yes/no/not applicable)

Survey items 24/26: Which courses? (please describe)

Survey items 27 and 28 gave respondents the opportunity to share other, non-collegiate coursework they may have taken, such as courses through the Frances Clark Center (www.pianoinspires.com, 2022) or the Lotus Centre (The Lotus Centre www.lotuscentre.net, 2023).

In addition to formal coursework, respondents were asked about other ways they may have learned to teach students with NDs. This question was based on findings from the qualitative case studies of Martiros (2012) and Mullins (2017), where participants were found to have learned how to teach students with NDs in various ways outside of formal coursework. Survey item 29 included a list of possible answers drawn from Martiros (2012) and Mullins (2017), requesting respondents *check all that apply* and describe any “other” responses not included in this list:

- Self-education (e.g., reading books, articles, websites)
- Trial and error
- Consulting with caregivers (e.g., parents) about successful approaches
- Consulting with other piano teachers
- Consulting with professionals (e.g., psychologists, teachers, special educators, speech pathologists)

- Professional development events (e.g., conference sessions, webinars, summer workshops)
- Other (please describe): _____

Survey items 30–32 were focused on piano instructors’ teaching setting. In survey item 30, respondents were asked about their typical primary teaching setting. Response options were private/individual lessons, semi-private (2-3 students), group classes (>4 students), a combination of group and private lessons, and virtually/online. Respondents were then asked if they alter their teaching setting when working with students with NDs, and if so, to elaborate how their teaching setting was modified in the subsequent prompts (survey items 31 and 32).

Survey items 33–38 related to piano instructors’ experience teaching students with NDs. To learn about which NDs piano instructors had the most experiences with and to what magnitude, respondents were asked which NDs their students were affected by and how many students they had taught with each specific disorder in survey item 33. I utilize a 5-point Likert-type scale focused on frequency with the anchors: never (0), rarely (1), occasionally (2), a moderate amount (3), and a great deal (4) (Vagias, 2006).

Survey item 34 was designed to collect information regarding participants’ experiences teaching students with undiagnosed or uncommunicated NDs. This open-ended prompt invited respondents to describe any experiences they have had teaching students with *symptoms* of these behaviors, devoid a medical diagnosis or communication from caregivers. If they had no experiences with this phenomenon, respondents were instructed to leave the item blank. This prompt was based on my own experiences in the field, as well as responses on my previous research regarding teaching students with

specific behaviors of various NDs, but without communication of a diagnosis from caretakers (Ostrosky, 2023). It is important to distinguish medically diagnosed NDs from observed behaviors that do not have a diagnosis. This is because piano instructors are not medical professionals and do not have the capacity or mandate to diagnose a disorder, though teachers' observations can be helpful for providing clinicians with data to support a diagnosis (Sarahan, 2022). The prevalence of this issue of undiagnosed or uncommunicated diagnoses in my own professional experience and previous research determined the need to include a question on undiagnosed or uncommunicated NDs.

The final prompts regarding piano instructor experiences with students with NDs were survey items 35–38. Respondents were asked how often they are asked, how often they agree, and how often they decline to teach students with NDs. In survey item 35, respondents were asked in what contexts they would decline to teach a student with NDs, and to *check all that apply*. The response options were based on findings from Martiros (2012), and my own experiences in the field. The response options were:

- Need for extra planning time
- Lack of knowledge
- Lack of prior success
- Stigma associated with teaching children with disabilities
- Nothing would prevent me from agreeing to teach a student with a ND
- Other (please describe): _____

Section 4: Confidence and perceived success in teaching students with NDs.

Section 4 was the final part of the questionnaire and included prompts designed to collect data on piano instructors' levels of confidence and perceived success in teaching students

with NDs. Because confidence and perceived success are often measured as part of self-efficacy (SE) assessments (Bandura, 2006), I used prompts from previous SE studies to measure respondents' perceptions of piano instructors' confidence and success. For questions relating to SE, I used a 10-point scale consistent with previous SE studies in music and music education (e.g., Bandura, 2006; Klein, 2021; Regier, 2019). In survey item 39, respondents were asked to indicate their level of confidence teaching students with NDs. They were asked about each category of ND individually, using an identical list of disorders from survey items 20, 21, and 33 that were derived from the DSM 5-TR (APA, 2022).

Survey items 40 and 41 used prompts describing teaching situations. Respondents were asked to indicate their level of confidence (survey item 40) and effectiveness (survey item 41) for each prompt. I adapted these prompts from the teacher efficacy for inclusive practices (TEIP) scale, initially designed for general education settings (Sharma et al., 2012), the SE scale for music teachers (SESMT) (Özmenteş, 2011), and prompts relating to teacher effectiveness from Regier (2019), a study on the self-efficacy of band directors teaching concert, marching, and jazz-ensembles. Survey items 40 and 41 were divided into categories based on the root of each prompt. Survey item 40 used the root, "I am confident..." with the following prompts:

- ...teaching both neurotypical and neurodivergent students.
- ...in my ability to prevent disruptive behavior in the lesson before it occurs.
- ...in my ability to get parents/families involved in the music learning activities of their children with disabilities.

- ...in designing activities to meet individual needs of students with mild impairments.
- ...in designing activities to meet individual needs of students with moderate impairments.
- ...in designing activities to meet individual needs of students with severe impairments.
- ...in my ability to help others who know little about neurodevelopmental disabilities understand student behaviors.
- ...when dealing with students who engage in challenging behaviors such as non-compliance or “meltdowns”.
- ...modifying my teaching strategies when working with students with diagnosed neurodevelopmental disabilities.
- ...modifying my teaching strategies when working with students with suspected neurodevelopmental disabilities.
- ...discussing neurodevelopmental disabilities with parents/families of students.

Survey item 41 used the root, “I am able to,” with the following prompts:

- ...calm a student who is disruptive or upset.
- ...make parents feel comfortable bringing their children with disabilities to piano lessons.
- ...assist parents/caregivers in helping their children with disabilities do well in their piano lessons.

- ...accurately gauge student comprehension of what I have taught.
- ...provide appropriate challenges for very capable students.
- ...redirect disruptive behavior in the piano lesson.
- ...provide alternative explanations or examples when students are confused.
- ...earn the trust of parents and caregivers of students with NDs.
- ...establish a positive rapport with students with NDs.

For both survey items 40 and 41, I included prompts that described specific teaching situations so that respondents were able to think beyond the names of disorders and examine their levels of confidence and perceived success from the perspective of their specific teaching effectiveness (Regier, 2019).

The final survey question was an open-ended question inviting respondents to share any additional information about their experiences with individuals with NDs either in or outside the private piano classroom. An open-ended or “venting question” allows respondents to identify any issues they feel were not addressed in the questionnaire, or that require extra context or clarity (Hai-Jew, 2019; Rea & Parker, 2005). In addition, comments from the final open-ended question can inform future research.

Procedures

Pre-data Collection. The proposal document was submitted to dissertation committee members on May 1, 2023. The committee approved the document on May 11, 2023. Upon approval of the proposal document, I submitted an application to the University of Oklahoma’s Internal Review Board (OU-IRB) for approval of the study. The application was approved on May 18, 2023.

Data Collection. After the proposal was approved by the OU-IRB, I distributed recruitment materials to potential respondents. With the assistance of Ryan Greene, Director of Membership Development and Affiliate Relations at MTNA, a recruitment email was disseminated to 13,053 piano teacher members, out of 17,082 total members as of May 31, 2023. I also invited members of the following active piano teacher organizations on Facebook by posting a link to the survey instrument and approved recruitment message to each group page:

- [The Art of Piano Pedagogy](#) (>24,000 members)
- [Piano Teacher Central](#) (>17,000 members)
- [Piano Teacher Support: Students with Disabilities or Special Needs](#) (>3,000 members)

I first contacted administrators and moderators of each group to seek permission to post a research invitation on the message board. Moderators from both *The Art of Piano Pedagogy* and *Piano Teacher Central* asked that in return for recruiting from their membership, that I share findings with the group after completing the research, to which I agreed. I posted an invitation to respond to the questionnaire on Monday, May 22, 2023, at 8:15 A.M. CDT, which coincided with the date and time of the MTNA email distribution. The survey link was open for a total of two weeks, with a reminder issued after 10 days. The survey closed on June 5, 2023.

Data Analysis. I collected the data via Qualtrics software (Qualtrics, 2023). Once collected, I imported the data into *jamovi* software (v. 2.3.26, 2023) for analysis. I labeled the variables as nominal or continuous and used exploratory data analysis to determine whether data is distributed normally, if there were outliers present, or if other data-entry

errors exist (Morgan et al., 2014). I cleaned the data and used minimal deductive imputation to account for missing data, where appropriate (Brick & Kalton, 1996). I ran descriptive statistics on all demographic data, including age, gender, location, level of education, and field of study. Frequencies and means were used to analyze data regarding respondents' experiences teaching students with NDs, their preparation to teach students with NDs and their levels of confidence and perceived success in teaching students with NDs.

Once descriptive statistics were complete, I conducted exploratory analysis to ascertain the relationships between the variables. Exploratory analysis showed that no statistically significant differences existed when confidence and success were grouped by gender, race, ethnicity, age, or level of education. Therefore, I conducted non-parametric mean-rank comparisons of respondents' levels of confidence and perceived success based on respondents' field of study and whether or not they had taken coursework addressing NDs. Non-parametric tests were chosen because exploratory analysis revealed that data were not normally distributed, thus violating one of the assumptions of parametric *t*-tests or ANOVAs. See chapter 4 for complete data analysis procedures.

CHAPTER 4: RESULTS

Purpose of the Study

The purpose of this study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with neurodevelopmental disabilities. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with neurodevelopmental disabilities. I examined (a) which neurodevelopmental disabilities do piano instructors have familiarity and experience with, (b) what extent piano instructors include students with various neurodevelopmental disabilities in their piano studios, (c) what contexts piano instructors learn to teach students with neurodevelopmental disabilities, and (d) how confident and successful piano teachers believe themselves to be in teaching students with neurodevelopmental disabilities.

Research Procedures

The questionnaire was distributed on Monday May 22, 2023, at 8:15 A.M., CDT and remained open through Monday June 5, 2023, 11:59 P.M., CDT. A recruitment email was sent by the Music Teachers National Association (MTNA) with assistance from Ryan Greene, Director of Membership Development and Affiliate Relations at MTNA. The message reached all members that indicated that they were piano instructors, totaling 13,052 emails (out of 17,082 total members as of May 31, 2023). A post-survey report from MTNA indicated that the recruitment email was opened by 8,955 (69.9%) members, and the survey link clicked 1,206 times (9.2%). This is a higher percentage of clicks/opens than is normal for MTNA sponsored emails, which have a cumulative

average of 59% open rate and 3% click rate, as stated by the post-survey report from MTNA, shared via personal communication.

At the same time, I distributed recruitment invitations via Facebook, to the following piano teacher groups:

- [The Art of Piano Pedagogy](#) (>24,000 members)
- [Piano Teacher Central](#) (>17,000 members)
- [Piano Teacher Support: Students with Disabilities or Special Needs](#)
(>3,000 members)

I first contacted administrators and moderators of each group to seek permission to post a research invitation on the message board. Moderators from both *The Art of Piano Pedagogy* and *Piano Teacher Central* asked that in return for recruiting from their membership, that I share findings with the group after completing the research, to which I agreed.

Data collection took place via Qualtrics, an online survey platform available through the University of Oklahoma, yielded an initial population of 814 ($N = 814$). Of the respondents who answered the question, “Where did you access this survey?” ($n = 748$), an overwhelming majority of total respondents reported that they accessed the questionnaire via the recruitment email from MTNA ($n = 711, 95.1\%$); the remaining respondents ($n = 37, 4.9\%$) were recruited from the aforementioned piano instructor Facebook groups. See Table 4.1 for complete recruitment method data.

Table 4.1*Respondents' Questionnaire Access*

	Frequency	%
Email invitation from MTNA	711	95.1
Invitation from friend or colleague	11	1.5
Facebook: Piano Teacher Support: Students with Disabilities or Special Needs	10	1.3
Facebook: Piano Teacher Central	9	1.2
Facebook: The Art of Piano Pedagogy	5	0.7
Facebook: MTNA Collegiate Chapters	2	0.3

Note. $N = 748$

Data Analysis

Initial survey responses ($N = 814$) were imported into Microsoft Excel (2021), accessed via the University of Oklahoma, for the purposes of exploratory analysis (Russell, 2018). Exploratory analysis involved labeling variables as nominal, ordinal, or continuous, and examining the dataset for missing or incomplete responses. Responses were deleted if they did not click “yes” on the informed consent page ($n = 10$), or if they only completed the demographic section ($n = 55$). The remaining responses ($N = 749$) formed the primary dataset, which was an acceptable response rate for subsequent analysis (Fink, 2017). The response rate was high enough to be generalizable with a confidence interval of 99%, indicating that these results and can be generalizable to the larger population of non-collegiate piano instructors in the US (Qualtrics, 2023). Participants were able to skip any responses apart from the informed consent question and the three subsequent weeding questions (i.e., the reCAPTCHA, does the respondent

teach non-collegiate piano lessons, and is the respondent over the age of 18). Therefore, *N* values in the following analyses vary depending on the number of valid responses for each survey prompt.

In addition to checking the data for completeness, I used deductive imputation to fill in gaps where there was a high degree of certainty as to the intended response.

Deductive imputation assumes a high degree of certainty regarding the nonresponse item (Brick & Kalton, 1996). For instance, a respondent who answered “0” or “not at all aware” for a particular neurodevelopmental disorder would likely also not be aware of associated symptoms with that disorder. Therefore, a nonresponse item for question 21 was deductively imputed if the respondent indicated they were not aware of the disorder at all in question 20.

The survey questionnaire consisted of 43 questions with quantitative (e.g., Likert-type scale items, multiple choice prompts) as well as open-ended or free response prompts. Of the valid responses ($N=749$), quantitative data were analyzed using *jamovi* Desktop v. 2.3.26, a free open-source data analysis software based on the R programming language. Data were analyzed using several descriptive methods where appropriate, including frequencies, percentages, means, and standard deviations. Qualitative data were coded inductively, where codes emerged based on the dataset (Patton, 2015). *In vivo* coding was used where possible, to preserve the voice of the respondents (Merriam & Tisdell, 2015).

Descriptive Statistics

Descriptive statistics are presented in the following section. Each section of the survey was analyzed descriptively, beginning with demographic information. Basic

demographic information including gender, race, and ethnic background is presented first, followed by respondent location by state and age in years. Information about respondents' teaching environment is presented next, including studio size, studio environment and teaching setting. Finally, information regarding respondents' education level, field of study at all degree levels, and additional certifications included. After demographic information, I present descriptive statistics regarding each subsequent section of the survey: (1) familiarity with neurodevelopmental disabilities (NDs), (2) preparation and experience in teaching piano students with NDs, and (3) perceived success and confidence in teaching piano to students with NDs.

Respondent Demographics

Gender, Race, and Ethnic Background. Respondents' gender and racial backgrounds were overwhelmingly female ($n = 641$, 85.6%) and white ($n = 659$, 88.1%), out of the total valid responses ($N = 749$). For those who chose to self-report their racial background, the most common self-description was a combination of identities such as "multi-racial." Complete demographic information can be found in Table 4.2.

Table 4.2*Respondents' Demographic Information*

	Frequency	%
<i>Gender</i>		
Female	641	85.6
Male	98	13.1
Non-binary	2	0.3
Prefer not to say	8	1.1
<i>Race</i>		
White	659	88.1
Asian	53	7.1
Other/prefer to self-describe	25	3.3
Black or African American	7	0.9
American Indian or Alaskan Native	2	0.3
Native Hawaiian or Pacific Islander	2	0.3
<i>Hispanic or Latino Ethnicity</i>		
No	720	96.1
Yes	29	3.9

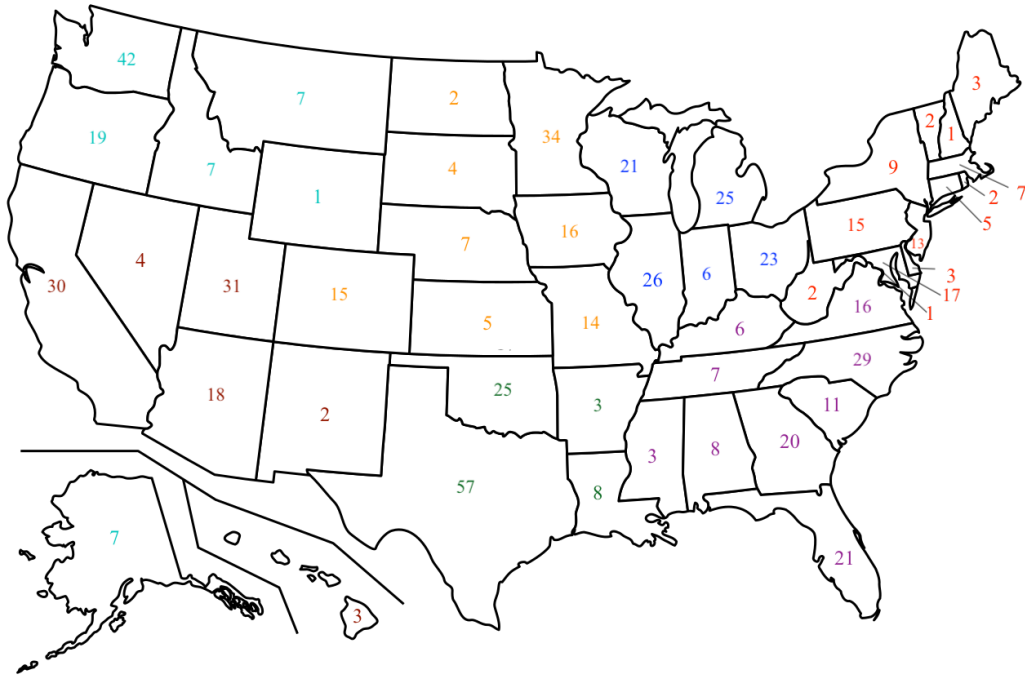
Note. $N = 749$

Location, Age, Years of Teaching Experience

Location. Given the national distribution of recruitment materials to piano instructors in the United States, all 50 states plus the District of Columbia were represented in the recorded responses, and all regions of MTNA were represented. Of the total sample ($N = 749$), 660 (88.1%) respondents provided their location while a smaller subset ($n = 89$, 11.9%) did not. The responses were fairly evenly distributed among the regions of MTNA, with the most responses coming from the Southern division. See Figure 4.1 and Table 4.3 for detailed information on respondent location.

Figure 4.1

Respondents' Location by State



Note. $n = 663$. Regions of MTNA are represented by colored numbers: Northwest (turquoise), Southwest (maroon), West Central (orange), South Central (green), Southern (purple), East Central (blue), and Eastern (red).

Table 4.3

Divisions of MTNA Represented

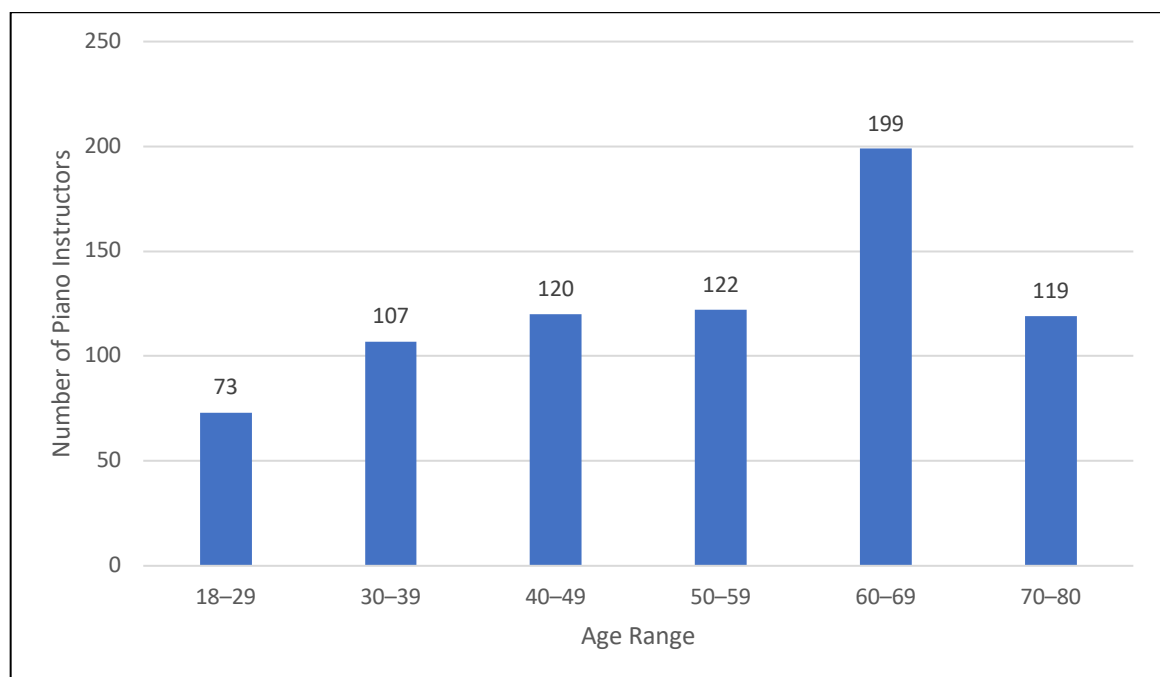
	Frequency	%
Southern	121	18.3
East Central	101	15.2
West Central	97	14.6
South Central	93	14.0
Southwest	88	13.3
Northwest	83	12.5
Eastern	80	12.1

Note. $N = 663$

Age. Respondents were given the option to state their age (in whole years) using a slider that ranged in age from 18–80 years old. Participants ($N = 740$) reported an age range of 19–80 years. The most prevalent ages represented were 60–69 years ($n = 199$, 26.9%), and the least prevalent were in the youngest age category of 18–29 years ($n = 73$, 9.9%), as shown in figure 4.2. The high number of respondents who selected 80 years of age ($n = 31$, 4.2%) may have been a result of the age range slider ending with 80, particularly when considering respondents’ commentary in end-of-survey responses that indicate ages well beyond 80.

Figure 4.2

Frequency of Respondents’ Age Range

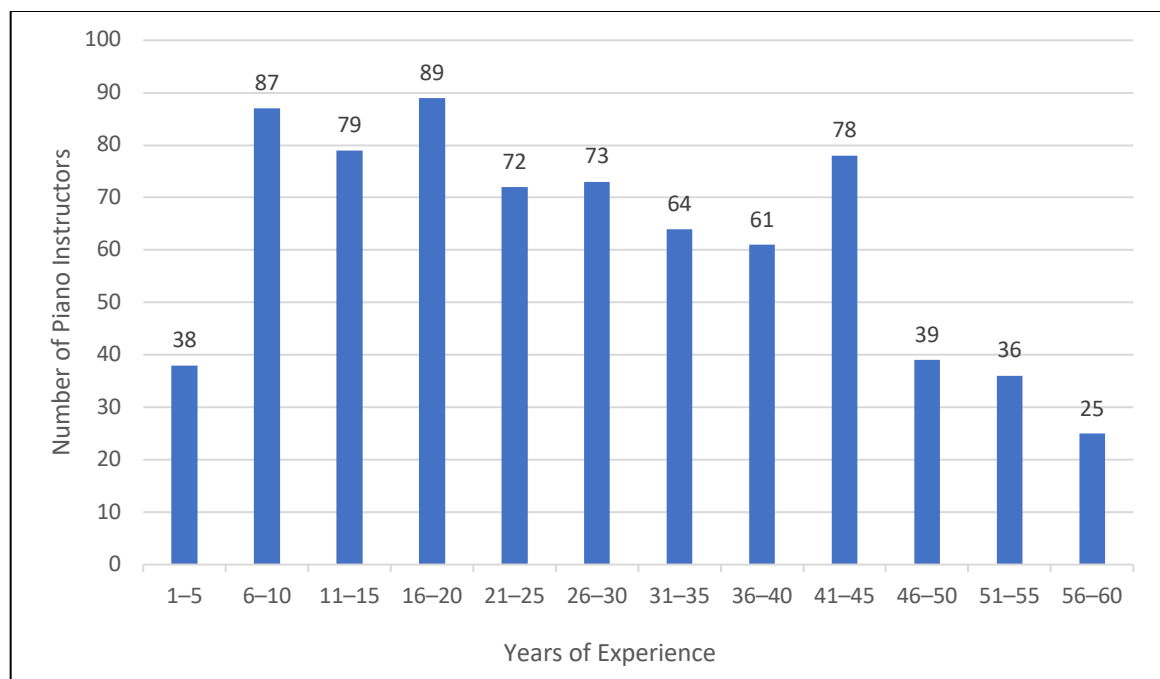


Note. $n = 740$

Teaching Experience. Respondents' ($N = 741$) years of teaching experience ranged from 1–60 years. As with the age range, the high number of respondents who selected exactly 60 years ($n = 20, 2.7\%$) may have been a result of the teaching experience slider ending with 60. Nevertheless, there was a wide spread of the number of years of piano teaching experience. See Figure 4.3 for complete frequency data of respondents' length of piano teaching experience.

Figure 4.3

Frequency of Respondents' Years of Piano Teaching Experience



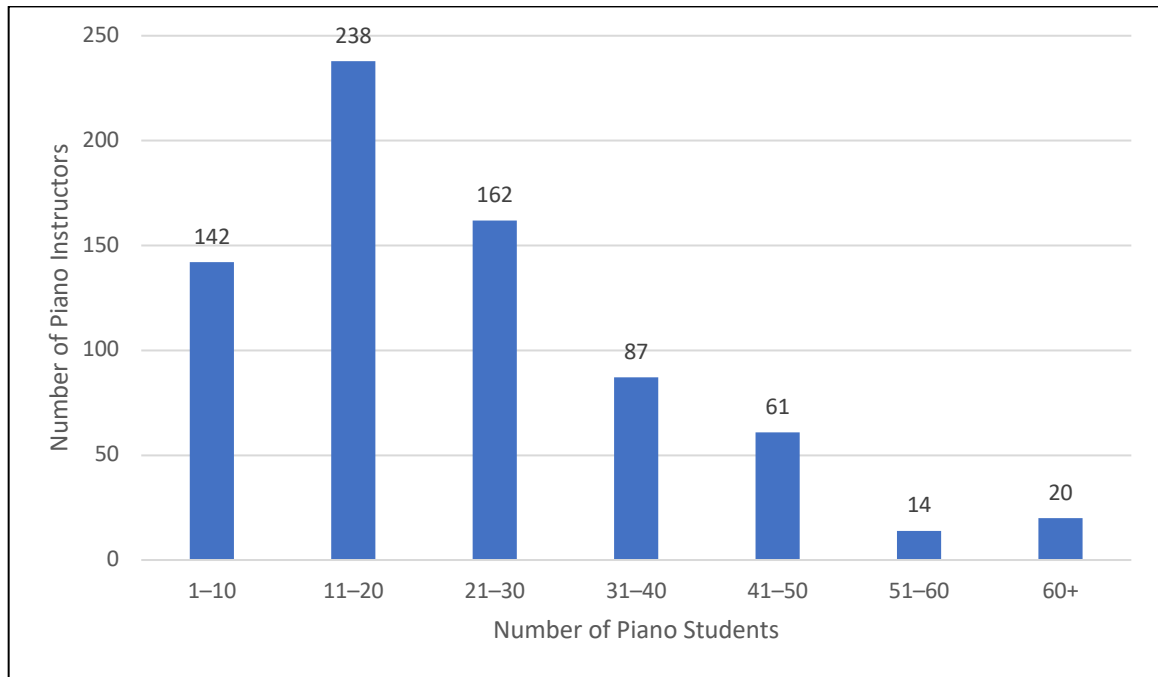
Note. $N = 741$

Size of Teaching Studio and Studio Environment. Respondents ($N = 724$) reported their typical number of enrolled piano students in question 12. Most piano instructors ($n = 238, 32.9\%$) reported studio sizes of 11–20 students. The next most

commonly occurring brackets were 21–30 students ($n = 162$, 22.4%) and 1–10 students ($n = 142$, 19.6%). Studio sizes of more than 30 students made up a smaller percentage of the total ($n = 182$, 25.1%). See Figure 4.4 for complete studio size information.

Figure 4.4

Respondents' Typical Number of Students



Note. $N = 724$

Most respondents ($N = 749$) taught in a home studio ($n = 505$, 67.4%), followed by an independent studio *outside* of the home ($n = 93$, 12.4%). Less than 10% ($n = 72$) of respondents were associated with an educational institution, such as a community music school ($n = 59$, 7.9%) or a pre-college conservatory ($n = 13$, 1.7%). Most piano instructors taught private or individual piano lessons ($n = 641$, 85.6%). Other teaching settings accounting for 14.4% ($n = 104$) of the total responses included group instruction ($n = 11$, 0.5%), online instruction ($n = 63$, 8.4%), and combinations of group and private

instruction ($n = 30$, 4.0%). Complete information on piano instructors' studio settings can be found in Table 4.4.

Table 4.4

Piano Instructors' Studio Settings

	Frequency	%
<i>Studio environment</i>		
Home studio	505	67.4
Independent studio (outside the home)	93	12.4
Community music school	59	7.9
Other	45	6.0
Virtually/Online	34	4.5
Pre-college conservatory	13	1.8
<i>Teaching setting</i>		
Individual/private lesson	641	85.6
Virtually/online	63	8.4
Combination of private and group lessons	30	4.0
Group class (4 or more students)	11	1.5
Semi-private lesson (2-3 students)	4	0.5

Note. $N = 749$

Educational Background and Degree Level. Respondents ($N = 749$) were asked to report their highest degree earned. Most respondents ($n = 699$, 93.3%) reported having at least a Bachelor's degree, while 4.1% ($n = 31$) had earned an Associate's degree. Only 2.5% ($n = 19$) of piano instructors reported a high school diploma as their highest degree. A complete breakdown of respondents' level of education can be seen in Table 4.5.

Table 4.5*Piano Instructors' Degree Level*

	Frequency	%
Master's degree	326	43.5
Bachelor's degree	263	35.1
Doctorate degree	110	14.7
Associate's degree	31	4.1
High School diploma	19	2.5

Note. $N = 749$

Across all degree levels, a higher number of musical fields of study were reported as compared to non-musical fields. At the undergraduate level ($n = 719$), musical fields of study made up 83.3% ($n = 599$) of responses. At the master's ($n = 429$) and doctoral ($n = 109$) levels, higher percentages of musical fields of study were seen, 86.3% ($n = 370$) and 90.1% ($n = 99$), respectively. Piano performance was the most common degree program reported by respondents across all degree levels: undergraduate ($n = 259$, 36.0%), master's ($n = 141$, 32.9%), and doctorate ($n = 42$, 38.5%). Of the non-music degree programs reported, education was the most prevalent at the undergraduate level ($n = 20$, 4.7%), with many other fields of study reported at all degree levels (e.g., chemistry, history, engineering, and psychology). A small percentage of respondents reported special education or music therapy at the undergraduate ($n = 15$, 2.1%) and master's ($n = 7$, 1.6%) levels. See Table 4.6 for complete information about respondents' field of study in their higher education degree programs.

Table 4.6*Piano Instructors' Primary Field of Study in Their Undergraduate, Master's, and Doctorate Degrees*

Undergraduate Degree	Frequency	%
<i>Music fields (total)</i>	599	83.3
Piano performance	259	36.0
Other music degree	111	15.4
Piano performance and pedagogy	41	5.7
Piano pedagogy	52	7.2
Music education (concentration in piano)	91	12.7
Collaborative piano	15	0.6
Combination of piano and other discipline	19	2.6
Music therapy	11	1.5
<i>Non-music fields (total)</i>	131	18.1
Other non-music degree	107	14.9
Education	19	2.6
Special education	4	0.6
Not reported	1	0.1
Master's Degree	Frequency	%
<i>Music fields (total)</i>	370	86.3
Piano performance	141	32.9
Other music degree	71	16.6
Piano performance and pedagogy	64	14.9
Piano pedagogy	40	9.3
Music education (concentration in piano)	27	6.3
Collaborative piano	15	3.5
Combination of piano and other discipline	11	2.6
Music therapy	1	0.2
<i>Non-music fields (total)</i>	58	13.5
Other non-music degree	32	7.5
Education	20	4.7
Special education	6	1.4
Not reported	1	0.2
Doctorate Degree	Frequency	%
<i>Music fields (total)</i>	99	90.1
Piano performance	42	38.5
Piano performance and pedagogy	19	17.4
Piano pedagogy	13	11.9
Other music degree	12	11.0
Collaborative piano	8	7.3
Music education (concentration in piano)	4	3.7
Combination of piano and other discipline	1	0.9
<i>Non-music fields (total)</i>	10	9.2
Other non-music degree	7	6.4
Education	3	2.8

Note. $N = 749$. Undergraduate degree field of study ($n = 719$), master's degree field of study ($n = 429$), and doctorate degree field of study ($n = 109$)

Piano Instructors' Additional Certifications. Beyond higher education, respondents ($N = 746$) were invited to state any certifications they had undertaken. Most respondents ($n = 466, 62.5\%$) did not have additional certifications beyond their studies in higher education. Of the respondents that reported having additional certifications ($n = 280, 37.5\%$), most had one additional certification ($n = 207, 90.2\%$). When viewed by degree level, the percentage of respondents with additional certifications remained similar to the total group, with the exception of respondents with doctorate degrees ($n = 109, 14.6\%$) who had a higher percentage of additional certifications ($n = 51, 46.8\%$) than those without doctorate degrees ($n = 229, 30.7\%$). Of the respondents with additional certifications ($n = 280$), the most prevalent credential was the Nationally Certified Teacher of Music (NCTM) from MTNA ($n = 172, 64.2\%$). See Table 4.7 and 4.8 for complete information about piano instructors' additional certifications.

Table 4.7

Piano Instructors' Additional Certifications

	Frequency	%
No additional certification	466	62.5
One certification	207	90.2
Two certifications	46	6.2
Three or more certifications	27	3.6
<i>Total cases with at least one additional certification</i>	<i>280</i>	<i>37.5</i>

Note. $N = 746$

Table 4.8*Piano Instructors' Additional Certifications by Degree Level*

Degree	Additional Certification	Frequency	%	<i>n</i>
HS diploma	No	13	68.4	19
	Yes	6	31.6	
Associate's degree	No	19	61.3	31
	Yes	12	38.7	
Bachelor's degree	No	181	69.1	262
	Yes	81	30.9	
Master's degree	No	195	60.0	325
	Yes	130	40.0	
Doctorate degree	No	58	53.2	109
	Yes	51	46.8	

Note. *N* = 746

Familiarity with NDs

The first area to be examined outside of demographic information was respondents' familiarity with NDs. Survey prompts 20–21 examined how familiar respondents were with NDs as categorized in the DSM 5-TR. The question was asked in two ways. First, respondents were asked to rate their familiarity with various neurodevelopmental disabilities/disorders using Likert-type scale anchors of *not familiar at all* (0), *slightly familiar* (1), *moderately familiar* (2), *very familiar* (3), and *extremely familiar* (4), in question 20. Second, I asked piano instructors to rate their awareness of the behaviors associated with the same list of NDs (in question 21), using the same Likert-type scale anchors.

Piano instructors were most familiar with attention-deficit/hyperactivity disorder (ADHD) ($M = 2.50$, $SD = 1.08$), followed by autism spectrum disorder (ASD) ($M = 2.28$, $SD = 1.11$); motor disorders ($M = 1.11$, $SD = 1.11$) and tic disorders ($M = 1.03$, $SD = 1.03$) were the least familiar. Interestingly, respondents rated themselves slightly higher when asked about their awareness of behaviors associated with specific NDs vs. their familiarity with each disorder, though the relative ranking of each disorder remained the same between both questions—where ADHD and ASD were the most familiar NDs and motor and tic disorders were the least familiar. See Table 4.9 for complete information on familiarity with and awareness of behaviors associated with various NDs.

Table 4.9

Piano Instructors' Familiarity and Awareness of Behaviors Associated with NDs

	<i>Awareness</i>			<i>Familiarity</i>		
	Mean	SD	N	Mean	SD	N
Attention-deficit/hyperactivity disorder	2.75	1.12	748	2.50	1.08	749
Autism spectrum disorder	2.61	1.16	748	2.28	1.10	749
Learning disorders	2.06	1.17	748	1.88	1.07	749
Intellectual disability	1.81	1.19	748	1.56	1.07	748
Communication disorders	1.75	1.20	748	1.46	1.08	748
Motor disorders	1.37	1.23	747	1.11	1.11	749
Tic disorders	1.27	1.17	747	1.03	1.03	749

Note. Responses were based on a scale of *not familiar at all* (0), *slightly familiar* (1), *moderately familiar* (2), *very familiar* (3), and *extremely familiar* (4).

In survey prompt 22, respondents were asked how often they interacted with a person with any type of ND outside of the teaching studio. Respondents were invited to share the approximate frequency of interactions using the Likert-type response anchors *never* (0), *rarely* (1), *occasionally* (2), *a moderate amount* (3), and *a great deal* (4) in the following situations: (a) family/home life, (b) as a peer, (c) as a caregiver/parent, (d) as a colleague, and (e) in other social situations. Most respondents had minimal exposure to persons with NDs outside of the teaching studio, the exception being in family/home situations, where more respondents ($n = 219, 29.5\%$) reported having “a great deal” of interactions with a neurodevelopmentally disabled individual ($M = 2.20, SD = 1.53$). See Tables 4.10 and 4.11 for complete information regarding respondents’ interactions with neurodevelopmentally disabled individuals outside of the teaching studio.

Table 4.10

Frequency of Piano Instructors’ Interactions with NDs (Outside of Teaching)

Interaction Type	Never	Rarely	Occasionally	A Moderate Amount	A Great Deal	<i>N</i>
Family/home life	163 (21.9%)	99 (13.3%)	134 (18.0%)	128 (17.2%)	219 (29.5%)	743
As a peer	137 (18.7%)	199 (27.2%)	234 (32.0%)	109 (14.9%)	52 (7.1%)	731
As a caregiver/parent	369 (50.3%)	116 (15.8%)	78 (10.6%)	63 (8.6%)	107 (14.6%)	733
As a colleague	237 (32.6%)	226 (31.1%)	171 (23.5%)	75 (10.3%)	18 (2.5%)	727
Other social contexts	55 (7.5%)	179 (24.3%)	320 (43.5%)	135 (18.3%)	47 (6.4%)	736

Table 4.11

Means and Standard Deviations for Piano Instructors' Interactions with NDs (Outside of Teaching)

Interaction Type	Missing	<i>M</i>	<i>SD</i>	<i>N</i>
Family/home life	6	2.20	1.53	743
As a peer	18	1.64	1.15	731
As a caregiver/parent	16	1.21	1.49	733
As a colleague	22	1.19	1.08	727
Other social contexts	13	1.92	0.99	736

Note. Responses were based on a scale of *not familiar at all* (0), *slightly familiar* (1), *moderately familiar* (2), *very familiar* (3), and *extremely familiar* (4).

Preparation and Experience in Teaching Piano Students with NDs

The second area of the questionnaire examined what ways piano instructors were prepared to teach students with NDs, and to what degree piano instructors taught these students. Survey prompts 23–38 were designed to examine a variety of factors, including prior coursework that addressed issues of special education in and out of higher education, as well as how often piano instructors agreed or declined to teach a student with a ND.

Piano Teacher Education

Coursework by Degree Level. In survey prompts 23 and 25, respondents were asked if coursework in their undergraduate and graduate education addressed NDs either as the main topic of a course or as an element/unit within a wider area of content. Using a dichotomous yes/no question (with an option for N/A), responses for both

undergraduate ($n = 748$) and graduate ($n = 739$) degrees were overwhelmingly “no,” (undergraduate degrees, $n = 606$, 81.0%; graduate degrees, $n = 512$, 69.3%). See Table 4.12 for complete information on how often the topic of NDs was addressed within degree coursework.

Table 4.12

Frequency of Coursework Addressing NDs by Degree Level

Degree Level	NDs Addressed?	Frequency	%	<i>N</i>
Undergraduate degree	No	606	81.0	748
	Yes	118	15.8	
	n/a	24	3.2	
Graduate degree	No	512	69.3	739
	Yes	71	9.6	
	n/a	156	21.1	

Note. $N = 748$, undergraduate degree ($n = 748$), graduate degree ($n = 739$)

Coursework by Field of Study. In order to learn if inclusion of course topics regarding NDs was related to the field of study, I combined “like” degrees with one another. Each respondent that supplied information about their degree level for any degree was assigned a category based on how much coursework regarding NDs could be found in each degree program. For example, if a respondent had any general or music education degree listed, they were placed in the “education” category, even if they had other degrees in piano performance. All degree programs reported were placed in the following categories:

1. Piano (included piano performance, piano pedagogy, and collaborative piano degrees)
2. Education (included general and music education)
3. Other music degree
4. Other non-music degree
5. ND relevant degree (including music therapy, special education, and psychology degrees)

Most respondents reported that no courses addressed teaching individuals with NDs, regardless of degree plan. Piano instructors with backgrounds in education fields, and fields related to NDs, reported the highest percentages of relevant coursework in both undergraduate and graduate programs. In fields related to NDs, 51.2% (n = 21) and 64.0% (n = 16) of respondents reported topics related to NDs being covered in their undergraduate and graduate degrees, respectively. The low percentages are somewhat surprising, given that special education and music therapy degrees are known to cover NDs extensively. It is possible that the coursework covered topics relating to NDs but did not address specific pedagogies for individuals with NDs. In education fields, 34.1% (n = 57) and 21.9% (n = 30) of respondents reported topics related to NDs being covered in their undergraduate and graduate degrees, respectively. See Tables 4.13 and 4.14 for complete information about coursework addressing NDs by field of study.

Table 4.13*Frequency of Coursework Addressing NDs by Field of Study (Undergraduate)*

Field of Study	NDs Addressed	Frequency	%
Piano (e.g., performance, pedagogy, collaborative)	No	344	91.7
	Yes	31	8.3
<i>Total Piano</i>		<i>375</i>	<i>100.0</i>
Education (e.g., general education, music education)	No	110	65.9
	Yes	57	34.1
<i>Total Education</i>		<i>167</i>	<i>100.0</i>
Other music field (e.g., applied instrument, music theory)	No	64	95.5
	Yes	3	4.5
<i>Total Other Music</i>		<i>67</i>	<i>100.0</i>
Other non-music field (e.g., chemistry, history, engineering)	No	53	94.6
	Yes	3	5.4
<i>Total Non-music</i>		<i>56</i>	<i>100.0</i>
ND relevant field (e.g., music therapy, special education, psychology)	Yes	21	51.2
	No	20	48.8
<i>Total ND Relevant</i>		<i>41</i>	<i>100.0</i>

Note. N = 706

Table 4.14*Frequency of Coursework Addressing NDs by Field of Study (Graduate)*

Field of Study	NDs Addressed	Frequency	%
Piano (e.g., performance, pedagogy, collaborative)	No	297	93.1
	Yes	22	6.9
<i>Total Piano</i>		<i>319</i>	<i>100.0</i>
Education (e.g., general education, music education)	No	107	78.1
	Yes	30	21.9
<i>Total Education</i>		<i>137</i>	<i>100.0</i>
Other music field (e.g., applied instrument, music theory)	No	48	98.0
	Yes	1	2.0
<i>Total Other Music</i>		<i>49</i>	<i>100.0</i>
Other non-music field (e.g., chemistry, history, engineering)	No	40	97.6
	Yes	1	2.4
<i>Total Non-music</i>		<i>41</i>	<i>100.0</i>
ND relevant field (e.g., music therapy, special education, psychology)	Yes	16	64.0
	No	9	36.0
<i>Total ND Relevant field</i>		<i>25</i>	<i>100.0</i>

Note. N = 571

Specific Undergraduate Coursework. The respondents who selected “yes” to survey prompt 23 ($n = 118, 15.8\%$), “Did you take coursework that addressed teaching students with NDs in your **undergraduate** education?” were then asked to provide the names of any courses they took that addressed said topics. Open-ended response data were coded thematically so that frequencies could be condensed into subject areas. For instance, “special education course,” “special education class,” and “intro to special ed”

were all coded as “special education course.” Most of the courses listed were non-music courses ($n = 107, 90.7\%$), while music courses accounted for 37.3% ($n = 44$) of the total courses listed. Respondents were able to list multiple courses, so the total frequencies counted ($n = 151, 128.0\%$) exceed the number of piano instructors responding to the prompt ($n = 118$). The most prevalent non-music courses listed were special education courses ($n = 28, 23.7\%$), Developmental/Child Psychology ($n = 17, 14.4\%$), Educational Psychology ($n = 14, 11.9\%$), Abnormal Psychology ($n = 12, 10.2\%$), and general psychology ($n = 4, 3.4\%$). The most prevalent music courses listed were music therapy courses ($n = 20, 16.9\%$). Considering both categories (music and non-music), psychology ($n = 48, 40.6\%$) accounted for the majority of course types listed. See Table 4.15 for complete information about which undergraduate courses were listed by respondents.

Table 4.15*Undergraduate Courses that Addressed Special Education Topics*

Name of Course	Frequency	%
<i>Non-music courses</i>	<i>107</i>	<i>90.7</i>
Special education course	28	23.7
Developmental/child psychology	17	14.4
Educational psychology	14	11.9
“The Exceptional Child”/Educating exceptional learners	14	11.9
Abnormal psychology	12	10.2
General education course	10	8.5
Special education practicum	4	3.4
General psychology	4	3.4
Sociology course	2	1.7
Neuroscience course	1	0.8
Universal design for learning	1	0.8
<i>Music Courses</i>	<i>44</i>	<i>37.3</i>
Music therapy course	20	16.9
Music education course	8	6.8
General piano pedagogy	7	5.9
Music therapy practicum	5	4.2
Independent study in special education and piano pedagogy	1	0.8
Music psychology	1	0.8
Teaching music to students with special needs	1	0.8
Piano pedagogy for students with autism	1	0.8
<i>Total Undergraduate Courses Listed</i>	<i>151</i>	<i>128.0</i>

Note. Percentages represent the number of respondents ($n = 118$) who indicated they had taken a course during their undergraduate degree. Total percentages equal greater than 100% due to some respondents reporting multiple courses taken.

Specific Graduate Coursework. The respondents who selected “yes” to survey prompt 25 ($n = 71$, 9.6%), “Did you take coursework that addressed teaching students with NDs in your **graduate** education?” were then asked to provide the names of any courses they took that addressed NDs. Given that respondents were able to list multiple courses, the total frequencies counted ($n = 106$, 148.0%) exceed the number of individual responses to the prompt ($n = 118$). Open-ended response data were coded in the same fashion as those in undergraduate coursework (above). As with undergraduate course offerings, respondents who listed graduate courses tended to do so in non-music disciplines, referencing a total of 67 non-music courses ($n = 67$, 94.3%); 39 (54.2%) music courses were provided. The most prevalent non-music courses were in Special Education ($n = 32$, 45.1%) which aligned with the responses for undergraduate courses. However, psychology courses played a smaller role at the graduate level ($n = 14$, 19.7%) than at the undergraduate level ($n = 47$, 39.8%). In music disciplines, piano pedagogy courses were most frequently cited ($n = 15$, 21.1%), followed by music therapy courses ($n = 9$, 12.7%). See Table 4.16 for complete information about which graduate courses were listed by respondents.

Table 4.16*Graduate Courses that Addressed Special Education Topics*

Name of Course	Frequency	%
<i>Non-music Courses</i>	67	94.3
Special education course	32	45.1
“The Exceptional Child”/Educating exceptional learners	10	14.1
Developmental/child psychology	6	8.5
Abnormal psychology	3	4.2
Counseling course	3	4.2
General education course	3	4.2
General psychology	3	4.2
Special education practicum	3	4.2
Educational psychology	2	2.8
Neuroscience course	1	1.4
Universal design for learning	1	1.4
<i>Music Courses</i>	39	54.2
General piano pedagogy	15	21.1
Music therapy course	9	12.7
Music education course	4	5.6
DEI in the piano studio	3	4.2
Music therapy practicum	3	4.2
Independent study in special education and piano pedagogy	1	1.4
Independent study in piano pedagogy	1	1.4
Piano pedagogy for students special needs	1	1.4
Psychology of music	1	1.4
Teaching music to students with special needs	1	1.4
<i>Total Graduate Courses Listed</i>	106	148.5

Note. Percentages represent the number of respondents ($n = 71$) who indicated they had taken a course during their graduate degree. Total percentages equal greater than 100% due to some respondents reporting multiple courses taken.

Non-degree Training and Education. In addition to degree coursework, respondents were asked if they had undertaken any coursework or workshops that addressed NDs outside of their degree programs. Out of the 742 responses to this prompt, most participants ($n = 625$, 84.2%) reported that they had not taken any additional coursework or training beyond their degree programs (as seen in Table 4.17).

Table 4.17

Frequency of Coursework Taken Addressing NDs Outside of Degree Coursework

Degree	NDs Addressed?	Frequency	%
Did you take coursework that addressed teaching students with NDs outside of your degree coursework?	No	625	84.2
	Yes	117	15.8

Note. $N = 742$

If outside coursework/training was taken, respondents were asked to supply the names of such non-degree courses they took via an open-ended prompt. Data were coded thematically so that frequencies could be condensed. For instance, “local music teacher groups,” “NCKP and MTNA events,” and “sessions at conventions” were all coded as “session or lecture at a music teacher conference.” While non-music courses ($n = 75$, 64.2%) were still more prevalent than music courses ($n = 73$, 62.3%), the frequency of each was much more even than in prompts regarding degree programs. As in survey items 24 and 26, respondents could list multiple courses, so the total frequencies counted ($n = 148$, 126.5%) exceed the number of piano instructors responding to the prompt ($n = 117$, 100.0%). The most prevalent type of non-music coursework or training was

professional development (PD) associated with a particular job (i.e., workshops for PD, in education, nursing, other non-music fields, or continuing education courses for state teaching licenses). Stand-alone workshops or lectures for non-music fields made up 13.5% ($n = 20$) of courses listed, while continuing education credits for state teaching licenses made up 12.8% ($n = 19$) of courses listed. When combined, training associated with respondents' employment accounted for 26.3% ($n = 39$) of training outside of degree programs. For courses within music disciplines, training most often came in the form of conference sessions at local, state, and national music teacher conferences and meetings ($n = 35$, 23.6%), followed by online courses and webinars through national music teacher organizations (e.g., The Frances Clark Center, Berklee College of Music). See Table 4.18 for complete information regarding which non-degree courses respondents listed.

Table 4.18*Non-degree Courses and Seminars that Addressed Special Education Topics*

Name of Course	Frequency	%
<i>Non-music Courses</i>	75	64.1
Workshops for professional development (education, nursing, other non-music fields)	20	13.5
Continuing education courses for teaching license	19	12.8
Psychology courses	15	10.1
Special education seminar	10	8.5
The Exceptional Child/Educating exceptional learners	4	2.7
Foster parenting classes	3	2.0
Counseling courses	2	1.4
YouTube videos	1	0.7
Church class	1	0.7
<i>Music Courses</i>	73	62.3
Session or lecture at a music teacher conference	35	23.6
Webinars/online courses through national music teaching organizations	19	12.8
Music therapy course/seminar 10	6.7	
Private study	3	2.0
Music for special learners	2	1.4
Conference sessions at a music therapy conference	1	0.7
Music teacher mentoring websites	1	0.7
Orff/Kodály Course	1	0.7
Suzuki training	1	0.7
<i>Total Non-degree Courses Listed</i>	148	126.5

Note. Percentages represent the number of respondents ($n = 71$) who indicated they had taken a course outside of their degree programs. Total percentages equal greater than 100% due to some respondents reporting multiple courses taken.

Other Ways of Gaining Knowledge. Respondents were asked in what ways they had gained knowledge about how to teach piano students with NDs in survey prompt 29. Six response options were provided, (a) self-education, (b) consulting with parents/caregivers about successful approaches, (c) trial and error, (d) consulting with other piano teachers, (e) professional development events (e.g., conference sessions, webinars, summer courses) and (f) consulting with professionals (e.g., psychologists, teachers, special educators). Respondents were offered the opportunity to submit multiple responses, resulting in the the total frequency count ($n = 2,782$, 385.3%) exceeding the number of respondents to the prompt ($N= 722$). Self-education ($n = 640$, 88.6%) was the most used method, followed by consulting with parents ($n = 560$, 77.6%) and trial and error ($n = 533$, 73.8%). The other three response options were chosen between 40–50% of respondents. See Table 4.19 for complete information regarding piano instructors' methods of gaining knowledge about teaching students with NDs.

Table 4.19

Piano Instructors' Methods of Gaining Knowledge about Teaching Students with NDs (outside of coursework)

	Frequency	% of responses	% of respondents
Self-education (e.g., reading books, articles)	640	23.0	88.6
Consulting with parents/ caregivers about successful approaches	560	20.1	77.6
Trial and error	533	19.2	73.8
Consulting with other piano instructors	378	13.6	52.4
Professional development Events (e.g., conference sessions, webinars, summer courses)	351	12.6	48.6
Consulting with professionals (e.g., psychologists, teachers, special educators)	320	11.5	44.3
<i>Total Responses</i>	<i>2,782</i>	<i>100.0</i>	<i>385.3</i>

Note. These responses were provided by 722 respondents.

Piano Instructors' Experience with Teaching Students with NDs

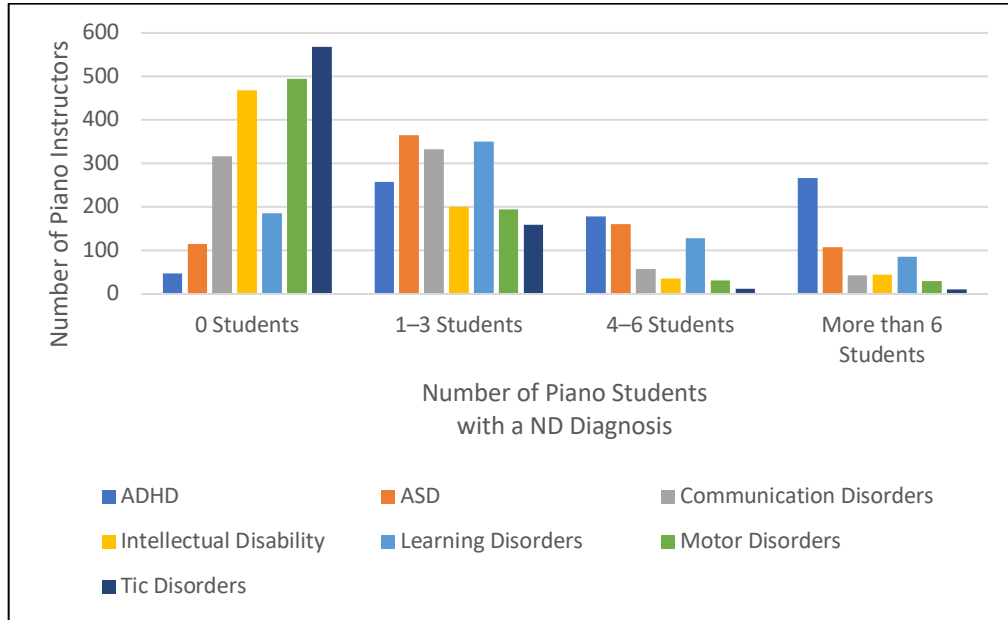
NDs Represented During Piano Instructors' Careers. To learn about the extent of piano instructors' experience in teaching students with NDs, I used survey prompts 33–38 to examine the approximate number of students with a ND that piano instructors had taught, as well as piano instructors' willingness to accept a student with a ND. First, respondents were asked to approximate the number of students they had taught with a medically diagnosed ND. (The list of NDs here was identical to the list used in survey prompts 20–21 regarding familiarity and awareness of NDs.) Piano instructors reported teaching the highest numbers of students with ADHD and ASD, where 35.5% ($n = 266$) of instructors had taught more than 6 students with ADHD and 14.4% ($n = 108$) of instructors had taught more than 6 students with ASD. Piano instructors had the least amount of experience teaching students with tic disorders, motor disorders, and intellectual disability. See Table 4.20 and Figure 4.5 for complete information regarding the number of students piano instructors taught was a ND diagnosis.

Table 4.20*Number of Students with an ND Diagnosis Over the Course of Piano Instructors' Career*

	0	1-3	4-6	More Than 6	<i>N</i>
Attention-deficit/ hyperactivity disorder	47 (6.3%)	258 (34.4%)	178 (23.8%)	266 (35.5%)	749
Autism spectrum disorder	115 (15.4%)	365 (48.7%)	161 (21.5%)	108 (14.4%)	749
Communication disorder	316 (42.4%)	332 (44.4%)	57 (7.6%)	43 (5.7%)	748
Intellectual disability	468 (62.6%)	200 (26.7%)	36 (4.8%)	44 (5.9%)	748
Learning disorders	185 (24.7%)	350 (46.7%)	128 (17.1%)	86 (11.5%)	749
Motor disorders	494 (66.0%)	194 (25.9%)	31 (4.1%)	29 (3.9%)	748
Tic disorders	568 (75.8%)	159 (21.2%)	12 (1.6%)	10 (1.3%)	749

Figure 4.5

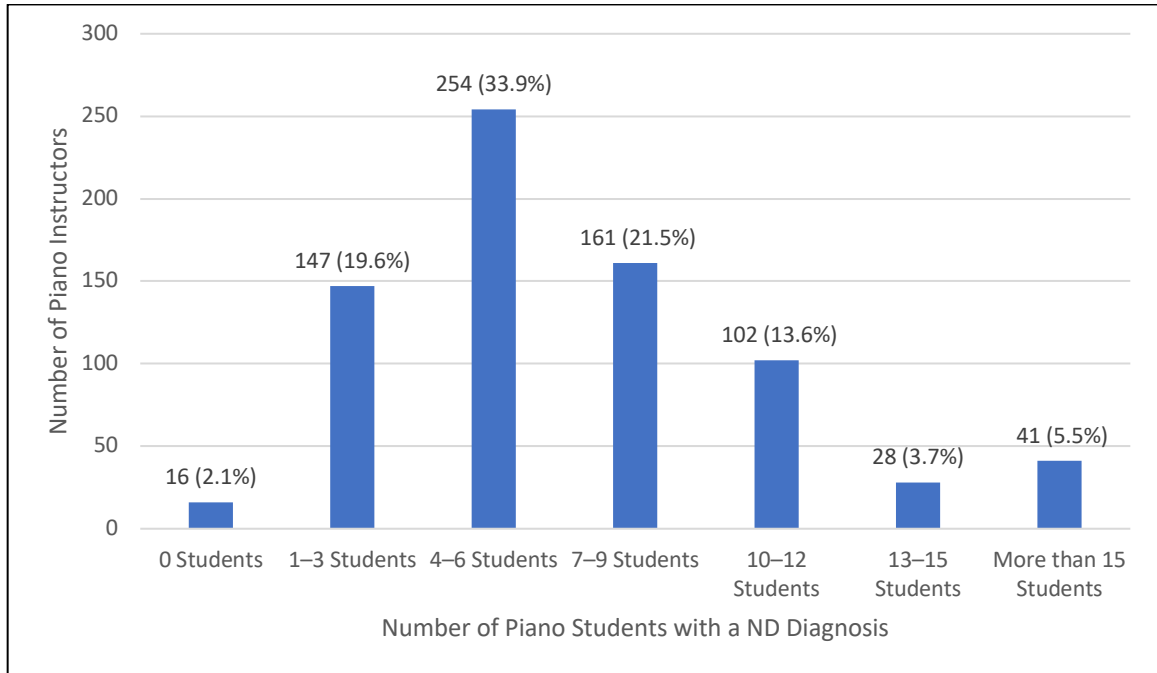
Number of Students with a ND Diagnosis Over the Course of Piano Instructors' Career (split by disorder)



Additionally, I calculated the general frequency of total students with NDs respondents reported teaching over the course of their careers ($N = 749$). Most piano instructors reported that had taught at least one student with a diagnosed ND ($n = 733$, 97.9%) and most responses fell in the “4–6 students” range ($n = 254$, 33.9%). For complete information regarding the total number of students with NDs taught by piano instructor respondents, see Figure 4.6.

Figure 4.6

Number of Students with a Specific ND Diagnosis Over the Course of Piano Instructors' Career (not split by disorder)



Piano Instructors' Willingness to Accept or Decline a Student with a ND. I

used survey prompts 35–38 to examine the rationale of piano instructors regarding their decisions to teach or not teach a student with a ND. Respondents were first asked how often they were asked to teach a student with a ND, then asked how often they (a) agree to teach a student with a ND, and (b) how often they decline. The response options for each of these questions utilized a 5-point Likert-type scale with anchors of *never* (0), *rarely* (1), *occasionally* (2), *a moderate amount* (3), and *a great deal* (4). Of the total responses ($N = 748$), most instructors responded that they were *rarely* ($n = 288$, 38.5%) or *occasionally* ($n = 264$, 35.3%) asked to teach a student with a diagnosed ND.

The means of the subsequent questions were, predictably, almost an inverse of each other where the mean of agreeing to teach was ($M = 2.53$, $SD = 1.25$) and the mean for declining to teach was ($M = 0.82$, $SD = 0.97$), indicating that piano instructors were more likely to agree to teach a student with a diagnosed ND than they were to decline to teach. Still, 54.2% ($n = 399$) respondents indicated that they would decline to teach a student “rarely,” at the minimum. See Tables 4.21 and 4.22 for complete information about the frequencies and means regarding piano instructors’ willingness to teach students with NDs.

Table 4.21*Frequency of Piano Instructors' Willingness to Teach Students with NDs*

	Never	Rarely	Occasionally	A Moderate Amount	A Great Deal	<i>N</i>
How often are you asked to teach students with diagnosed NDs?	66 (8.8%)	288 (38.5%)	264 (35.3%)	93 (12.4%)	37 (4.9%)	748
How often do you agree to teach students with NDs when asked?	43 (5.8%)	124 (16.8%)	202 (27.3%)	136 (18.4%)	234 (31.7%)	739
How often do you decline to teach students with NDs when asked?	338 (45.9%)	257 (34.9%)	100 (13.6%)	20 (2.7%)	22 (3.0%)	737

Table 4.22*Means and Standard Deviations of Piano Instructors' Willingness to Teach Students with NDs*

	Mean	<i>SD</i>	<i>N</i>
How often are you asked to teach students with diagnosed NDs?	1.66	0.97	748
How often do you agree to teach students with NDs when asked?	2.53	1.25	739
How often do you decline to teach students with NDs when asked?	0.82	0.97	737

Note. Responses were based on a scale of 0–4.

Since 54.2% ($n = 399$) of respondents ($N = 737$) indicated that they would decline to teach a student with a ND diagnosis at least some of the time, piano instructors were asked about the reasons they would decline to teach a student with a ND diagnosis. Six response options were provided: (a) *need for extra planning time*, (b) *lack of knowledge*, (c) *lack of prior success*, (d) *stigma associated with teaching neurodiverse students*, (e) *nothing would prevent me*, and (f) *other reason*. Given that respondents could submit multiple responses, so the total frequencies counted ($n = 950$, 128.0%) exceed the number of respondents who answered the prompt ($N = 742$). The most prevalent reason selected was a *lack of knowledge* ($n = 333$, 44.9%) followed by *nothing would prevent me* ($n = 262$, 35.3%). *Other reason* was the third most selected response ($n = 194$, 26.1%). See Table 4.23 for complete information regarding piano instructors' reasons for declining to teach a student with a ND diagnosis.

Table 4.23*Piano Instructors' Reasons for Declining to Teach a Student with a ND Diagnosis*

	Frequency	% of responses	% of respondents
Lack of knowledge	333	35.1	44.9
Nothing would prevent me from accepting a student with a ND diagnosis	262	27.6	35.3
Other reason	194	20.4	26.1
Need for extra planning time	92	9.7	12.4
Lack of prior success	65	6.8	8.8
Stigma associated with neurodiverse students	4	0.4	0.5
<i>Total Responses</i>	<i>950</i>	<i>100.0</i>	<i>128.0</i>

Note. These responses were provided by 742 respondents.

The 194 respondents who answered *other option* for question 38 were invited to provide additional clarification. Open-ended response data were coded inductively to allow for emergent themes; 18 categories emerged, (e.g., *behavioral issues, commitment or support from parents/caregivers*). Respondents who cited reasons for declining to teach a student with a ND diagnosis that were pedagogically specific were coded as *reason unrelated to NDs* and accounted for 12.4% of cases ($n = 24$). These reasons were most often described as a scheduling issue, but also included the student being too young for lessons, and not having an appropriate practice instrument. The most commonly cited reasons relevant to teaching students with NDs was a lack of commitment or support from parents and caregivers ($n = 32$, 16.5%), followed closely by the student being

physically aggressive or violent ($n = 31, 16.0\%$), and other non-violent behavioral issues (e.g., being uncooperative or unable to focus) ($n = 30, 15.5\%$). The severity of ND ($n = 19, 12.4\%$) was also a reason that piano instructors cited as an issue that would prevent them from accepting a student with a ND diagnosis into their studio. See Table 4.24 for complete open-ended information about what would prevent a piano instructor from teaching a student with a ND diagnosis.

Table 4.24

Piano Instructors' Open-ended Responses for Declining to Teach a Student with a ND Diagnosis

	Frequency	% of responses	% of cases
Lack of commitment or support from parents/caregivers	32	14.4	16.5
Student is aggressive or physically violent	31	14.0	16.0
Behavioral issues, e.g., student is combative/uncooperative/unable to focus	30	13.5	15.5
Reasons unrelated to NDs e.g., no openings in the schedule	24	10.8	12.4
ND is too severe	19	8.6	9.8
I don't have the abilities or training	14	6.3	7.2
I would always agree to teach a ND student on a trial basis	13	5.9	6.7
Another teacher is better suited	11	5.0	5.7

	Frequency	% of responses	% of cases
Need for too much mental/ physical energy	11	5.0	5.8
I am unfamiliar with a particular disability	8	3.6	4.1
If piano lessons aren't positive/ I don't connect with the student	6	2.7	3.1
"I don't have the patience"	5	2.2	2.6
Teaching students with NDs is not my specialty	5	2.2	2.6
Parents/caregivers conflating music lessons with Music Therapy	4	1.8	2.1
Group lessons too difficult for students with NDs	3	1.3	1.5
I only teach highly gifted students	3	1.3	1.5
"I don't have the right personality type"	2	0.9	1.0
Student needs are in opposition to my own sensory needs	1	0.04	0.05
<i>Total Responses</i>	<i>222</i>	<i>100.0</i>	<i>114.4</i>

Note. These responses were provided by 194 respondents.

Piano Instructor's Levels of Confidence and Perceived Success

The final section of the survey addressed piano teachers' levels of confidence and perceived success when teaching a student with a ND. Because confidence and perceived success are used as a measure of self-efficacy (Bandura, 2006), I used prior research from self-efficacy studies in music education and piano pedagogy to inform the data collection

for this section (e.g., Klein, 2021; Regier, 2019). As a result, responses were solicited using a confidence and ability scale of 0–10 in the following section.

Piano Instructors' Level of Confidence with Individual NDs. Respondents were asked to rate their level of confidence teaching students with specific NDs, using the same list from questions 20, 21, and 30. Piano instructors reported the highest levels of confidence teaching students with ADHD ($M = 6.97, SD = 2.59$) followed by ASD ($M = 6.14, SD = 2.75$); most respondents rated their confidence as “10” for ADHD ($n = 156, 21.4%$) and as “7” for ASD ($n = 104, 14.5%$). Piano instructors reported the lowest levels of confidence teaching students with motor disorders ($M = 3.89, SD = 2.98$), intellectual disability ($M = 3.98, SD = 2.91$), and tic disorders ($M = 4.02, SD = 3.11$). Most respondents rated their confidence as “1” for motor disorders ($n = 107, 16.8%$), “2” for intellectual disability ($n = 199, 14.1%$), and “1” for tic disorders ($n = 114, 18.5%$). See Table 4.25 for complete information regarding piano instructors' level of confidence with each ND.

Table 4.25*Piano Instructors' Level of Confidence with Individual Disorders*

	Mean	SD	N
I am confident teaching students with...			
...Attention-deficit/ hyperactivity disorder	6.97	2.59	728
...Autism spectrum disorder	6.14	2.75	717
...Communication disorder	5.17	2.89	693
...Intellectual disability	3.98	2.91	673
...Learning disorders	5.77	2.84	712
...Motor disorders	3.89	2.98	637
...Tic disorders	4.02	3.11	616

Note. *N* values vary among categories depending on the number of valid responses; Confidence items were anchored by a confidence scale ranging between 0 (*very unconfident*) to 10 (*very confident*).

Self-efficacy Prompts for Confidence and Success. In survey prompts 40 and 41, piano teachers were presented with self-efficacy statements related to teaching piano to students with NDs. This list of statements was adapted from the teacher efficacy for inclusive practices (TEIP) scale, initially designed for general education settings (Sharma et al., 2012), the self-efficacy scale for music teachers (SESMT) (Özmenteş, 2011), and prompts relating to teacher effectiveness from Regier's (2019) study on the self-efficacy of band directors teaching concert, marching, and jazz-ensembles.

Piano instructors reported the highest confidence levels for designing activities to meet the needs of students with mild impairments ($M = 7.05$, $SD = 2.74$), lower

confidence levels for meeting the needs of students with moderate impairments ($M = 6.41$, $SD = 2.81$), and the lowest levels of confidence for meeting the needs of students with severe impairments ($M = 4.62$, $SD = 3.11$). Most piano instructors rated their confidence as “10” for meeting the needs of students with mild impairments ($n = 176$, 24.6%), while rating their confidence as “8” for moderate impairments ($n = 104$, 14.6%), and “1” for severe impairments ($n = 87$, 12.7%). The remaining prompts all had means between 5.48–6.77, indicating a medium confidence level for the situations presented regarding teaching piano to students with NDs. See Table 4.26 for complete information on all prompts relating to piano instructors’ confidence levels in various teaching situations.

Table 4.26*Piano Instructors' Confidence Levels, Self-efficacy Prompts*

	<i>M</i>	<i>SD</i>	<i>N</i>
I am confident...			
...teaching both neurotypical and neurodivergent students.	6.1	3.05	700
...in my ability to prevent disruptive behavior in the lesson before it occurs.	5.55	2.74	709
...in my ability to get parents/families involved in the music learning activities of their children with disabilities.	6.16	2.79	714
...in designing activities to meet the individual needs of students with mild impairments.	7.05	2.74	715
...in designing activities to meet the individual needs of students with moderate impairments.	6.41	2.81	713
...in designing activities to meet the individual needs of students with severe impairments.	4.62	3.11	684
...when dealing with students who engage in challenging behaviors such as non-compliance or “meltdowns.”	5.48	2.90	700
...modifying my teaching strategies when working with students with diagnosed NDs.	6.63	2.90	715
...modifying my teaching strategies when working with students with suspected NDs.	6.77	2.78	718
...discussing NDs with parents/families of students.	6.44	2.92	708

Note. *N* values vary among categories depending on the number of valid responses; Confidence items were anchored by a confidence scale ranging between 0 (*very unconfident*) to 10 (*very confident*).

The second set of self-efficacy prompts began with the root, “I am able to...” and were followed by a list of items related to teaching students with NDs as well as items that are inherent to teaching all piano lessons. The means for this survey item were generally higher than the means for the confidence items, with the mean range of 6.44–8.18, as well as the response rate being higher, where N values for the confidence items ranged from $N = 684$ – 718 , while N values for the success items ranged from $N = 718$ – 736 . The discrepancy between reported confidence and ability levels, as well as differing response levels, will be discussed in full in Chapter 5.

Piano instructors reported the highest levels of perceived success for prompts unrelated to teaching students with NDs. The prompt, “I am able to provide appropriate challenges for very capable students,” had the highest levels of perceived success ($M = 8.18$, $SD = 2.08$), with most teachers rating their success as “10” ($n = 255$, 34.6%). Additionally, a large majority of respondents ($N = 736$) rated their success level for this prompt as “8” or above ($n = 534$, 72.5%)—followed closely by the prompt “I am able to provide alternative explanations or examples when students are confused,” where respondents ($N = 737$) rated their perceived success highly ($M = 7.98$, $SD = 2.22$). Again, most respondents rated their perceived success as “10,” ($n = 247$, 35.5%), with the majority rating their perceived success as “8” or above ($n = 505$, 68.5%). The lowest level of perceived success resulted from the prompt “I am able to calm a student who is disruptive or upset” ($M = 6.44$, $SD = 2.58$). Despite this prompt receiving the lowest level of perceived success, most respondents ($N = 722$) selected “8” for this prompt ($n = 121$, 16.6%). See Table 4.27 for complete information regarding piano instructors perceived success in teaching students with NDs.

Table 4.27*Piano Instructors' Perceived Levels of Success, Self-efficacy Prompts.*

	<i>M</i>	<i>SD</i>	<i>N</i>
I am able to...			
...calm a student who is disruptive or upset.	6.44	2.58	722
...make parents/caregivers feel comfortable bringing their children with disabilities to piano lessons.	7.56	2.56	718
...assist parents/caregivers in helping their children with disabilities do well in piano lessons.	6.69	2.73	726
...accurately gauge student comprehension of what I have taught.	7.35	2.25	736
...provide appropriate challenges for very capable students.	8.18	2.08	736
...redirect disruptive behavior in the piano lesson.	6.54	2.64	728
...provide alternative explanations or examples when students are confused.	7.98	2.22	737
...earn the trust of parents/caregivers of students with NDs.	7.54	2.53	726
...establish a positive rapport with students with NDs.	7.68	2.39	725

Note. *N* values vary among categories depending on the number of valid responses;

Success items were anchored by an ability scale ranging between 0 (*unable*) to 10 (*very able*).

Interactions Between Variables

Data Reduction

To better understand factors that led to the descriptive results in the previous section, I conducted additional statistical tests to learn how variables interacted with one another. Specifically, I wanted to know if (a) the respondents taking a course in their undergraduate or graduate education or (b) their field of study influenced their perceptions of confidence, success, and preparation to teach piano to students with a ND diagnosis. Exploratory analysis indicated that basic demographics such as age, gender and race/ethnicity would not produce significant results.

I recoded values for field of study because of the large number of degree plans reported by respondents. For the purposes of this analysis, I wanted to know if coursework undertaken influenced how respondents felt about teaching piano students with NDs. As a result, each respondent that supplied information about their degree level for any degree was assigned a category based on how much coursework regarding NDs could be found in each degree program. For example, if a respondent had any general or music education degree listed, they were placed in the “education” category, even if they had other degrees in piano performance. All degree programs reported were placed in the following groups:

1. **Piano** (included piano performance, piano pedagogy, and collaborative piano degrees) (n = 382, 52.7%)
2. **Education** (included general and music education) (n = 170, 23.4%)
3. **Other music** degree (n = 65, 9.0%)
4. **Other non-music** degree (n = 66, 9.1%)

5. **ND relevant** degree (included music therapy, special education, and psychology degrees) (n = 42, 5.8%)

Survey prompts 39 (confidence with specific NDs), 40 (confidence in teaching situations), and 41 (ability in teaching situations) were the dependent variables tested. To examine the internal consistency of these items, I computed Cronbach's α . For confidence relating to specific NDs, the alpha was high, $\alpha = 0.90$. Cronbach's α for confidence in teaching situations and ability in teaching situations were also high, $\alpha = 0.95$, and $\alpha = 0.95$, respectively. These α scores indicate that the items have good internal consistency, and will form a reliable scale (Russell, 2018). After ensuring that α scores were acceptable, I created latent variables for each of the three items. Confidence with specific NDs had a total possible score of 0–70, confidence in teaching situations had a total possible score of 0-100, and ability in teaching situations had a total score of 0–90. See Table 4.28 for means and SDs of each latent variable.

Table 4.28

Means and Standard Deviations of Latent Variables

	Mean	SD	Range	α
Confidence with specific NDs	33.12	16.92	0–70	0.90
Confidence in teaching situations	57.96	26.48	0-100	0.95
Ability in teaching situations	64.20	20.62	0-90	0.95

Note. N = 749

Relationships Between Field of Study and Confidence/Ability

Field of Study and Confidence with Specific NDs. I wanted to know if there were differences in levels of confidence with specific NDs based on respondents' field of study. Using the recoded values for field of study from above, I conducted a Kruskal-Wallis H test. I used this non-parametric test because the data were not normally distributed, thus violating one of the assumptions for an ANOVA. The analysis revealed that there was a statistically significant difference in confidence based on field of study ($\chi^2 = 30.49, df = 4, p < 0.001$). The effect size ($\varepsilon^2 = 0.04$) indicated a moderate practical significance. In order to locate the differences, I conducted a Dwass-Steel-Critchlow-Fligner (DSCF) pairwise comparison post hoc test. This analysis showed that there were no statistically significant differences among respondents with piano degrees (group 1), education degrees (group 2), other music degrees (group 3), and other non-music degrees (group 4). However, statistically significant differences existed between those with ND relevant fields of study (group 5) and every other group, meaning that respondents with higher education in ND relevant fields of study were more confident with each of the specific disorders, both statistically and practically.

Field of Study and Confidence/Ability in Teaching Situations. To learn whether there were differences in levels of confidence and perceived ability/success in piano teaching situations based on respondents' field of study, I conducted two more Kruskal-Wallis H tests. Again, the data were not normally distributed, violating one of the assumptions of an ANOVA, so this non-parametric test was used. Analysis revealed statistically significant results for both confidence in teaching situations ($\chi^2 = 35.34, df = 4, p < 0.001$) and ability/perceived success in teaching situations ($\chi^2 = 22.68, df = 4, p <$

0.001). The effect sizes ($\epsilon^2 = 0.05$) and ($\epsilon^2 = 0.03$) indicated a moderate and weak practical effect. Post hoc tests again revealed that no differences existed between groups 1–4, but that almost all groups were different from group 5, (respondents who had ND relevant fields of study). The only exception occurred within the test for “ability/perceived success in teaching situations,” where there was no statistically significant difference between group 3 (other non-music fields of study) and group 5 (ND relevant fields of study). See Table 4.29 for a complete comparison of respondents’ levels of confidence and ability based on respondents’ field of study.

Table 4.29

Comparison of Respondents’ Levels of Confidence and Ability Based on Respondents’ Field of Study

Variable	χ^2	<i>df</i>	<i>p</i>	ϵ^2
Confidence with specific NDs	30.49	4	< 0.001	0.04
Confidence in teaching situations	35.34	4	< 0.001	0.05
Ability in teaching situations	22.68	4	< 0.001	0.03

Note. $N = 749$

Relationships Between Taking a Course with Special Education Topics and Confidence/Ability

Beyond field of study, I wanted to learn if having taken a course in undergraduate, graduate, or non-degree/PD scenarios relating to NDs influenced respondents’ confidence and perceived success in teaching students with NDs. I conducted non-parametric Mann-

Whitney U tests to compare these variables because the data were not distributed normally, thus violating the assumptions for a parametric *t*-test. Each Mann-Whitney U test was conducted with the same dependent variables (confidence with specific NDs, confidence in teaching situations, and ability/success in teaching situations), alternating the grouping variables below:

1. “Did you take coursework that addressed teaching students with neurodevelopmental disabilities in your undergraduate education?”
2. “Did you take coursework that addressed teaching students with neurodevelopmental disabilities in your graduate education?”
3. Did you take coursework or professional development that addressed teaching students with neurodevelopmental disabilities outside of your degree coursework?

Analysis based on all three grouping variables showed statistically significant differences for each of the three dependent variables, ($p = < 0.001$, all tests). Respondents who had taken coursework at any level reported higher levels of confidence with specific NDs, higher confidence in teaching situations, and higher perceived ability/success in teaching situations. The effect sizes were between $r = 0.29$ and $r = 0.38$, indicating weak to moderate practical effects for these variables. See Table 4.30 for complete analysis of the Mann-Whitney U tests comparing respondents who took coursework relating to NDs and their confidence and ability levels in teaching piano students with NDs.

Table 4.30*Comparison of Respondents Who Took an Undergraduate, Graduate, or Non-degree**Course*

Variable	<i>n</i>	<i>Mean Ranks</i>	<i>SD</i>	<i>U</i>	<i>Z</i>	<i>p</i>
Undergraduate Course						
<i>Confidence w/ specific NDs</i>	748	33.12	16.92	25220.00	10.00	< 0.001
ND Course? Yes	118	41.06	15.23			
No	630	31.60	16.80			
<i>Confidence in teaching situations</i>	748	57.96	26.48	23132.00	16.00	< 0.001
ND Course? Yes	118	72.30	20.04			
No	630	55.22	26.67			
<i>Ability in teaching situations</i>	748	64.20	20.62	25528.50	9.00	< 0.001
ND Course? Yes	118	72.91	15.81			
No	630	62.54	20.99			
Graduate Course						
<i>Confidence w/ specific NDs</i>	739	33.12	16.92	16683.00	8.00	< 0.001
ND Course? Yes	71	74.04	12.09			
No	668	63.21	21.10			
<i>Confidence in teaching situations</i>	739	57.96	26.48	15737.50	14.00	< 0.001
ND Course? Yes	71	72.34	19.16			
No	668	56.50	26.81			
<i>Ability in teaching situations</i>	739	64.20	20.62	15508.50	11.00	< 0.001
ND Course? Yes	71	42.51	15.51			
No	668	32.19	16.84			

Variable		<i>n</i>	<i>Mean Ranks</i>	<i>SD</i>	<i>U</i>	<i>Z</i>	<i>p</i>
<hr/>							
<i>Non-degree Course/PD</i>							
<hr/>							
<i>Confidence w/ specific NDs</i>		742	33.12	16.92	26133.50	90.00	< 0.001
ND Course?	Yes	117	40.34	16.05			
	No	625	31.65	16.74			
<i>Confidence in teaching situations</i>		742	57.96	26.48	24262.00	15.00	< 0.001
ND Course?	Yes	117	70.80	21.31			
	No	625	55.38	26.70			
<i>Ability in teaching situations</i>		742	64.20	20.62	25546.50	8.00	< 0.001
ND Course?	Yes	117	72.48	16.47			
	No	625	62.54	20.99			
<hr/>							

Note. *n* values vary among categories depending on the number of valid responses.

CHAPTER 5: DISCUSSION

Understanding how piano instructors navigate their teaching of students with neurodevelopmental disabilities (NDs) is an important goal for the field of piano pedagogy—not only to help create more accessibility for piano students with NDs, but also to address the ongoing needs of piano instructors in the field and collegiate pianists seeking to build a career in the field. Research in this area of piano has been limited, with most extant studies using small-scale qualitative methodologies. Therefore, I sought to learn about piano instructors' experience, preparation, confidence, and perceptions of success in teaching students with NDs using this large-scale, quantitative survey study.

Purpose of the Study

The purpose of this study was to investigate piano instructors' perceived levels of confidence, success, and preparation in teaching students with NDs. A secondary purpose of the study was to learn about the varied contexts in which piano instructors learn how to teach students with NDs.

Research Questions

1. Which neurodevelopmental disabilities do piano instructors have familiarity and experience with, and to what degree?
2. To what extent do piano instructors include students with various neurodevelopmental disabilities in their piano studios?
3. In what contexts do piano instructors learn to teach students with neurodevelopmental disabilities?
4. How confident and successful do piano teachers believe themselves to be in teaching students with neurodevelopmental disabilities?

Summary of Research Procedures

Data were collected from piano instructors teaching piano in the United States, recruited primarily from members of the Music Teachers National Association (MTNA), but also from piano instructor groups on Facebook from May 22 – June 5, 2023. Respondents ($N = 749$) completed a researcher-designed survey which included prompts regarding (1) demographic information and educational background, (2) familiarity with NDs, (3) preparation to teach and experience in teaching students with NDs, and (4) confidence and perceived success in teaching students with NDs. I used descriptive and inferential data analysis for quantitative data and deductive and typical qualitative processes of coding and theming for open-ended responses.

In this chapter, I first present the piano teacher profile, which includes relevant demographic information. This is followed by a summary of the major findings, and a discussion of findings in relation to each of the research questions. The chapter concludes with a discussion of suggestions for future piano instructors, piano instructors, piano pedagogy professors/curriculum developers, ending with suggestions for future research and limitations of the study.

Piano Instructor Profile

To better understand the respondents' backgrounds, I asked demographic questions at the outset of the survey. The demographic data collected is important for understanding the influential factors and rationale of respondents' reported experiences, preparation, and confidence/perceived success in teaching students with NDs. In some respects, the piano instructors recruited for this study had widely varying backgrounds, which will help to explain and provide nuance for the following sections.

In terms of basic demographics such as gender and race, a vast majority of respondents reported being female ($n = 641$, 85.6%) and white ($n = 659$, 88.1%). They were all located in the United States; all 50 states including the District of Columbia were represented. Respondents ($N = 740$) ranged from 19–80 years old, with some participants indicating through open-ended responses that they were even older than 80. Respondents' ($N = 741$) years of teaching experience ranged from 1–60 years, with a wide spread of numbers of years teaching. The majority of piano instructors' experience teaching piano lessons fell between 6–45 years ($n = 603$, 81.4%).

Most piano instructors taught out of their home studios ($n = 505$, 67.4%), with smaller percentages of teachers in independent studios (outside the home), community music studios, pre-college conservatories, or other environments. Piano instructors reported studio sizes between 1–60 students, with most studios in the range of 11–20 students ($n = 238$, 32.9%). Most piano instructors reported that they taught private lessons ($n = 641$, 85.6%), with much smaller percentages for semi-private, group, or combination of group and private lessons. Additionally, 8.4% ($n = 63$) of piano instructors reported teaching online or virtually.

Respondents had a wide range of educational backgrounds. Most respondents had attained a minimum of a bachelor's degree ($n = 699$, 93.4%), and had varying fields of study in higher education. On average, 84.9% ($n = 1,068$) of degrees were in music disciplines, with piano performance as the most often reported degree for undergraduate study ($n = 259$, 36.0%), master's degrees ($n = 141$, 32.9%), and doctoral degrees ($n = 42$, 38.5%). Commonly reported non-music disciplines were mostly in the field of education. In the following sections of this chapter, I will address how the demographic information

reported by respondents relates to elements of piano instructors' experience, preparation, and confidence in teaching students with NDs.

Summary of Findings

In this section of the discussion, I present a summary of findings derived from the survey data. Because much of the descriptive data is novel in the field of piano pedagogy, the findings dealing with prevalence of piano instructors teaching students with NDs, as well as their education level and background can provide a necessary foundation for future inquiries into general demographics of piano instructors in the field of piano pedagogy, as well as the teaching of piano students with NDs.

Finding 1: Prevalence of Piano Instructors Teaching Students with NDs.

Results from the current study show that 97.9% ($n = 733$) of piano instructor respondents have taught or currently teach at least one student with a ND diagnosis; this percentage seems staggering. It is possible that this exceptionally high proportion of piano instructors that teach at least one student with a ND is due to self-selection in deciding to participate in the research, however, I included a statement in all recruitment materials that specified that no experience teaching students with NDs was necessary for eligibility to participate in this study. While there have been no previous large-scale inquiries into the prevalence of students with NDs seeking and finding piano instruction, small-scale studies have shown high percentages of inclusion of students with disabilities (Dumlavwalla & Bugaj, 2020; Ostrosky, 2023) in addition to mounting anecdotal evidence in the form of practitioner articles in piano pedagogy journals and conference sessions on topics of inclusion and special education piano pedagogy (Bauer, 2020; Kim, 2021; Ostrosky, 2023; Polischuk, 2018; Price, 2020, 2018, 2019; Steck-Turner, 2017).

Finding 2: Most Piano Instructors Are Underprepared to Teach Students

with NDs. Despite the large percentage of piano instructors including students with NDs in their studios, respondents reported low numbers of taking any coursework or training on the topic. Across the study, 81.5% ($n = 606$) of respondents had not taken a course during their undergraduate degree that addressed NDs in any way, 69.3% ($n = 512$) had not taken a course during their graduate degree, and 84.2% ($n = 625$) had not taken any coursework outside of their degree programs. This lack of training is problematic for both students with NDs and piano instructors, where students' needs are left potentially unmet, and instructors feel unconfident and less likely to accept a ND student. "Lack of knowledge" was most frequently cited reason for a piano instructor to decline to teach a student with a ND ($n = 333, 44.9%$). Piano instructors' confidence and perceived success was higher when respondents also reported a field of study related to NDs such as special education, music therapy, or psychology. More importantly, piano instructors across the study reported higher levels of confidence and perceived success when they reported having taken at least one course that addressed NDs in some way. Common courses that included components of special education pedagogy in music disciplines were piano pedagogy, music therapy, and in music education courses. Common courses that included components of special education pedagogy in non-music disciplines were psychology (e.g., abnormal, developmental) and special education courses. While further research is needed to learn how NDs are addressed and to what extent, this finding shows that topics addressing NDs can be embedded in coursework not necessarily designated as special education courses.

Finding 3: Most Piano Instructors Agree to Teach Students with NDs in Some Circumstances. With the statistic showing that 97.9% ($n = 733$) of piano instructors teach or have taught at least one student with a diagnosed ND, it can be inferred that most piano instructors agree to teach students with NDs. Because piano instructors reported that parents and caregivers do not always share diagnoses at the outset of lessons, there are some piano instructors that end up teaching students with NDs that wouldn't otherwise accept such students. This helps to explain the discrepancy of the following statistic, that 94.2% ($n = 696$) reported that they would accept a piano student with a ND at least some of the time. Knowing that piano instructors may choose to accept or decline a student for any reason, I wanted to know what circumstances would prevent piano instructors from accepting a student with a diagnosed ND. As previously stated, "lack of knowledge" was most frequently cited reason for a piano instructor to decline to teach a student with a ND ($n = 333, 44.9\%$), but respondents ($n = 194, 26.1\%$) were also forthcoming with barriers for accepting ND students via open-ended responses. Reasons for declining to teach a student with a ND included "lack of commitment or support from parents/caregivers," "student is aggressive or physically violent," and "behavioral issues (e.g., student is combative, uncooperative, and/or unable to focus)." While concerning and relevant issues for piano instructors and should be studied further, the implication is that most piano instructors are open to accepting students with ND in their studios.

Finding 4: Piano Instructors Seek Out Resources for Special Education Piano Pedagogy. While "lack of knowledge" was frequently cited as a barrier for piano instructors declining to teach a student with a ND ($n = 333, 44.9\%$), most piano instructors reported seeking information and education about NDs on their own, outside

of any degree program. Some respondents ($n = 640, 88.6\%$) cited reading books or articles to gain knowledge about teaching students with NDs, while others ($n = 560, 77.6\%$) reported that they had gained knowledge about how to teach ND students by consulting with parents or caregivers about successful approaches. Still, “trial and error” also was frequently cited ($n = 533, 73.8\%$) as a means of gaining instructional knowledge. Professional development was a viable source for special education piano pedagogy for nearly half of all respondents ($n = 351, 48.6\%$).

Despite findings from studies in music and general education indicating that in-service PD was less impactful than pre-service coursework and field-experiences (Feng & Sass, 2013; Kisbu-Sakarya & Doenyas, 2021), for many piano instructors, PD experiences may be the only formal education they have access to. As stated previously, there are many options for engaging in PD relating to special education piano pedagogy at national, state, and local music teachers’ conferences. Additionally, it may be unfeasible for practicing piano teachers to take collegiate coursework once they have earned their desired level of education.

Piano Instructors’ Experience in Teaching Students with NDs

Research question one dealt with piano instructors’ familiarity and experience in teaching piano students with NDs. Different facets of experience were explored through survey prompts, including which disorders piano instructors had the most familiarity with, how many students they had taught that had NDs, and in what non-teaching contexts they had been exposed to an individual with a ND diagnosis.

Familiarity with NDs

Familiarity with Individual Disorders. Respondents were given a list of NDs adapted from the DSM 5-TR (American Psychiatric Association, 2022) and asked to rate their level of familiarity with each disorder. Following, respondents were instructed to rate their level of awareness of the behaviors associated with each disorder using a 5-point, Likert-type scale: *not familiar at all* (0), *slightly familiar/aware* (1), *moderately familiar/aware* (2), *very familiar/aware* (3), and *extremely familiar/aware* (4).

Respondents reported the highest familiarity ratings for attention-deficit/hyperactivity disorder (ADHD) $M = 2.50$, $SD = 1.08$), followed by autism spectrum disorder (ASD) ($M = 2.28$, $SD = 1.11$). These findings were unsurprising, given that, in the US, ADHD is by far the most prevalent diagnosed ND, followed by ASD. As of 2016, 8.4% of children aged 2–17 were diagnosed with ADHD (Danielson et al., 2018; Ercan et al., 2022), and 1–3% diagnosed with ASD in the US (Christensen et al., 2019; Xu et al., 2018).

Piano instructors reported the lowest levels of familiarity for motor disorders ($M = 1.11$, $SD = 1.11$) and tic disorders ($M = 1.03$, $SD = 1.03$). These survey prompts also were often skipped completely by respondents, which may indicate that familiarity and awareness of these disorders could be lower than reported among piano instructors.

Despite a lack of familiarity by piano teachers in this study, motor disorders are quite prevalent in the US, with 5–6% of children are estimated to be affected with disorders in this category—particularly, developmental coordination disorder (DCD) (Blank et al., 2012). However, they remain relatively unknown with only 41% of pediatricians and 23% of general physicians being aware of DCD (Harris et al., 2015). If healthcare

professionals are largely unfamiliar with this disorder, it comes as no surprise to learn that piano instructors were also unfamiliar.

Contexts of Familiarity

In the Piano Lesson. Piano instructors ($N = 749$) were asked how many students they had taught who had a diagnosis of a ND. The overwhelming majority of respondents reported that they had taught at least one student with a diagnosed ND ($n = 733, 97.9\%$). This finding is a much higher percentage than what Dumlavwalla & Bugaj (2020) reported from their quantitative study on the training, tools, and resources that studio piano and string teachers have at their disposal to prepare them to work with students with disabilities. The authors found that 84% of respondents ($N = 60, n = 34$ piano teachers) had experience teaching at least one student with a disability, which is still a solid majority. The finding in the current study indicates that a staggering majority of piano instructors have experience teaching piano students with NDs, and demonstrates a compelling need within the field of piano pedagogy to support piano instructors' success in teaching neurodiverse students, as well as neurotypical students.

When broken down by disorder, piano instructors' ($N = 749$) reported teaching high numbers of students with ADHD ($n = 266, 35.5\%$) and ASD ($n = 108, 14.4\%$). Again, ADHD and ASD are the most prevalent NDs (Christensen et al., 2019; Danielson et al., 2018; Ercan et al., 2022; Xu et al., 2018), so these percentages are unsurprising. The ranks of *familiarity* and *awareness* of specific NDs from the previous section are almost perfectly aligned with the ranks of number of students taught with a specific disorder. Again, it may be unsurprising that piano instructors would have more

familiarity and awareness of NDs that they had exposure to via teaching a student with a particular ND.

Other Contexts. Since piano teachers may have experiences with individuals with NDs outside of the piano teaching studio, I wanted to learn about the other contexts in which piano instructors gained exposure to individuals with NDs. Most respondents ($n = 681$, 92.5%) had at least some interactions with individuals with NDs outside of the teaching studio, including in family situations ($n = 580$, 78.1%), in classroom settings (as a peer) ($n = 594$, 81.3%), acting as a caregiver or parent ($n = 364$, 49.7%), and as a colleague ($n = 490$, 67.4%). These high percentages reflect the improved attitudes towards individuals with disabilities and their greater visibility in the public sphere since the passage of IDEA in 1975 (Begeny & Martens, 2007) and provide further justification for the need to prepare piano instructors to teach students with NDs. Given that they encounter such individuals in everyday life, it is likely that piano instructors also will teach students with NDs in formal settings.

The Extent of Inclusion within Piano Studios

In research question two, I sought to determine piano teachers' willingness to practice inclusion within their studios: "To what extent do piano instructors include students with various NDs in their piano studios?" Respondents were asked about the frequency with which they were asked to teach a student with a diagnosis of a ND, how often they agreed or declined, and what their reasoning was for declining to teach a student with a ND diagnosis. Unlike teaching music in public schools, instructors of private piano lessons may choose who they want to teach and decline to teach a student for any reason, so these questions are unique to the field of piano pedagogy.

Researchers in music education have studied the prevalence of disabled students in music classrooms since 1977 and continuing through more recent decades. Findings from landmark studies (e.g., Atterbury, 1998; Cooper, 1999; Frisque et al., 1994; Gfeller et al., 1990; Gilbert & Asmus, 1981; Shehan, 1977; Shelfo, 2007; Sideridis & Chandler, 1995) have helped to inform and influence music teacher education programs and PD offerings to help music teachers meet the needs of disabled students. Aside from Dumlavwalla & Bugaj's (2020) relatively small-scale study ($N = 60$, $n = 34$ piano teachers), the extent of how many *piano instructors* have taught students with NDs has remained unexplored in the field of piano pedagogy. The current study represents the first large-scale study to explore the prevalence of NDs in piano teaching environments.

Willingness to Include. Most respondents ($N = 748$) reported that they were “rarely” ($n = 288$, 38.5%) or “occasionally” ($n = 264$, 35.3%) asked to teach a student with a medically diagnosed ND. An overwhelming majority of piano instructors reported that they were open to the idea of accepting a student with a ND diagnosis when asked to do so, with only 5.8% ($n = 43$) of respondents disclosing that they would never agree to teach a student with a medical diagnosis of a ND. Most respondents ($n = 234$, 31.7%) indicated that they agreed to teach a student with a ND “a great deal.” These findings show that many piano instructors view teaching students with NDs as something that is not insurmountable, but something that they are willing to try.

Barriers for Accepting ND Students. Because most piano instructors indicated that there were situations where they would decline to teach a student with a ND diagnosis, they were then asked further details about such situations. The closed response items presented were adapted from the findings of Martiros (2012) and included “lack of

knowledge” ($n = 333, 45.9\%$), “need for extra planning time” ($n = 92, 12.4\%$), “lack of prior success” ($n = 65, 8.8\%$), and “stigma associated with neurodiverse students” ($n = 4, 0.5\%$). While Martiros (2012) found that “stigma” was a factor in deciding to accept a student with a disability, the current study showed that it was a negligible factor, and that most factors piano instructors reported had to do with how they felt about their own skills and preparation—not how they felt about the student in question. This difference in findings may be attributed to the small number of participants in the 2012 study, as well as greater visibility and acceptance of students with disabilities in the field of piano pedagogy at the time of this writing compared with attitudes in 2012.

In addition to closed response options, respondents had the opportunity to cite other barriers for accepting a student with a ND. Respondents ($n = 194$) that selected “other reason” were given the option to provide further details. The most common reason cited was a “lack of commitment or support from parents or caregivers,” ($n = 32, 16.5\%$), followed closely by “student is aggressive or physically violent,” ($n = 31, 16.0\%$). One piano instructor noted, “I do not allow self-injurious behavior or physically acting out. I draw a hard line at violence.” Other, non-violent behavioral issues were mentioned by respondents ($n = 30, 15.5\%$). One piano instructor described their experiences with behavioral issues:

I turn down kids if I can't work with them. One kid was messing with the keys on the piano. Another kid was putting his feet on the keys if he sat *at all*. Another girl just plain wouldn't listen, like not even putting her hands on the piano when I asked. These are the only kids I've turned away.

In agreement with the participants in Martiros (2012), some piano instructors reported believing that students with NDs should have the opportunities to learn piano but felt like another teacher would do a better job attending to students' individual needs. One respondent stated:

I might turn away a student who I've already been teaching if I feel like another professional would better suit their needs. It's respectful both to myself and the student to know my own limits as a teacher.

While most piano instructors reported that they would be willing to accept students with NDs in at least some circumstances, there were several outliers whose responses indicated that they believed students with NDs would not be capable of musical performances, or that they could not be considered high achieving or talented. One respondent wrote, "I have a limited amount of patience and tolerance toward nonmusical performances," while another stated, "I teach high ability/talented students because that is where my expertise as a pianist is." This finding indicates that there are still problematic attitudes towards individuals with disabilities, which potentially could be ameliorated with more visibility of musicians with NDs in concert programming, and more opportunities for piano instructors to see and work with students of all abilities during their formative programs of study.

Preparation to Teach Piano to Students with NDs

In research question three, I asked "In what contexts do piano instructors learn to teach students with NDs?" Because of the respondents' wide variety of fields of study, I wanted to learn where they gained knowledge or expertise for teaching piano to students with NDs. Respondents provided their educational backgrounds, and while it is possible

to infer what kind of coursework they engaged in during their studies based on typical degree plans, I wanted to learn specifically where respondents had gained this knowledge in practice. I also investigated other learning activities to examine the how the respondents viewed their learning of special education pedagogy for the piano lesson.

Degree Coursework Related to NDs

After supplying their fields of study in higher education, respondents were asked if they had taken any coursework that addressed individuals with NDs in their undergraduate studies, in their graduate studies, and outside of degree-seeking contexts. In all contexts, most respondents reported that they had not taken any kind of coursework in undergraduate degree programs ($n = 606$, 81.0%), graduate degree programs ($n = 512$, 69.3%), or non-degree coursework ($n = 625$, 84.2%). This finding is important considering that almost all piano instructor respondents reported that they teach piano to students with NDs in some capacity ($n = 733$, 97.9%). In music education research literature, music teachers felt more confident about their abilities to teach students with disabilities when they had pre-service experiences in coursework as well as field experiences (Culp & Salvador, 2021; Hourigan, 2009; Salvador, 2010). The implication from the lack of conscious inclusion of special education topics in degree programs geared towards teaching piano is that professional piano instructors in the field are woefully underprepared to meet these teaching challenges. Additionally, while PD for practicing piano instructors can be helpful, research studies in general education have found that the best predictor of success in teaching students with special education needs is the incorporation of inclusive education experiences at the undergraduate and graduate level (Feng & Sass, 2013; Kisbu-Sakarya & Doenyas, 2021). Based on current and

previous research findings, it seems imperative that piano pedagogy curricula include coursework that addresses teaching piano to students with disabilities to better prepare future piano instructors for relevant and necessary skills needed to teach piano lessons.

Coursework by Field of Study. Despite the bulk of respondents not engaging in any coursework related to NDs through their degree programs, it is important to examine how topics relating to NDs were incorporated into coursework for the respondents who reported “yes.” The rates of coursework included in degree plans was highest for education and ND relevant fields such as music therapy, special education, and psychology in both undergraduate (education, $n = 57$, 34.1%; ND relevant, $n = 21$, 51.2%) and graduate (education, $n = 30$, 21.9%; ND relevant, $n = 16$, 64.0%) degree programs. When asked to list the names of the courses taken, respondents cited special education courses (undergraduate $n = 28$, 23.7%; graduate, $n = 32$, 45.1%,) as well as psychology courses (undergraduate, $n = 47$, 39.8%; graduate, $n = 14$, 11.9%) as the most common courses that included topics on NDs.

For music fields of study, the most cited courses taken by piano instructors that included topics on NDs were music therapy courses for undergraduate degrees ($n = 20$, 16.9%) and general piano pedagogy for graduate degrees ($n = 15$, 21.1%), followed by music therapy courses at any level ($n = 9$, 12.7%). Surprisingly, only a few respondents mentioned any music education courses as addressing topics related to teaching students with NDs (undergraduate $n = 8$, 6.8%; graduate, $n = 4$, 5.6%), as research literature in music education has shown that special education components throughout coursework has been a strategy for music teacher education programs to address this issue (Hourigan, 2006, 2007; Salvador, 2010). This may be attributed to the fact that many music

education programs do not open course availability to students outside the degree; piano students majoring in performance or other music-related degree likely would not have the opportunity to enroll. Still, incorporating topics for teaching students with NDs into existing coursework is a possible solution for helping future piano instructors learn about this important topic. A general piano pedagogy course is an ideal placement for these topics, and they should be included at both the undergraduate and graduate levels. Additionally, offering even rudimentary music therapy coursework for future piano instructors at undergraduate or graduate levels can help future piano instructors to fill the gap in their studies. Future researchers might investigate piano pedagogy professors' rationale for not including such topics into existing pedagogy curricula.

Professional Development and Non-Degree Coursework for Practicing Professionals

PD experiences are another way that practicing piano instructors may fill gaps in their education. In order to examine piano instructors' PD experiences, I asked how they gained knowledge about teaching students with NDs outside of formal coursework. They were able to select multiple items from the closed response options presented, as well as describe their own experiences (if not listed within the closed response options). Adapted from Mullins (2017), PD regarding teaching students with NDs included self-education (i.e., reading books or articles) ($n = 640, 88.6\%$), consulting with parents/caregivers about successful approaches ($n = 560, 77.6\%$), trial and error ($n = 533, 73.8\%$), consulting with other piano instructors ($n = 378, 52.4\%$), formal PD (e.g., conference sessions, webinars) ($n = 351, 48.6\%$), and consulting with professionals (e.g., psychologists, special educators, teachers) ($n = 320, 44.3\%$). Many piano instructors cited sessions or lectures at music teachers' conferences (local, state, and national) ($n = 35, 23.6\%$) and required

PD/coursework associated with a state education license ($n = 39, 26.3\%$) for the open-ended responses.

The high rates of practicing piano instructors seeking out resources in the area of special education piano pedagogy is indicative of the need for more training and awareness of these issues in higher education. Both major piano pedagogy conferences (e.g., National Conference for Keyboard Pedagogy, MTNA National Conference) feature inclusive teaching tracks that provide practicing piano instructors with peer-reviewed PD. Even though research findings from general education research have frequently shown that the most effective teacher education occurs at the undergraduate and graduate level (Feng & Sass, 2013; Kisbu-Sakarya & Doenyas, 2021), ongoing PD also can help in-service general and music educators address special education pedagogy (Grimsby, 2020). More research is needed to ascertain the scope and effectiveness of the types of PD offered as sessions that are part of piano teacher conferences.

Confidence and Perceived Success in Teaching Students with NDs

Research question four dealt with piano instructors' levels of confidence and perceived success in teaching students with NDs. Questions related to this topic examined (a) piano instructors' confidence teaching students with specific disorders, (b) piano instructors' confidence and feelings of success in teaching situations relating to students with NDs, and (c) how their confidence was impacted by their field of study and whether they had engaged in coursework that addressed NDs in their studies in higher education.

Confidence with Specific NDs. Findings from the descriptive analysis showed that respondents were most confident teaching students with ADHD ($M = 6.97, SD$

=2.59) and ASD ($M = 6.14, SD = 2.75$). This aligns with findings from the previous sections of the current study, where respondents reported having the most familiarity, awareness, and experience with ADHD and ASD, as well as aligning with the impact of mastery experiences on self-efficacy (SE) (Bandura, 1982). Respondents reported the lowest levels of confidence with motor disorders and tic disorders, which also aligns with the lowest levels of familiarity, awareness, and experience from the previous sections of this study. Additionally, response rates for motor and tic disorders were markedly lower than for more prevalent disorders, implying that respondents perhaps did not know enough to respond to the items.

Confidence in Teaching Situations. Piano instructors responded to SE items with the anchor, “I am confident...” followed by a list of ten situational prompts relating to teaching students with NDs. Respondents reported the highest levels of confidence in designing activities to meet the needs of students with mild impairments ($M = 7.05, SD = 2.74$), lower confidence levels for meeting the needs of students with moderate impairments ($M = 6.41, SD = 2.81$), and the lowest levels of confidence for meeting the needs of students with severe impairments ($M = 4.62, SD = 3.11$). This finding shows that piano instructors are more comfortable with less severe, more typical learners. Many piano instructors cited the severity of a disorder as a reason they would decline to teach a ND student, which combined with the high percentage of piano instructors citing “lack of knowledge” ($n = 333, 44.9\%$) as another reason to decline to teach students with ND diagnoses, implies that piano instructors believe that teaching students with moderate to severe NDs necessitates specific knowledge and expertise—the kind of training that is not typically part of an applied piano degree program. This is supported by research in

music education, where music teachers had more confidence in teaching mainstreamed students when they were provided with specific teaching strategies, as well as learning about the musical potential for special education students (Darrow, 1999; Wilson & McCrary, 1996). Because music educators in public schools do not have the ability to decline to teach students as piano instructors do, further research is needed to fully explore the nuances of severity of NDs and how it affects the levels of piano instructors' confidence in teaching situations.

Another source of low confidence for piano instructors pertained to student behaviors. Participants responded to two prompts focused on student behaviors: "I am confident in my ability to prevent disruptive behavior in the lesson before it occurs" ($M = 5.55$, $SD = 2.74$) and "I am confident when dealing with students who engage in challenging behaviors such as non-compliance or 'meltdowns'" ($M = 5.48$, $SD = 2.90$). Responses to these prompts indicate a lower level of confidence among piano instructors when students exhibit challenging behaviors. Findings from studies of general education teachers in total-inclusion classrooms corroborate this, where teachers' attitudes towards students with behavioral or emotional issues were negative, while having positive attitudes towards students with intellectual disabilities (Burke & Sutherland, 2004; Hastings & Oakford, 2003).

Although challenging or disruptive behaviors can be a typical component of teaching students with NDs, this finding also points to the general lack of behavioral topics in piano pedagogy curricula (Johnson, 2002; Milliman, 1992). Classroom management is a broad topic that is addressed in teacher education programs and piano pedagogy courses tend to omit topics of student behavior, instead focusing on teaching

strategies, teaching literature, and observation of practicing professionals (Johnson, 2002). While it may not be feasible to add coursework to already course-intensive applied piano degree programs, piano pedagogy professors could address elements of behavioral education in piano pedagogy coursework. This could aid piano instructors in developing effective strategies for both neurotypical and neurodiverse students. Where possible, encouraging collegiate piano students to enroll in educational psychology courses could also have benefits for pianists who will likely end up teaching piano lessons to students with NDs. Since the most common career path for a pianist in an applied piano degree program is as a piano instructor at some level (Cheng, 2016; Duke, 1997; Fredrickson, 2007; Gray, 1998; Jiang, 2022; Sturm et al., 2000; Walker, 2008), it should follow that the acquisition of pedagogical skills should be as important as the acquisition of performance skills.

Perceived Success in Teaching Situations. To measure respondents' perceived sense of ability or success in teaching students with NDs, I used survey prompts that began with the root, "I am able to..." followed by a list of items related to teaching students with NDs, as well as items that are inherent to teaching all piano lessons. The means for these items ($M = 6.44-8.18$) were generally higher than the means for confidence items ($M = 4.62-7.05$). Additionally, the response rate for "ability" items was higher; responses for the confidence items ranged from $N = 684-718$, while success item responses ranged from $N = 718-736$.

The highest "ability" means represented teaching situations that were not necessarily related to teaching students with NDs, though they could certainly apply. These items were:

1. I am able to provide appropriate challenges for very capable students ($M = 8.18$, $SD = 2.08$)
2. I am able to provide alternative explanations or examples when students are confused ($M = 7.98$, $SD = 2.22$)

For these two items, most teachers rated their ability at 8 (*extremely successful*) or higher ($n = 534$, 72.5%; $n = 505$, 68.5%, respectively). A comparison of ratings for ability items *not* related to teaching students with NDs (higher) versus those specific to ND instruction (lower) indicates that there is a gap in perceived success regarding special education among piano teachers. The implication from this finding is that piano instructors are generally confident in their teaching abilities, but less confident when it comes to teaching students with NDs—particularly when students present with moderate to severe behavioral challenges. Supporting this finding is research in special education, where special education specialists reported emotional disturbance/behavior disorders, students with specific learning disabilities, and students with ADHD as the most challenging students (Westling, 2010). Given that special education specialists find behavioral issues to present the most difficulties, it is unsurprising that piano instructors who typically have little special education training are also unconfident in their abilities to teach students in this category.

Differences in Confidence and Success Based on Other Factors

To understand if there were variables that influenced piano instructors' levels of confidence and perceived success in teaching students with NDs, I conducted additional tests to compare means split by different grouping variables. Exploratory analysis showed that there were no significant differences in confidence or success when grouped by

gender, race, ethnicity, age, or level of education. However, differences emerged when (a) confidence and success variables were grouped by field of study in higher education, (b) whether respondents had taken at least one course regarding NDs in either their undergraduate or graduate education, and/or (c) if they had taken non-degree coursework or attended PD events.

Relationships Between Field of Study and Confidence/Ability. I coded the reported fields of study for each unique case based on the most relevant field of study reported. For instance, if a respondent reported that they had an undergraduate music education degree and a graduate piano performance degree, they were coded as “education.” (Education majors (both music and general education) are likely to encounter at least cursory contact with special education pedagogy, more so than piano performance majors.) Or, if a respondent had a piano performance undergraduate degree, but a master’s in music therapy, they were coded as “ND relevant degree,” because music therapy majors encounter a great deal of coursework regarding individuals with disabilities. All applied piano degrees were coded together based on the overlap of required coursework. The five categories created were:

1. **Piano** (included piano performance, piano pedagogy, and collaborative piano degrees) ($n = 382, 52.7\%$)
2. **Education** (included general and music education) ($n = 170, 23.4\%$)
3. **Other music** degree ($n = 65, 9.0\%$)
4. **Other non-music** degree ($n = 66, 9.1\%$)
5. **ND relevant** degree (included music therapy, special education, and psychology degrees) ($n = 42, 5.8\%$)

Findings from Kruskal-Wallis H tests revealed that there were statistically significant differences in levels of confidence and ability when grouped by field of study. However, post hoc analysis via the Dwass-Steel-Critchlow-Fligner (DSCF) pairwise comparison test revealed that there were no statistically significant differences between piano, education, other music, and other non-music fields of study. Each of the four groups were different in both statistical significance ($p < 0.001$) as well as practical significance ($\epsilon^2 = 0.03\text{--}0.05$) from the group with ND relevant fields of study. This means that for all confidence and ability variables, respondents who majored in special education, music therapy, or any type of psychology reported higher levels of confidence and perceived success than those in all other fields of study. This finding is important because it demonstrates that those who majored in degree programs that contain coursework regarding NDs are more confident in teaching piano to students with NDs, even though their field of study does not necessarily include a piano or music component. This is supported by several studies in music education. Perceptions of preparedness and ability in teaching students with disabilities in music classrooms were demonstrated to be higher if pre-service teachers engaged in specific special education courses in addition to pre-service field placements as compared with those who did not (Hourigan, 2007; VanWeelden & Whipple, 2005). In-service music educators who took a graduate course that addressed "...specific skills and knowledge deemed necessary to effectively include students with special needs in music classrooms" (Hammel & Gerrity, 2012, p. 7) rated themselves as better prepared and more confident in including students with disabilities in their music classes after taking the course.

Relationships Between Taking a Course with Special Education Topics and Confidence/Ability. I wanted to learn if there were any relationships between respondents having taken a course relating to NDs and their levels of confidence and success at teaching students with NDs. This is because most piano instructors surveyed had educational backgrounds in a piano area, rather than a ND relevant field of study. While most respondents did not have coursework regarding NDs in any capacity or degree level, those that reported having taken at least one course relating to NDs in either their undergraduate, graduate, or non-degree/PD study reported higher levels of confidence and perceived success than those that had not.

Mann-Whitney U tests were conducted to evaluate these variables, and were practically and statistically significant at undergraduate, graduate, and non-degree levels. While the effect sizes were weak to moderate, ($r = 0.29-0.38$), they showed the important relationships between taking even one course and being able to better serve the needs of students with NDs. This finding indicates that raising piano instructors' confidence can be as simple as including a unit on teaching piano students with NDs in a piano pedagogy course or including a music therapy or special education element in coursework for aspiring piano instructors. Many piano instructors reported attending workshops and conference sessions, which is an important service for practicing piano instructors who may not have had special education pedagogy as part of their initial training. Further research is needed to explore piano and piano pedagogy degree plans and how coursework addressing teaching students with NDs can be incorporated, much like ways in which special education topics are incorporated into existing music education course curricula (Hourigan, 2007).

Research in music teacher self-efficacy (SE) supports this finding, that positive experiences throughout pre-service coursework helps to build positive SE. Regier (2019) found that pre-service music educators developed greater SE when they were familiar with the challenges and previous successes of pedagogical experiences. Special education research also supports building positive SE at the pre-service level to ensure that special educators are prepared to implement positive inclusion in their classrooms. Sharma et al. (2012) stated that a teacher with high SE believed that students with special education needs could learn effectively in the classroom, while the opposite was true if the special educator had low SE. These findings in music education, special education, as well as findings from the current study make a compelling case for revising the piano pedagogy curriculum to include opportunities for future piano instructors to build positive SE during their collegiate study.

Implications of Piano Instructors' Preparation, Experience, Confidence, and Perceived Success in Teaching Students with NDs

Findings from this investigation have implications for several audiences. Piano instructors, future piano instructors, and collegiate piano faculty, all have important roles in aiding the accessibility of piano lessons to individuals with NDs, as well as in increasing rates of success and confidence for piano instructors in special education piano pedagogy. In the following section, I list suggestions for piano instructors, future or “pre-service” piano instructors, and collegiate piano pedagogy professors. The commonality for each of these groups is a need for conscious inclusion of special education topics in coursework at all levels—undergraduate, graduate, and non-degree.

Suggestions for Piano Instructors

Piano instructors who find themselves being asked to teach students with NDs may feel underprepared and unconfident about their abilities to work with this population and may feel isolated in their attempts to take on these challenges. Addressing the special education gap in piano degree programs should be a priority for collegiate piano faculty and departments of music at the curricular level if piano instructors are to be adequately prepared to meet this exceedingly common teaching challenge. The following suggestions for practicing piano instructors address educational needs of instructors, but also provide strategies to lessen isolation and stigma of accepting students with NDs into piano studios.

- **Read practitioner articles in professional journals.** Both *Piano Magazine* and *The American Music Teacher* publish articles that provide teaching strategies as well as background information for common challenges of working with students with various NDs. Members of each organization can view archived editions of journals on the web.
- **Host sensory friendly recitals.** Recitals where audience members and performers are inclusive of neurodiverse individuals are termed “sensory friendly recitals” or “sensory friendly concerts.” These concerts can help normalize the existence of neurodiverse individuals in the public sphere. Sensory friendly concerts take audience and performers’ sensory needs into account, and provide individualized accommodations such as low light, seating accommodations, hearing protection, as well as visual aids and clear indications of when it is appropriate to clap for performers.

- **Attend professional conferences.** Many music teacher conferences promote inclusive teaching practices and provide a platform for sessions regarding the different aspects of teaching inclusively, such as strategies for particular disorders and recital programming. Conference sessions may be the only formal education practicing piano instructors have access to.
- **Consult with other piano instructors.** When speaking to other practicing piano teachers, I often hear how isolating these teaching challenges can be. Knowing that an overwhelming majority of piano instructors have faced these types of challenges can be empowering and help build feelings of success and confidence.
- **Collaborate with parents and caregivers.** The parents and caregivers of piano students are the greatest resource for working with ND students. Since each individual is unique and will have different needs, communicating with members of the family about successful approaches can save time and prevent frustration or learning about the students' needs via trial and error.

Suggestions for Future Piano Instructors

Since practicing piano instructors have varied educational backgrounds, these suggestions are focused on collegiate piano students, as that was the primary field of study for this investigation. At the collegiate level, students may take many classes in and out of their field of study. This provides important opportunities to address topics of NDs while studying for a degree. The following suggestions may help future “pre-service” piano instructors build a foundation for meeting the needs of ND students.

- **Enroll in a ND related course.** These can be psychology courses, courses in special education, or courses in music therapy. Courses with special education

pedagogy as their principal content can help build a framework for understanding neurodiversity.

- **Ask music faculty for guidance.** Ask faculty to address topics relating to special education in piano pedagogy and methods courses. Choose inclusion topics where possible during independent research.
- **Discuss issues with peers.** Student to student discussions can be of great value throughout the collegiate process. Discussion of teaching strategies are important avenues for creating an open dialogue about the challenges of access and availability of music instructions for individuals with disabilities.
- **Host sensory friendly recitals.** Sensory friendly recitals can provide performance opportunities for collegiate students working on repertoire, but also provide enriching musical experiences for individuals with NDs who may not feel comfortable attending a traditional concert. Connect with local schools' special education teachers to spread the word.
- **Get involved in local and/or collegiate music teacher associations.** Make connections with practicing piano instructors and consult with them about teaching students with NDs. Request programming dealing with special education piano teaching.
- **Attend professional conferences.** As stated above, music teacher conferences often feature sessions on inclusive teaching. Students can often attend at discounted rates or for free.

Suggestions for Piano Pedagogy Professors

Piano pedagogy professors have an important role in shaping how future piano instructors view the field and in deciding what topics are addressed. Most piano majors (e.g., performance, pedagogy, collaborative, music education) will take at least one piano pedagogy course during their undergraduate and/or graduate degrees. Inclusive teaching or special education pedagogy are not included in most piano pedagogy texts, with the notable exceptions of *Transformational Piano Teaching: Mentoring Students from All Walks of Life* (Polischuk, 2019) which contains two chapters regarding special education pedagogy and *Autism & piano study: A basic teaching vocabulary* (Price, 2023). The suggestions below can help professors of piano pedagogy better prepare their students to meet the needs of piano students with NDs.

- **Include a unit of study on special education pedagogy into general pedagogy coursework.** This can be a stand-alone unit or can be incorporated into many areas of standard teaching including the teaching of learning theories, reading approaches, studio business, and field experiences or teacher observations.
- **Invite guest lecturers and experts.** Music therapists, special educators, or piano instructors with experience teaching students with NDs can all make valuable contributions to the formation of positive associations with teaching piano to students with NDs.
- **Offer courses for learning to teach piano to students with NDs.** These can be electives and taught within piano departments, or co-taught with music educators, special education professors, or music therapists.

- **Use texts that incorporate teaching many kinds of learners.** If none are available, supplement existing piano pedagogy texts with readings from piano pedagogy journals and readings from outside the discipline of piano/music.
- **General pedagogy discussions should include a wide array of neurodiversity.** In the current study, respondents had the most experience (and therefore confidence) with ADHD and ASD. Other disorders listed had lower levels of familiarity, experience, and confidence. This doesn't mean that individuals with less prevalent disorders have higher levels of severity or different needs, these issues should be addressed during units regarding special education pedagogy.
- **Design projects and assignments that can help students build self-efficacy in teaching students with NDs throughout coursework.** Observations of teaching and guided field experiences can help students attain vicarious and mastery experiences which have a great impact on a person's sense of SE.
- **Address student behavior and "classroom management."** Regardless of disability, piano pedagogy professors should seek to address elements of "classroom management," a common topic in music education, but rarely addressed in piano pedagogy curricula or texts. The survey items to do with challenging or disruptive behaviors had the lowest reported levels of confidence. Since most piano instructors teach private lessons, dealing with challenging behaviors is not often expected from piano instructors, however, developing strategies for redirecting disruptive behaviors can be a useful for neurodiverse and neurotypical students.

Future Research

As the area of special education pedagogy is relatively unexplored in the field of piano pedagogy, there are ample opportunities for future research. First, researchers may investigate the scope and effectiveness of conference sessions that are commonly presented. Many piano instructors reported that their primary type of education about teaching students with NDs came in the form of conference professional development. Delving into content analyses of conference sessions was outside of the scope of the current study, but researchers may explore the frequency of ND topics offered, as well as piano instructors' perceptions of how conference sessions "fill the gap" in piano instructors' formal education. Modeling research after similar studies, such as Kiehn & Kimball (2008) who investigated conference offerings at the *Wisconsin Music Educators Association State Annual In-Service Conference* between 2004 and 2007 and (Ferretti & Latimer, 2017) who investigated conference session topics presented by the American Choral Directors Association National Conference between 1960 and 2013 are warranted. These studies both investigated the types of sessions programmed divided into subject categories. This has yet to be explored in the field of piano pedagogy and could yield important results about what the field considers to be important for practicing and future piano instructors to learn about.

The current study was designed to assess piano instructors' own perceptions about teaching students with NDs, leaving the interpretation of what constituted a student with a ND diagnosis to the respondent. Of course, there is great variation between various NDs, both in type of disorder and severity. Future researchers may examine the perspectives of parents and caregivers of individuals with NDs as well as the students

themselves in order to better understand the needs of members of the neurodevelopmental disability community. Studies from clinical disciplines such as Ansari et al. (2016) can provide a model for how to effectively and respectfully engage with parents, caregivers, and individuals with NDs.

One major issue mentioned by participants in open-ended responses regarding piano instructors teaching students with NDs was that many families are either unaware of their child's condition, or not communicative with the piano instructor regarding individual needs. This is a pervasive issue for piano instructors that does not have a clear analogue in education research literature and has yet to be explored in piano pedagogy as of the time of this writing. Because special education interventions in public schools are based on diagnoses, where once the student has been diagnosed, administrators and teachers at the school-work as a team with parents/caregivers and physicians to create Individualized Education Plans (IEPs). Once an IEP is in place, all stakeholders are informed about the student's needs. This does not occur in private piano instruction, leaving the disclosure of educational needs at the discretion of parents/caregivers. Being unaware of what accommodations would be needed for students was of concern to many piano instructors surveyed.

Future research is warranted in the area of parental involvement, as undiagnosed/undisclosed NDs were mentioned by many piano instructors in open-ended responses, but outside of the scope of the current study. Additionally, in general education as well as special education, the role of parental involvement in crafting IEP's is incorporated differently by educators in public schools than in private piano instruction (Martin et al., 2004), leading to a contrasting parent-teacher dynamic in each situation. In

the current study, as well as previous inquiries in piano pedagogy (Dumlavwalla & Bugaj, 2020; Martiros, 2012; Mullins, 2017; Ostrosky, 2023), piano instructors regarded parental communication and support as essential for teaching students with disabilities—while that is not always true in the field of special education. Several research studies examined the IEP meeting process and which members of the IEP team were allowed to contribute (e.g., special education teacher, general education teacher, parent, student) and found that the voices of parents and students were not given priority in these meetings (Hartas, 2008; Martin et al., 2004; Williams-Diehm et al., 2014). Exploring the discrepancies of how educators interact with parents of special education students in general education as well as “extra-curricular” education experiences could shed light on the challenges of incorporating parental support or “buy-in” in the piano studio.

Limitations of the Study

In recruiting participants for this research, I utilized the piano instructor member list from MTNA as well as posting recruitment materials to piano instructor groups on Facebook. While the number of responses indicates that the results may be generalizable to the broader population ($N = 749$) (Fink, 2017; Qualtrics, 2023), the lack of demographic diversity may limit the generalizability of this research. The respondents overwhelmingly reported that they accessed the survey via the email from MTNA ($n = 711, 95.1\%$). This resulted in most of the usable data coming from MTNA-affiliated piano instructors. It is possible that members of this organization had biases that influenced their responses. Additionally, most respondents were female ($n = 641, 85.6\%$) and white ($n = 659, 88.1\%$), which aligns with the population demographics of MTNA (Crappell, 2019), but not necessarily with the field at large.

The percentage of respondents who reported teaching or having taught at least one student with a ND ($n = 733, 97.9\%$) seems an extremely high number that may be artificially inflated. If potential recruits were not interested in special education topics, they may not have clicked on the survey link, leading to a self-selection bias, where the respondents are more likely to respond to a survey when they themselves engage in the phenomenon being tested (Bethlehem, 2010). I attempted to account for this bias by including a statement in all recruitment materials: “No experience teaching students with disabilities is necessary in order to participate.” Still, I received email correspondence from a potential respondent who did not want to participate because she had no experience teaching piano to students with disabilities. Care should be taken when generalizing using this finding due to the potential of self-selection bias.

In addition to self-selection bias, under-coverage bias is a potential limitation of using a web-survey to collect data (Bethlehem, 2010). In web-surveys, under-coverage refers to the issue of under-sampling an otherwise fitting segment of the population due to lack of access to the internet. While most adults in the US have access to the internet either at home or via mobile devices (Smith et al., 2016), the use of a web-based data collection tool can exclude potential participants. I received an email from a potential participant who requested a hard-copy of the questionnaire due to a vision impairment, but I was ultimately unable to grant this request because of IRB concerns of anonymity, as well as the initial application not addressing potential hard-copy requests. This could be addressed in future research by including statements about accessibility in the initial IRB request that allow for alternate methods of data collection. Doing so could lessen the effect of under-coverage bias in future research.

Conclusion

As attitudes towards persons with disabilities shifted during the twentieth century, individuals with disabilities have found greater acceptance and visibility in the public sphere. Mandated inclusion of individuals with disabilities in public schools has led to the inclusion of disabled people participating in environments that previously reflected limited access, including piano lessons. Unfortunately, education of piano instructors has lagged behind the strong desire for accessible piano instruction for neurodiverse persons. As piano instructors increasingly accept students with ND diagnoses into their piano studios, it becomes more important than ever to equip these musician–teachers with the toolset to meet the needs of all of their students.

Until this study, the prevalence of ND students participating in piano lessons was unknown, leaving special education piano pedagogy as a niche specialty. The reality is that teaching students with NDs should not be considered niche, as an overwhelming majority of piano instructors appear to teach lessons to students with NDs. Because of its ubiquity, and the implications for equitable treatment of all students, special education piano pedagogy deserves a place among standard piano pedagogy coursework. The findings from this study indicated that a piano instructor’s confidence and willingness to accept ND students was higher when they took at least one course or attended at least one workshop. The respondents who reported taking such courses were in the minority, but their levels of confidence and perceived success were significantly greater than those who had not. The profession might begin by modeling practices after related disciplines. In addition to added coursework, the fields of music therapy and special education have observation and practicum experiences built into their curricular structure, thus building

self-efficacy through guided student experiences. This is not typical for piano pedagogy, and incorporating special education experiences into applied music degree plans may seem like an insurmountable challenge. However, university-level piano programs must adapt to changing realities of the profession. Starting with incorporating elements of special education and/or psychology into *existing* coursework is a strategy used in music education programs (Hourigan, 2007; VanWeelden & Whipple, 2005), which may serve as the most immediate and available approach to remedy this gap in pedagogical education. Increasing pedagogical offerings in formalized piano training (both at the university level and in professional development opportunities) seems imperative in improving instructors' confidence in meeting students' needs. How does the piano profession move forward toward a more equitable view of access to piano study for neurodivergent individuals? Meaningful inclusion begins with acknowledging the importance of the task, building on the growth of inclusion initiatives in music teacher organizations, and finally incorporating these principles into curriculum in higher education so that piano instructors may create lasting and positive musical experiences for all of their students.

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**Appendix A: Survey of Piano Teachers for Students with Neurodevelopmental
Disabilities**

Q1 Informed Consent

Yes

No

Q2 Are you over the age of 18?

Yes

No

Q3 Do you currently teach non-collegiate piano lessons?

Yes

No

Q4 You may participate if you teach both collegiate and non-collegiate lessons, however please answer all prompts in regards to your non-collegiate students and experiences.

Q5 I currently identify my gender as:

- Male
- Female
- Non-binary / third gender
- Prefer not to say
- Prefer to self-describe _____

Q6 Are you of Hispanic, Latino, or Spanish origin?

- Yes
- No

Q7 How do you describe yourself?

- American Indian or Alaska Native
 - Asian
 - Black or African American
 - Native Hawaiian or Pacific Islander
 - White
 - Another race or ethnicity not listed above
-

Q8 In which state(s) do you primarily teach?

▼ Alabama ... Wyoming

Q9 What is your age?

Q10 How long have you been teaching piano lessons? (count the current year as 1 year)

Q11 On average, how many students are typically enrolled in your studio?

Q12 What is your primary piano teaching environment?

- Home Studio
- Independent Studio (outside the home)
- Pre-college Conservatory
- Virtually, online
- Community Music School
- Other _____

Q13 In which settings do you primarily teach your student(s)?

- Individual/Private lesson
- Semi-private lesson (2-3 students)
- Group class (4 or more students)
- Virtually

Q14 What is your highest degree earned?

- High School Diploma
- Associate's
- Bachelor's
- Master's
- Doctorate
- Performance Certificate

Q15 What was/were your major field(s) of study for your Doctorate degree?

- Piano Performance
- Music Education, concentration in piano
- Piano Pedagogy
- Piano Performance and Pedagogy
- Collaborative Piano
- Other (Musically Oriented Degree, please specify)

- Other (Non-musically Oriented Degree, please specify)

Q16 What was/were your major field(s) of study for your Master's degree?

- Piano Performance
- Music Education, concentration in piano
- Piano Pedagogy
- Piano Performance and Pedagogy
- Collaborative Piano
- Other (Musically Oriented Degree, please specify)

- Other (Non-musically Oriented Degree, please specify)

Q17 What was/were your major field(s) of study for your undergraduate degree?

- Piano Performance
- Music Education, concentration in piano
- Piano Pedagogy
- Piano Performance and Pedagogy
- Collaborative Piano
- Other (Musically Oriented Degree, please specify)

- Other (Non-musically Oriented Degree, please specify)

Q18 Do you hold additional certifications beyond a teaching certificate (e.g., NCTM, Dalcroze, Kodály, Orff-Schulwerk, Suzuki, etc.)?

Yes

No

Q19 Please list additional certifications.

Q20 Please rate your level of familiarity for each disorder below:

	Not familiar at all	Slightly familiar	Moderately familiar	Very familiar	Extremely familiar
Intellectual Disability (e.g. Down syndrome, global cognitive delay, fetal alcohol syndrome, formerly referred to as "mental retardation")	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication Disorder (e.g. speech, hearing, oral function disorders such as stuttering, audio processing disorder, Language impairments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Spectrum Disorder (formerly inclusive of Asperger's syndrome, high and low functioning autism)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attention-Deficit/Hyperactivity Disorder (formerly inclusive of Attention Deficit Disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impairments in reading, written expression, and/or mathematics (e.g. dyslexia, dyscalculia)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motor Disorders (e.g. dyspraxia, developmental coordination disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tic Disorders (e.g. Tourette's syndrome)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q21 Please rate your level of awareness of the behaviors associated with the following disorders?

	Not at all aware	Slightly aware	Somewhat aware	Moderately aware	Extremely aware
Intellectual Disability (e.g. Down syndrome, global cognitive delay, fetal alcohol syndrome, formerly referred to as "mental retardation")	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication Disorder (e.g. speech, hearing, oral function disorders such as stuttering, audio processing disorder, Language impairments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Spectrum Disorder (formerly inclusive of Asperger's syndrome, high and low functioning autism)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attention-Deficit/Hyperactivity Disorder (formerly inclusive of Attention Deficit Disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impairments in reading, written expression, and/or mathematics (e.g. dyslexia, dyscalculia)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motor Disorders (e.g. dyspraxia, developmental coordination disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tic Disorders (e.g. Tourette's syndrome)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q22 Outside of teaching piano, please indicate how often you have had interactions with a person with one or more ND in the following contexts:

	Never	Rarely	Occasionally	A moderate amount	A great deal
Family/home life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a peer in school	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a caregiver	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a colleague	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other social contexts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q23 Did you take coursework that addressed teaching students with neurodevelopmental disorders in your undergraduate education?

- Yes
- No
- not applicable

Q24 Which courses?

Q25 Did you take coursework that addressed teaching students with neurodevelopmental disorders in your graduate education?

- Yes
- No
- not applicable

Q26 Which courses?

Q27 Did you take coursework that addressed teaching students with NDs outside of your degree coursework?

- Yes
- No

Q28 Which courses?

Q29 Outside of formal coursework, how have you gained knowledge about teaching students with neurodevelopmental disorders? Check all that apply:

- Self-education (reading books, articles)
 - Trial and error
 - Consulting with caregivers (e.g. parents) about successful approaches
 - Consulting with other piano teachers
 - Consulting with professionals (i.e. psychologists, teachers, special educators, speech pathologists, etc.?)
 - Professional development events (e.g. conference sessions, webinars, summer workshops)
 - Other (please describe)
-

Q30 Over the course of your career, approximately how many students have you taught who were medically diagnosed with the following disorders:

	0	1-3	4-6	more than 6
Intellectual Disability (e.g. Down syndrome, global cognitive delay, fetal alcohol syndrome, formerly referred to as "mental retardation")	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Communication Disorder (e.g. speech, hearing, oral function disorders such as stuttering, audio processing disorder, Language impairments)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Autism Spectrum Disorder (formerly inclusive of Asperger's syndrome, high and low functioning autism)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Attention-Deficit/Hyperactivity Disorder (formerly inclusive of Attention Deficit Disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Impairments in reading, written expression, and/or mathematics (e.g. dyslexia, dyscalculia)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Motor Disorders (e.g. dyspraxia, developmental coordination disorder)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Tic Disorders (e.g. Tourette's syndrome)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q31 Describe any experiences you have had with students with symptoms of these behaviors without a medical diagnosis or communication from caregivers. If you have none, please leave blank.

Q32 How often are you asked to teach students with diagnosed neurodevelopmental disabilities?

- never
- rarely
- occasionally
- a moderate amount
- a great deal

Q33 How often do you agree to teach students with neurodevelopmental disabilities when asked?

- never
- rarely
- occasionally
- a moderate amount
- a great deal

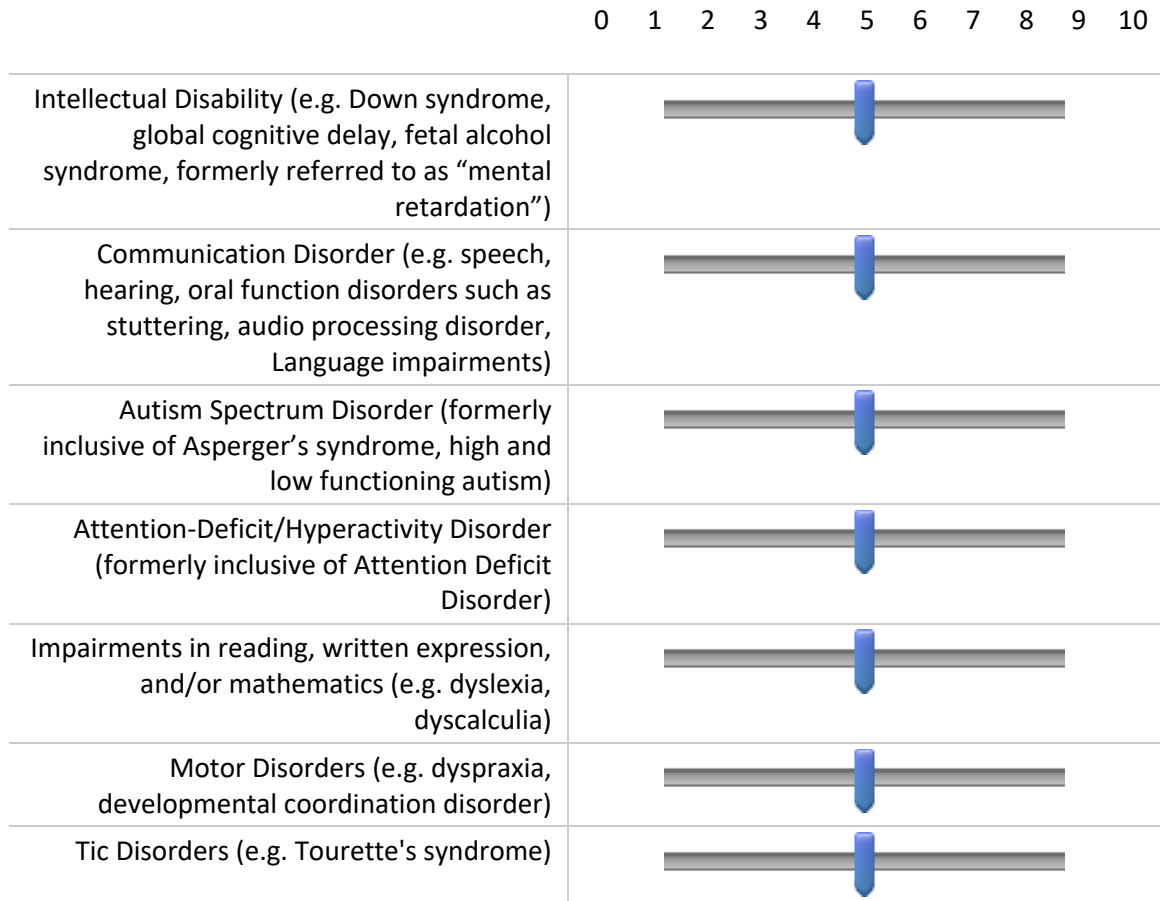
Q34 How often do you decline to teach students with neurodevelopmental disabilities when asked?

- never
- rarely
- occasionally
- a moderate amount
- a great deal

Q35 What would prevent you from accepting a student with a ND into your studio? Check all that apply.

- need for extra planning time
- lack of knowledge
- lack of prior success
- stigma associated with teaching children with disabilities
- nothing would prevent me from agreeing to teach a student with a ND
- Other, please list _____

Q36 Please rate your confidence in teaching piano students who are diagnosed with or exhibit symptoms of the following disorders on a scale from 0 (Not Confident) to 10 (Highly Confident)?



Q37 Please rate your level of confidence for each item below on a scale from 0 (not confident) to 10 (highly confident)

I am confident:

0 1 2 3 4 5 6 7 8 9 10

...teaching both neurotypical and neurodivergent students.	
...in my ability to prevent disruptive behavior in the lesson before it occurs.	
...in my ability to get parents/families involved in the music learning activities of their children with disabilities.	
...in designing activities so that individual needs of students with	
disabilities are accommodated.	
...in my ability to help others who know little about neurodevelopmental disabilities understand student behaviors.	
...when dealing with students who engage in challenging behaviors such as non-compliance or “meltdowns”.	
...modifying my teaching strategies when working with students with diagnosed neurodevelopmental disabilities.	
...modifying my teaching strategies when working with students with suspected neurodevelopmental disabilities.	
...discussing neurodevelopmental disabilities with parents/families of students.	


Q38 Please rate your level of effectiveness for the following teaching skills on a scale from 0 (not effective) to 10 (highly effective).

I am able:

	0	1	2	3	4	5	6	7	8	9	10
...calm a student who is disruptive or upset.											
...make parents feel comfortable coming to piano lessons.											
...assist families in helping their children do well in their piano lessons.											
...accurately gauge student comprehension of what I have taught.											
...provide appropriate challenges for very capable students.											
...redirect disruptive behavior in the piano lesson.											
...provide alternative explanations or examples when students are confused.											
...earn the trust of parents and caregivers of students with neurodevelopmental disabilities.											
...establish a positive rapport with students with neurodevelopmental disabilities.											

Q39 Is there anything else you would like to share about your experiences with people with ND both in and out of the classroom?

Appendix B: Recruitment Materials



MTNA
MUSIC TEACHERS NATIONAL ASSOCIATION

Sponsored Message: This is a paid advertisement.

Dear Brian,

My name is Katie Ostrosky, and I am a PhD in Music Education in Piano Pedagogy candidate at the University of Oklahoma. For my dissertation, I am investigating piano teachers' experiences in teaching students with disabilities such as autism spectrum disorder and ADHD. Data from this study will be used to examine piano teachers' perceived success, confidence, and preparation as they relate to teaching students with neurodevelopmental disabilities.

For this research, I am seeking piano teachers to complete a brief survey on this topic. No experience teaching students with disabilities is necessary in order to participate.

Please take approximately 10 minutes to complete the linked survey

You can access the survey here:

TAKE THE SURVEY

Or copy and paste the URL below into your internet browser:
https://ousurvey.qualtrics.com/jfe/form/SV_eUSVMMQYEVVpw8u

The survey will close on June 5, 2023. If you have any questions, you can contact me at katieostrosky@ou.edu or my faculty advisor, Dr. Christopher Baumgartner at cbaumgartner@ou.edu.

Thank you in advance for your help with this research!

Sincerely,

Katie Ostrosky, NCTM



Katie Ostrosky shared a link.

May 22 · 🌐



Hello Piano Teachers!

My name is Katie Ostrosky, and I am a PhD in Music Education in Piano Pedagogy candidate at the University of Oklahoma. For my dissertation, I am investigating piano teachers' experiences in teaching students with disabilities such as autism spectrum disorder and ADHD. Data from this study will be used to examine piano teachers' perceived success, confidence, and preparation as they relate to teaching students with neurodevelopmental disabilities.

For this research, I am seeking piano teachers in the United States to complete a brief survey on this topic. No experience teaching students with disabilities is necessary in order to participate.

Please take approximately 10 minutes to complete the linked survey.

You can access the survey here:

[Take the Survey](#)

Or copy and paste the URL below into your internet browser:

https://ousurvey.qualtrics.com/jfe/form/SV_eUSVMMQYEVVpw8u

The survey will close on June 5, 2023. If you have any questions, you can contact me at katieostrosky@ou.edu or my faculty advisor, Dr. Christopher Baumgartner at cbaumgartner@ou.edu.

Thank you in advance for your help with this research!

OUSURVEY.QUALTRICS.COM



Piano Instructors for Students with Neurodevelopmental Disabilities

Appendix C: Institutional Review Board Approval



Institutional Review Board for the Protection of Human Subjects Approval of Initial Submission – Exempt from IRB Review – AP01

Date: May 18, 2023 **IRB#:** 15962

Principal Investigator: Katie M Ostrosky

Approval Date: 05/18/2023

Exempt Category: 2

Study Title: Piano Instructors' Perceptions of Preparation, Success, and Confidence in Teaching Students with Neurodevelopmental Disabilities

On behalf of the Institutional Review Board (IRB), I have reviewed the above-referenced research study and determined that it meets the criteria for exemption from IRB review. To view the documents approved for this submission, open this study from the *My Studies* option, go to *Submission History*, go to *Completed Submissions* tab and then click the *Details* icon.

As principal investigator of this research study, you are responsible to:

- Conduct the research study in a manner consistent with the requirements of the IRB and federal regulations 45 CFR 46.
- Request approval from the IRB prior to implementing any/all modifications as changes could affect the exempt status determination.
- Maintain accurate and complete study records for evaluation by the HRPP Quality Improvement Program and, if applicable, inspection by regulatory agencies and/or the study sponsor.
- Notify the IRB at the completion of the project.

If you have questions about this notification or using iRIS, contact the IRB @ 405-325-8110 or irb@ou.edu.

Cordially,

A handwritten signature in black ink that reads 'Lara Mayeux'.

Lara Mayeux, Ph.D.
Chair, Institutional Review Board