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The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy

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Abstract

The voice change process is a treacherous time, and the female voice change process is underrepresented in literature and often ignored in classrooms (Sweet, 2018). The purpose of this study is to explore the psychological effects of the voice change process in female students and identify current pedagogical trends as used by current secondary choral music educators. Participants included a) Choral music education students who experienced a female voice change and b) Current secondary choral music educators. Choral music education students responded to a background survey which collected voice change process self-efficacy data. Selected informants underwent semi-structured interviews about their voice change experience. Current secondary choral music educators responded to an attitudinal/pedagogical survey of both Likert-type and open-ended prompts. An overarching theme for choral music education students included the aspects of typical adolescent psychological development. This includes perceptions of fear, a "violation of the ensemble" (Sweet, 2015), negative self-efficacy, the "imaginary audience" (Elkind, 1967), and the negative influence from family and teachers. Secondary choral music educators showed differences in levels of preparation and confidence with the female voice change. These findings are most likely directly related to the lack of Social Emotional Learning techniques in past and current classrooms. Applications of this study may continue to inform the field of music education of the effects of the female voice change and pedagogical changes that can be made to lessen negative psychological effects. Future researchers may focus on the effectiveness of pedagogical approaches in use by secondary choral music educators.

Keywords: Female voice change, Social Emotional Learning, Developmental Psychology

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The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy

The adolescent voice change process can succinctly be summarized as a physiological change of the larynx which results in a shift in vocal range and timbre. Female adolescents experience a voice change process that includes both muscular and vocal fold changes. Although the physical changes have been heavily studied, the psychological implications of this change in females have been neglected in recent scholarly literature (Sweet, 2018). Adolescent psychology is a multi-faceted field of study that covers many psychological phenomena that occur during adolescence. Such phenomena as fear, the imaginary audience, and the personal fable work together to make adolescents feel like they are alone in the changes and struggles that they encounter in this stage of life (Elkind, 1967). Specifically, a fear of violating the ensemble sound can cause students to withhold their voice and place undue strain and tension on their vocal mechanism in a time in life where it should be allowed to develop naturally (Sweet, 2015). Moreover, studies that show pedagogy supporting the psychological challenges are scarce. Social Emotional Learning (SEL) is an extremely important factor in the development of adolescents and as such, should be used in the classroom that addresses the voice change process.

This study is important to the profession of music education and to me as a future educator. Current research lacks a clear application of techniques of Social Emotional Learning techniques in relation to voice change pedagogy. Therefore, the purpose of this study is to explore the psychological effects of the voice change process in female students and identify current pedagogical trends in voice change education. The research

questions for this study are: 1) What are the psychological effects of the voice change on female students? 2) How do Social Emotional Learning techniques affect self-perceptions in female students experiencing the voice change? 3) What are current pedagogical approaches to the voice change process?

Literature Review

This literature review examines the physiological changes, psychological implications, and pedagogical recommendations associated with the female voice change process. Understanding the physiology and psychology of the voice change process is a key area of how the voice change process should be approached in the classroom. From existing literature, there is a broad understanding that during the time of puberty and adolescence, students go through many psychological changes. They can have incredibly self-centered mindsets which results in an altered sense of reality. This altered sense is described as adolescent egocentrism (Harter, 2012). These psychological phenomena do not exist independently from physical and hormonal changes during puberty. The hormonal fluctuations that occur during puberty can be drastic on their own, but when coupled with the physical and emotional changes that result from them, the effects can seem quite large. As the body reacts to new levels and exposure to estrogen and progesterone, blood flow levels to the vocal folds and nasal passages change. This can cause excess fluid to build up in the vocal folds and a change in the shape of the sinuses which can result in a singer having a different or altered sense of their own voice (Kadakia et al., 2013).

A strong understanding of the physiological changes undergone in puberty and vocal tract morphology is needed to fully understand the psychological implications and he pedagogical reasonings for certain techniques that will be described later. Existing pedagogical literature suggests multiple exercises to address the physical changes associated with the voice change process, but it lacks pedagogy that supports the

associated psychological challenges. To successfully navigate voice changes, educators must put equal weight on both the physiological and the psychological changes.

Physiology

The adolescent voice change process consists of changes in muscles and vocal fold length in the context of puberty and bodily development. The muscular development during the female voice change process involves both intrinsic and extrinsic laryngeal muscles (Leborgne, 2016). The extrinsic laryngeal muscles control the movement of the hyoid bone and the vertical movement of the whole larynx. Intrinsic muscles of the larynx control the actions of closing, opening, lengthening, and contracting of the vocal folds (Leborgne, 2016). During the voice change process, these muscles can weaken and become unable to fully contract. In particular, the interarytenoid muscle, which holds the vocal folds together for phonation, can have insufficient contraction. The weakness of the interarytenoid muscles causes the back of the vocal folds to separate and form the "mutational triangle" (Gackle, 1991). This triangle is created at the back of the vocal folds during phonation and allows air to pass through. This is what causes the stereotypical breathy sound of pubescent females.

The vocal folds also undergo changes during the voice change process. While the male voice change process may present larger differences in vocal fold length (1 cm), the female vocal folds also lengthen. This lengthening culminates in a change of about three to four millimeters (Gackle, 1991). The consequences of the change in length translates to an overall widening of the vocal range. The range is altered by lowering of the bottom range an interval of a major third and a small change at the top of approximately a major second (1991). While this is a crucial part of the voice change process, much of the

change is seen in the length and shape of the vocal tract which leads to a greater difference in timbre and color (Gackle, 2014).

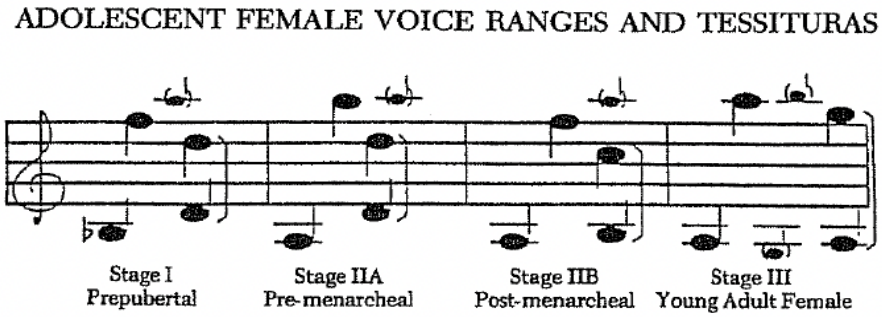
The physiology of the female voice change process remained mostly unstudied until research by Lynne Gackle (1987), who began a discussion on tone production in junior high school aged females. That study began a surge of research on the female voice change process. Soon after, Gackle identified four stages of voice change process as: Prepubertal, Pre-menarcheal, Post-menarcheal, and Young Adult Female (1991). These stages gave the same notice to the female voice change process as the male voice change process was given in the past. The stage system also allows the assumption that the change happens gradually through "shades of change." Gackle (1991) states:

> Perceptually, female voice change can best be described as *shades of change*. If the color blue is suggested, the mind may conjure many different shades of blue – from azure to royal or navy blue – with many colors represented in between. In many ways, color association is an appropriate way to aid in understanding the development of the female voice. The overall color is that of a treble sound – it does not change. However, in terms of *richness, depth,* and *warmth*, the quality changes noticeably, and those stages of change can readily be identified by a trained listener. (p.21)

Gackle (1991, p. 23) published the widely used chart of voice ranges and tessiture of each stage (see Figure 1).

Figure 1

Adolescent Female Voice Ranges and Tessituras



Note: Complete development if the voice continues after post mutation

* Brackets indicate tessituras

Although these stages are fundamental in the understanding of the female voice change process, recent research has suggested that the voice change process occurs in phases rather than stages. This phase system lends itself even more to be described as different shades of the same color. The voice still changes, but it blends smoother through phases.

The onset of puberty is observed in females to occur anywhere from the age of eight to fourteen (Abitbol et al., 1999). The vocal folds are extremely sensitive to hormonal changes. In particular, the larynx has been shown to have receptors for estrogen and progesterone (Kadakia et al., 2013). These two hormones start to be produced during puberty and are crucial in the vocal change. The height of vocal change is to be expected around 9th grade in U.S. school systems (May, 2013). In ninth grade, most students are fourteen or fifteen years old and most female students will have already entered the voice change process.

With these changes comes many challenges during this time. Challenges can include “a complete lack of phonation in certain areas of vocal range, excessive

breathiness in tone, vocal unpredictability, a lack of strength or endurance when singing, limited vocal range, and difficulties transitioning across registers" (Sweet, 2015, pp. 78-79). Every challenge can be related back to a muscular or vocal fold related change. Moreover, singers are continuously learning how to modify their tone to fit into an ensemble setting. The timbre of a voice can be changed by shifting sound modifiers such as the use of nasality and placement of the voice (Howard et al., 2019). As muscles are strengthening and weakening, this ability may grow or shrink depending on their developmental stage.

Psychology

Psychology in adolescent is a highly researched area in education. Many different scholars have published theories on how students learn, interact and process emotion during this time of life. Bandura's Social Learning Theory stresses a relationship between personal factors, emotion, and behavior (1977, 1986, 1997). Each of these three facets have an effect on each other in a persons' daily life. Social Learning theory is based on behavioral developments that are learned and influenced by models and people around them. Since learning and behaviors can be learned from other people around someone, it is also important to examine the psychological implications alongside the learning theory. Defined by Elkind when building on Piaget's stages, adolescent egocentrism can have many effects on the psychology of this stage of life (1967). As discussed before, adolescent egocentrism results in an altered sense of reality that many people will find themselves in. Self-efficacy also plays a large role at this time in life. Self-efficacy can be defined as one's own perceived ability to plan and complete a task (Bandura, 1977, 1986, 1997).

The voice change process can be a bumpy road. Psychological implications have been studied in the context of choral groups as well as in individuals. In individuals, the changing voice can bring new beliefs about oneself (Denison & Denison, 2019). Since the voice is such an innate part of one's identity, it is understandable that such beliefs may be shifted during puberty and the voice change process. As adolescents' voices shift, they may begin to have feelings of fear, frustration, and/or a lack of confidence (Sweet, 2015). The variety of emotions varies between individuals and the phase that they find themselves in. As seen in a 2015 study, college aged students looking back on their voice change process recalled having a lack of confidence and general negative emotions (Sweet, 2015). Recent studies have shown that negative emotions vastly outweigh positive emotions regarding singing in adolescent females (Sweet, 2018). These negative feelings can also be heightened when combined in the choral setting.

School choir and chorus classes have been noted in multiple settings to value the sound of the ensemble over the needs of the individual singers. Choral educators are seen placing females as altos because, in that moment in their voice change process, they may exhibit a stronger low range and a breathy tone in the upper range. Conversely, an educator may place a female student as a soprano because they have not developed a full, lower range in that moment in her voice change process. This labeling has the potential for significant psychological implications. Students may see their teacher with a "halo", meaning that they could do nothing wrong, while they are cementing a voice part in a student's mind that may not be physiologically best (Sweet & Parker, 2019). Speaking out against the decision of the teacher, which was most likely made for the good of the ensemble, rarely happens. There can be a fear of diminishing the sound of the ensemble

as a whole and a lack of confidence in certain areas of one's own voice (Sweet, 2018). Sometimes this discrepancy of natural voice versus placed voice type can cause internal conflict. Conflict may be about vocal timbre and the idea of what each voice part is supposed to sound like versus what each students' voice sounds like. For example, a misplaced student may be placed as an alto but have a lighter tone that more aligns with her idea of a soprano voice type. This internal conflict of where she should be singing causes a lack of confidence and lessens her self-efficacy.

During the time of adolescence, students may develop the psychological phenomenon called egocentrism (Elkind, 1967). Egocentrism is the apparent inability for adolescents to differentiate the feelings of others toward them and their own feelings about themselves as it relates to Piaget's stages of development. This manifests itself into two key areas: the Personal Fable and the Imaginary Audience. The Personal Fable is when an adolescent believes that all of their experiences and feelings are unique to only themselves and no one experiences them like they do. The words "You wouldn't understand" or acting as if they are invincible are often telling signs of the Personal Fable. The Imaginary Audience is when an adolescent may perceive that everyone else is looking at them or watching. Elkind notes that the Imaginary Audience is a major reason why some adolescents may seek privacy or retreat (1967). Harter goes on to also include the ideas of self-awareness in conjunction with egocentrism. She states, "This preoccupation and uncertainty contributes to intense introspection, self-reflection, and rumination particularly about one's negative characteristics. This preoccupation can represent shared reflection within a close relationship that can border on co-rumination," (2011, pp. 164).

The idea of choral singing once again appears here. In particular, straight-tone choirs have led to an overall fear of creating a "violation of the unified sound" and diminishing the quality of the choir (Sweet, 2015, p. 85). Fear causes students to withhold their sound for the sake of the ensemble. While most likely unintentional, withholding the voice can cause a lack of confidence and lessens self-advocacy over time. While the choir class may have its negative psychological effects, choir has also been shown to process through to positive sides. In another study, women's choir participants developed a social identity in seven steps. These steps are: Coming in singing, becoming a group, learning musically, opening up my voice and me, experiencing confidence, stronger group, and envisioning myself (Parker, 2018).

Although the adolescent voice change process may be daunting for many female singers, there are brighter spots throughout. Self-efficacy plays a large part in this. Self-efficacy theory is how individuals perceive their own ability to execute behaviors that will complete certain tasks (Bandura, 1977, 1986, 1997). The expansion of vocal range during the voice change process is one of the largest positives cited by female students and is also one of the most important factors in improving self-efficacy (Owen, 2017). The presence and importance of support group environments cannot be undermined. In Sweet and Parker's 2018 study, they found "Intrapersonal and interpersonal interactions, both past and present, fostered emotional responses that influenced female vocalists' perceptions of their voice" (p.75). Seeing that other people are going through the same positives and negatives of the voice change process helps to break through the egocentrism and builds a healthier self-image in students during the voice change process.

Pedagogy

The existing pool of literature is heavily focused on the physiological issues and changes associated with the voice change process. After extensive searches on sites such as ProQuest, GIL Find, and Google Scholar, I have found a lack of sources for current pedagogical recommendations to aid the psychological issues associated with the female voice change process. Most of the literature regarding pedagogy can separated into two categories: Warm-up recommendations and conversations with students.

Warm-up recommendations in literature come from the *bel canto* tradition of connecting each area of the voice to one other in the solo voice area of research. In the choral singing side of research, the straight tone choir is the most prevalent style that is studied. These teaching and singing styles are still the most prominent style in voice lessons and collegiate classes that educators take. One of the most important concepts in both singing styles is consistency of the voice. "Consistency" refers to the tone, vibrato (or lack thereof), breath control, and intonation. The top recommendation is for both vocal and breathing warmups to occur (Sweet, 2015). Warm-ups that focus on the voice and tone production have been shown to improve intonation and tone, while warm-ups that focus on breath have improved breath management, consistent tone production, and proper intonation. Specific warmups can include humming an interval of a perfect fifth, up and down, in the middle voice as well as lip-buzzing (raspberry, lip trill, bubbling) of an octave up and down. These warmups have been studied to increase self-efficacy in singers during the voice change process (Owen, 2017).

The *passaggio*, or areas between vocal registers, can be a treacherous zone for even fully developed singers. With the added challenge of the voice change process,

shifting *passaggios*, and a lack of confidence due to these factors, the *passaggio* can become a no-go zone for many adolescent females. While the *passaggio* may be an off-putting area for students, teachers must work on it with the students to prevent them from developing a fear or disdain for singing in this area of their voice. Flexibility is the key to unlocking the *passaggio* in any voice. One stand-out warmup includes stepwise motion through the *passaggio* (Caldretti, 2017). This encourages connectivity and confidence in the *passaggio* areas.

Another key area in warm-ups is body mapping. Body mapping is the practice of inquiry and self-observation in an effort to create an internal image of the functions of the body. In a recent publication, body mapping was connected to proper and healthy vocal technique and phonation (Denison & Denison, 2019). Body mapping can be incorporated throughout choral rehearsals and solo practice.

Having meaningful conversations with students is also an important part of the pedagogy of the voice change process. Incorporating these conversations before and during the voice change process can be crucial in students understanding of what is happening physiologically and how it affects them psychologically. In particular, the discussion of voice issues may have not been properly attributed to the voice change process in previous conversations (McRoy, 2011). This is dangerous not only because of the lack of correct information, but also because adolescents may attribute these vocal issues to themselves or to something that is innately wrong with them. A strong recommendation can be for teachers to listen to students individually or in small groups to assess which stage of voice change process they are experiencing (May, 2013). This is time consuming, and it is possible that it takes time away from the rehearsal, but it allows

students to take charge of this time in their life. A system to keep track of this voice change process can also be beneficial for a physical representation for the voice change process.

An important area that is noticeably smaller in the literature is pedagogy that supports Social Emotional Learning (SEL). Social Emotional Learning is defined as an educational practice that incorporates both social and emotional skills into curriculum and the school day. Social Emotional Learning consisted of five main components. These components are self-awareness, self-management, social awareness, relationship skills, and responsible decision-making. Many analyses have supported the positive effects of Social Emotional Learning in adolescents across multiple grade levels and across the world (Durlak et al., 2011). This is especially important in the arts disciplines, specifically voice, where these skills become crucial in delineating issues that may occur within your own body.

Therefore, the purpose of this study is to explore the psychological effects of the voice change process in female students and identify current pedagogical trends in voice change process education.

Method

There are many avenues to study the psychological impacts of the voice change process. However, for this study, I will be using a sequential explanatory mixed method (Creswell & Plano Clark, 2011). This allows for quantitative data analysis informed later by qualitative data. Multiple theories have emerged about learning and acquiring knowledge. This study will use the theory of constructivism. Constructivism states that learning is not a passive process. Learners construct their own knowledge by incorporating new information into their previously conceived knowledge and networks or schemas. Within constructivism there are individuals that experience events differently (Vygotsky, 1978). For example, due to hormonal changes in the body, which have been proven to exist, the voice with change during puberty. However, each person will experience this event differently in their own body and mind. This makes the event, the voice change, a phenomenon. Phenomenology is the study of how different events are experienced in individuals (Crotty, 1998). Specifically, phenomenological research is a primarily qualitative research method that seeks to find and understand an essence of a universally experienced event (Crotty, 1998).

Participants

Participants in this study included ten college-aged, vocal/choral primary pre-service teachers who experienced a female voice change at a large university in the southeastern United States and sixteen current secondary choral music educators. Although gender and age are defined for the teacher candidate participants, they are not considered for the current educators. Potential informants were identified using convenience sampling.

Materials

Pre-service teachers will take a background survey grounded in Fisher's Singing Self-Efficacy Scale for Emerging Adolescent Males (Fisher, 2014) and Sweet's Screening Survey (Sweet, 2018) to gather demographic information and allow for purposeful sampling. Interviews will be conducted based on respondent information and willingness to volunteer. Current choral educators will respond to a survey grounded in Campbell's survey instrument (Campbell, 2016).

Design

This study will be conducted following a sequential explanatory mixed method approach starting with quantitative methods and moving to qualitative methods to inform results of the survey. The background/self-efficacy survey will be administered to potential informants and analyzed quantitatively. Current choral educators' responses to the survey will tell which attitudes current teachers hold toward the voice change process and how they use their teaching strategies to support those students. The interviews with teacher candidates will be semi-structured and will allow insight to their experiences during their voice change process. The interviews will also reveal what pedagogical techniques were used in the classrooms during their voice change process and what techniques could be improved.

Procedure

Potential informants will be invited to take part in the research study via university-sanctioned email addresses. If informants choose to participate, consent for the background survey will be obtained electronically as the first slide in the survey. Those who choose to interview will be emailed an additional consent form for that portion and

should return it electronically or in person prior to scheduling an interview time. Interviews will be conducted around the schedules of the participants and will take place in the music library. Recordings and transcriptions will be stored in a secure folder (password protected) on the PI's personal laptop. The only individuals with access to the folder will be the PI and the faculty advisor. Consent forms will be stored in a file cabinet in the faculty advisor's office for the required amount of time. After the required amount of time, all documents will be destroyed. Current choral educators' responses were collected and analyzed for attitudinal differences and current pedagogical methods.

Results

This study aimed to answer three research questions:

1) What are the psychological effects of the voice change on female students?

2) How do Social Emotional Learning techniques affect self-perceptions in female students experiencing the voice change?

3) What are current pedagogical approaches to the voice change process?

Two populations of participants were identified: Choral music education students and current secondary choral music educators. This explanatory mixed-method study collected quantitative data on a four-point Likert-type scale as well as qualitative information in open-ended responses. Separate surveys were given to choral music education students (n = 10) and current secondary choral educators (n = 16). Semi-structured interviews were also conducted with choral music education students.

Choral Music Education Student Survey Results

Choral music education students (n = 10) responded to fourteen Likert-type questions which all reflected back on their own voice change process. Multiple one-way analyses of variances (ANOVA) along with several paired sample t-tests were used to measure differences in attitudes and psychological issues that students held in regard to their voice and the voice change process. Provided below are the descriptive statistics (See Table 1) and results from statistical analysis tests for significance between different areas of the voice change related to self-efficacy. The full text of the survey can be found in Appendix A.

Table 1

Choral Music Education Student Survey Descriptive Statistics

Question	*M*	*SD*
I could sing well.	3.60	.49
I could sing in tune.	3.60	.49
I could sing easily in my high voice.	2.80	.75
I could sing loud in low voice.	2.70	.90
I could sing loud in high voice.	3.10	.70
I could sing without a breathy tone in middle voice.	2.70	.90
I could sing comfortably in high voice.	2.90	.83
I could control my singing my mid voice.	2.80	.60
I could change notes quickly.	3.00	1.10
I could sing with a good sound in low voice.	2.80	.98
I could sing with full voice in all ranges.	1.70	.90
I could sing without a breathy tone in high voice.	2.70	1.10
I could sing high pitches without straining.	2.60	1.02
I could sing a long phrase of music without having to take extra breaths.	2.20	.98

Comparisons Between Singing Well and Other Factors

Multiple ANOVA tests were conducted to find significances between different areas related to voice change challenges and self-efficacy issues. The first ANOVA was used to analyze the relationships between respondents believing that they could sing well

and all other items. There was a significant relationship between singing well (M = 3.60, SD = .49) and singing loud in the high voice (M = 3.10, SD = .70); $F(2, 11) = 7.68$, p = .02. Respondents provided a high confidence is their singing ability overall but provided a lower confidence in being able to sing loud in their high voice. A statistically significant relationship was also found between singing well and singing without a breathy tone in the mid voice $F(2, 11) = 5.41$, p = .05 (See Table 1.) Respondents provided higher confidence in singing ability even though they provided a lower confidence in singing without a breathy tone in their middle voice. Another statistically significant relationship was revealed between singing well and being able to change notes quickly $F(2, 11) = 10.00$, p = .01. Respondents looking back at their voice change provided a high confidence in their ability to sing well but provided a lower confidence in their ability to change notes quickly.

A statistically significant relationship was also found between singing well and being able to sing full voice in all ranges of the voice $F(2, 11) = 5.41$, p = .05. Respondents provided a high confidence in their ability to sing well but provided a significantly lower confidence in being able to sing with a full voice in their whole range. Another significance was found to exist between singing well and being able to sing without a breathy tone in high voice $F(2, 11) = 30.72$, $p < .01$. Respondents provided a high confidence in singing well even though they provided a lower confidence in their ability to sing in their high voice without a breathy tone in their high voice. A statistically significant relationship also exists between singing well and being able to sing higher pitches without straining $F(2, 11) = 6.901$, p = .03. When reflecting on their voice change, respondents provided a higher confidence in their ability to sing well but

provided a lower confidence in their ability to sing high pitches without straining their voice.

No significant difference was found between the ability to sing well and singing in tune $F(2, 11) = 4.126$, $p = .08$. Respondents provided equal confidence in their ability to sing well and sing in tune when reflecting on their voice change.

When reflecting back on their voice change, choral music education students reported being able to sing well even though they dealt with many of the typical issues of the adolescent voice change process (breathiness, inability to change notes quickly and difficulty singing in extreme registers). Respondents suggest that these factors do not influence their confidence in singing well during the adolescent voice change process.

Comparisons Between Singing In Tune and Other Factors

Another ANOVA was conducted to analyze significances between singing in tune and all other questions. A significant relationship was found between singing in tune and being able to sing with a full voice in all ranges $F(2, 11) = 5.41$, $p = .05$. Respondents reported a higher confidence in their ability to sing in tune while reporting a lower confidence in their ability to sing easily in their high voice. Another significant relationship exists between singing in tune and being able to sing loud in the low voice $F(2, 11) = 5.41$, $p = .05$. Respondents provided a significantly higher confidence in their ability to sing in tune than their ability to sing loud in their low voice. The final significant relationship was found between singing in tune and singing with a good sound in the low voice $F(2, 11) = 6.40$, $p = .04$. Respondents provided a significantly higher confidence in their ability to sing in tune than their ability to sing with a good sound in their low voice.

When reflecting back on their voice change process, respondents reported being able to sing in tune while lacking the confidence in their ability to sing loud and with a good sound in their low voice. Respondents also reported being able to sing in tune but provided a much lower confidence in being able to sing with a full voice in all ranges.

Comparisons Between Singing Without Breathy Tone and Other Factors

An ANOVA was run between singing without a breathy tone in the mid voice and all other questions. No significant relationships were found.

Another ANOVA was conducted to find significances between being able to sing without a breathy tone in the high voice and all other questions. A statistically significant relationship was found between being able to sing without a breathy tone in the high voice and singing easily in the high voice $F(2, 11) = 7.60$, $p = .02$. Another statistically significant relationship was found between being able to sing without a breathy tone in the high voice and singing loud in the high voice $F(2, 11)$, $p = .04$. Respondents reported a higher confidence in their ability to sing loud in their high voice than singing without a breathy tone in their high voice.

Other Findings

Another ANOVA was conducted to find significances between being able to sing with a full voice in all ranges and all other questions. There was not a significant relationship between singing with a full voice in all ranges and singing loudly in the high range $F(2, 11) = .175$, $p = .84$.

Current Secondary Choral Music Educator Results

Current secondary choral music educators (n = 16) responded to nine Likert-type questions and one free response which focused on their attitude toward and pedagogical practices with the female voice change process. ANOVAs and paired sample t-tests were conducted to compare the attitudinal differences and preparedness levels that teachers reported in regard to the female voice change process. This section provides the descriptive statistics (See Table 2) and results from statistical analysis for significance between different areas of pedagogy and knowledge. The full text of the survey can be found in Appendix B.

Multiple ANOVAs and paired sample t-tests were conducted to find significance differences in attitudes and preparedness levels that teachers hold in regard to the female voice change process. A paired sample t-test was used to determine a statistically significant difference between choral directors being familiar with the challenges of the female adolescent changing voice (M = 2.62, SD = .81) and I have adequate knowledge to manage the vocal change of female adolescent singers (M = 3.00, SD = .82); $t(14) = -2.09$, p = .01. Respondents held a higher belief that they have adequate knowledge to manage the female voice change process but believe that choral director community as a whole is not familiar with the challenges of teaching the female voice change process.

The descriptive statistics were broken down further to account for differences in attitudes between two groups: middle school (6^{th} – 8^{th} grade) and high school (9^{th} – 12^{th}) educators See Table 3.

Table 2

Current Secondary Choral Music Educators Survey Descriptive Statistics

Question	*M*	*SD*
Addressing the female voice change helps adolescent females successfully sing through during the time of vocal change.	3.25	.78
As female adolescent voices change and develop, unique challenges, relative to female vocal change, are present for the choral director.	3.44	.73
Choral directors spend too much time addressing female voice change.	1.69	.49
Female adolescent vocal change is over-emphasized within choral literature.	1.44	.51
Choral directors should continually look for new ways to help female students understand their vocal change process.	3.62	.50
When directors choose literature with the female changing voice in mind, female adolescent singers are more successful.	3.50	.52
The female adolescent changing voice and its challenges are represented well within professional development resources.	2.19	.66
Choral directors are familiar with the challenges of teaching the female adolescent changing voice.	2.62	.81
I feel that I have adequate knowledge/preparation to manage the vocal change of female adolescent singers.	3.00	.82

Table 3

Grouped Teacher Survey Descriptive Statistics

Question	Grade Level	*M*	*SD*
Addressing the female voice change helps adolescent females successfully sing through during the time of vocal change.	Middle High	2.89 3.71	.78 .49
As female adolescent voices change and develop, unique challenges, relative to female vocal change, are present for the choral director.	Middle High	3.56 3.29	.53 .95
Choral directors spend too much time addressing female voice change.	Middle High	1.78 1.57	.44 .54
Female adolescent vocal change is over-emphasized within choral literature.	Middle High	1.67 1.14	.50 .38
Choral directors should continually look for new ways to help female students understand their vocal change process.	Middle High	3.44 3.86	.53 .38
When directors choose literature with the female changing voice in mind, female adolescent singers are more successful.	Middle High	3.56 3.43	.53 .54
The female adolescent changing voice and its challenges are represented well within professional development resources.	Middle High	2.22 2.14	.67 .69
Choral directors are familiar with the challenges of teaching the female adolescent changing voice.	Middle High	2.56 2.71	.88 .76
I feel that I have adequate knowledge/preparation to manage the vocal change of female adolescent singers.	Middle High	3.00 3.00	.87 .82

An ANOVA was conducted to find statistically significant differences in attitudinal scores between middle school teachers (n = 9) and high school teachers (n = 7). A statistically significant difference was found between groups on Question 3: As female adolescent voices change and develop, unique challenges, relative to female vocal change, are present for the choral director $F(2, 17) = 7.25$, $p = .02$. Middle School teachers reported that unique challenges related to the female voice change process are present to the directors at a higher rate than high school directors. A statistically significant difference was found between groups on Question 6: Choral directors should continually look for new ways to help female students understand their vocal change process $F(2, 17) = 7.35$, $p = .02$. High School teachers reported that teachers should continually look for new ways for female students to understand their voice change at a higher rate than Middle School teachers.

Qualitative Findings

Many themes emerged during analysis. The first theme, *Range of Voice*, refers to specific regions of the voice such as high voice and low voice, as well as range expansion. *Vocal Transitions* refers to issues regarding the passagio and navigating using chest voice v head voice. The third theme, *Fear*, encompasses both fear felt toward the voice and fear of violating the unified sound of the ensemble. *Technique*, the fourth theme, involves vocal usage, perceptions of proper and poor technique, and use of vibrato. The fifth theme, *Tone*, regards respondents' thoughts on mature tone, belting, and breathiness in their voices.

Two overarching themes also influenced each of aforementioned themes. *Adolescent Psychological Factors* influenced how respondents thought about their own

voice and how they experienced their voice change. *Secondary Vocal Experience* also spanned across all themes because the secondary classroom is the environment where most respondents were aware of aspects of their voice change such as voice part identity, positive and negative influences, and repertoire choices.

A list of choral music education student respondents with brief descriptions is provided below:

- Juliette – A singer who struggled with voice part identity throughout the voice change and received little instruction from teachers
- Faith – A singer who did not have a supportive teacher during the voice change but had high levels of confidence in her high range.
- Addison – A singer with a very large range and struggled with connecting full sound through the passagio.
- Hailey – A singer who did not have a supportive family system for at home practice and was frequently placed in lower voice parts due to her strong low voice.
- Raegan – A singer who sang in both classical and belt tones consistently.
- Ethel – A singer who struggled with healthy vocal usage as a vocalist and an athlete in high school and college.
- Elizabeth – A singer who received lots of positive reinforcement from her teachers but struggled with a breathy tone through college.
- Laura – A singer who was always aware of her volume and how it might be perceived by others, specifically in the high range.
- Kimberly – A singer who struggled with balancing volume in the low and high voices to be heard.

- Blakeley – A singer with a deeper voice who faced struggles with voice identity and influence from significant others.

Adolescent Psychological Factors

Self-efficacy, one's own perceived ability to plan and complete a task (Bandura, 1977, 1986, 1997), both positive and negative, heavily influenced how respondents viewed their own voice. Negative self-efficacy regarding their vocal development and range was apparent in respondents. In particular, struggling with certain areas of the voice consistently affected respondents' self-efficacy issues as evident in this quote from Addison:

> I felt like I'm failing. What I'm going through. It's especially that openness in the passaggio and the higher notes is what last semester was like. Not nice. It was really making me struggle and I can remember coming home and talking to [my roommate] and I would say that it makes me feel like a failure. (Addison)

Just because of a lack of openness in the passaggio and not being able to sing higher notes, Addison's self-efficacy was lower and she became less confident in her ability to sing in those ranges.

During a long string of vocal struggles, students may internalize feelings of failure and give up on being able to sing in certain ranges or in certain styles. Hailey, a respondent, stated in relation to her vocal challenges, "I think that when I had these challenges, I automatically labeled myself certain ways and I was like 'Okay, I just can't sing this'." A lack of knowledge was also associated with a lower sense of self-efficacy in respondents. Without the proper knowledge of the voice change, respondents felt like there was no control and ownership of the voice.

Positive self-efficacy persistently effect respondents' perceptions of their voice and their abilities throughout their lives. Among the feelings that influenced self-efficacy,

confidence emerged as a general statement. Faith, a respondent, was greatly influenced by her teachers encouraging her which allowed her to accept her own voice: “The teachers I work with now have made me feel confident and I've been more patient with me, and they know my voice pretty well.” Acceptance and ownership of the voice also related to a higher sense of self efficacy. Respondents gave simple, yet powerful statements including:

- “My voice is my voice” (Addison)
- “I just have to tell myself that's not how my voice was, right? That wasn't the part for me. I'm not the same as them. My voice is mine.” (Hailey)
- “It’s okay that my voice is airy and that I can’t sing all the high stuff. That’s not voice” (Laura).

The imaginary audience is a developmental psychological phenomenon where an adolescent may perceive everyone to be always looking or watching them (Elkind, 1967). This phenomenon emerges in early adolescence and can be viewed in the responses offered during interviews. Respondents described feeling like other people were judging them or noticing them in ensemble settings. Laura stated, “It felt like I was way too loud. I was so much louder than all the other girls singing the high stuff. So, I wouldn’t sing it.” In her case, no one explicitly told her that she was too loud. This was a perception of her own voice that then influenced her choices to sing in that setting or not. Another example was demonstrated when Addison said, “And not that somebody told me I was a failure, but that’s how it made… it felt when I was like, not getting what somebody else wanted me to get or what I wanted me to get, you know?”

Adolescent Vocal Experience

Many respondents spoke about not being taught about their voice change until arriving at college. This shines a light on the gaps in pedagogical attitudes of current secondary choral music educators on the female voice change. In particular, Elizabeth spoke about the male voice change in classrooms, but not the female voice change:

> I wasn't informed of anything regarding a voice change until college. So throughout middle and high school, it was brought up a lot for the guys and never brought up at all for us.

Without the necessary knowledge of what is happening physically during the voice change, respondents felt alone in this time of change.

The secondary choral classroom sets the environment and context in which students will experience the majority of their voice change process. Alongside their classroom experience, the vocal experience may be influenced by voice lessons and family factors. Respondents emphasized their voice part identity during interviews and acknowledged that this phenomenon occurs.

> I think there's a lot of identity that's wrapped up in your voice part or just your instrument in general, and you see that a lot. And high school ensembles like, you know, even band and orchestra or whatever, it's like, oh, that's a flutist, that's an oboist. And I think the same goes with singing of like there's this identity that can kind of come into it. (Ethel)

All respondents referred to themselves as a voice type at some point in the interview, although the labeling was inconsistent. Respondents used choir-based voice parts Soprano I, Soprano II, Alto I, and Alto II, as well as classically-based voice parts Soprano and Mezzo-soprano. Each voice part has qualities associated with it that respondents spoke about. These qualities are not only about the voice, but they also morph into who you are as a person. Still speaking about her own voice identity, Ethel described an identity crisis happening when her voice began to shift:

> There's the association of like, oh, you're gentle, you're floaty. That translated into how you are as a person. So, yeah, this is kind of weird identity crisis thing that's going on right now since I am vocally healthy and can sing higher notes, it's like, 'Oh, okay. I could actually be a higher voice part than I thought I was initially.' And that it's strange and it's foreign, it's scary.

Respondents also spoke about conflicts between the soprano and alto sections in choirs. This was not only about their voice and range, but also covering personalities and moving beyond the choral classroom. Feelings like these often were in line with, and reinforced, stereotypes that many respondents alluded to. For many students, this may be perceived as being categorized for voice part sorting, but some may see these labels as more than just their voices. Laura shared:

> When I was in high school, it was like the sopranos versus the altos. Like you're assigned soprano and you kind of take that on as a part of your identity. I had a little bit of an attitude. If I were put on alto, I wouldn't have actually been annoying, but I would have in my head throwing a fit because I would've been like, "No, that's not my voice. I'm not like them."

Outside influences, such as teachers and parents, also influenced how respondents remembered their voice change and how they felt about singing all the way through the voice change process. Negative influences from teachers and parents far outweighed positive influences during the interview process. Choir and private voice teachers have a strong influence on how students feel about their voice and how students use it. Faith spoke on the negative pressure that her teacher put on the class saying, "My teacher would tell us to force a vibrato out. I've heard from every other voice teacher that you're not supposed to force that. It'll come naturally with technique and age." This teacher was encouraging unhealthy vocal usage in their students. An ill-informed teacher caused both physical and psychological harm to students by encouraging unhealthy techniques in the classroom setting.

Family factors also influenced how respondents used their voice during adolescence. Practicing at home can be a struggle because of family working from home, the noise that is created during practice, or a lack of confidence to sing in front of family. Hailey stated that her family influenced how she used her voice registers because of her family's reactions to her practice:

> I would try to extend my range up by practicing more soprano rep and they'd be like 'That's too high. It hurts my ears.' So I always got discouraged and they always wanted me to sing alto because they liked it better.

Fear

Fear underwrote many remarks that respondents gave during interviews. Respondents were afraid of making mistakes and violating the ensemble sound. Mistakes could range from cracking on a note or using the inappropriate register shift for that setting. There may be a fear of high pitches in students who do not often use their upper register. This is turn creates a self-efficacy issue surrounding this range of voice and the student may choose to not sing/practice those pitches. After not practicing and using this register, students may believe that they cannot sing it and in turn, will not sing it:

> I sang alto when I was in sixth grade and [my teacher] would have us sing a scale and my high notes would feel a little held back because I was always scared. I felt like I couldn't reach them and then I never did (Faith).

Having a fear of violating the ensemble sound is an extremely prevalent feeling that respondents shared throughout interviews. The effects of trying to control the voice to blend into the ensemble can be damaging to the voice. This includes controlling emerging vibrato and controlling volume.

> Essentially, I learned with ensemble singing, controlling the pitch is how you're accurate and there's tension with straight tone singing. The tension with just trying to be accurate obviously affects how I sing in my solo voice, which isn't necessarily the proper way to go about things (Ethel).

Other respondents showed evidence of the imaginary audience within fear. This combination manifested in multiple respondents showing who expressed fears of being heard as an individual in the ensemble or being heard at all. The fear once again shows itself in forms of holding back volume and resisting that natural emergence of vibrato. Laura spoke briefly on this saying, “I was very afraid of my voice being heard at all in an ensemble setting by anyone. I felt like I was way too loud. I was so much louder than all the other girls singing the high stuff.” Respondents more likely exhibited this feeling more often when speaking about their high voice and singing soprano.

Range of Voice

The range of a singing voice is, in basic terms, the limit of what someone can phonate while singing. The measure is crucial in how students identify with their voice and classify certain registers/passagi within their singing voice. For some respondents that identified as altos or mezzo-sopranos, the high voice was a daunting area because of a lack of usage and training. In relation to a lack of usage, Blakeley said, “My high voice was kind of just an untouched thing. It would come out super screechy and tense.” Respondents also said that singing higher could relate to greater psychological pressure in an ensemble setting. Juliette described this pressure in context of being exposed, saying, “High notes can be fun, but they are a lot of pressure. Especially if you’re in a choir that you’re going to be extremely exposed because you’re a soprano singing high. It’s a lot of pressure.”

Respondents also spoke about the challenges of the low voice. The low voice is often misinterpreted by students. These misconceptions could be caused by a myriad of influences, but students end up with the wrong idea of how to produce this register.

Addison spoke on these misconceptions in her own voice saying, “I feel like I might have pushed more because of thinking low, thinking dark, thinking down, thinking I have to kind of get this out.” However, respondents that identified as alto or mezzo-soprano voice types had a different outlook on this register. Ethel stated, “I’m a relatively stronger build, like I’m a heftier woman per se, just strength wise. And so, it’s almost empowering to be a lower female voice part. I’m strong because I can sing low.” Language that is normally associated with the high voice, such as “opening up,” was also present in respondents that identified as alto and mezzo-soprano voice types. Blakeley mentions this language about her low voice saying, “My low end was still pretty good. And now I’m opening even more, and I can go even lower.”

For respondents, most expansion of their vocal ranges was a recent occurrence. Most notably, the range expansion happened when they started taking private voice lessons. When talking about an expanding range, respondents also wished that they would have known about range expansion earlier, specifically in high school.

> Oh, now my range is huge. I feel like I can I sing alto, but my solo rep is soprano, so I'm pretty comfortable with singing in both ranges. I wish I had known. I mean, that probably comes with age, but I wish I was more confident because I can sing higher notes really nicely, but I also can sing lower notes and a warm tone. And I wish I knew that when I was younger because I didn't really know. I didn't know anything about that. (Faith)

It is important to note that respondents wished to know about this information but due to the physiological changes in the voice change process, this expanded range may not be accessible yet at that point in their lives.

Vocal Transitions

Areas of the voice that transition between registers can be difficult to navigate, especially for untrained or adolescent voices. These transition points, or *passagi*, can be

heard in between the chest voice and head voice registers. Current voice science informs that these names are misnomers, but respondents used these names so frequently that they have been included. The secondo passaggio is the transition area generally around C4 to F4. When speaking about the secondo passaggio, respondents were very blunt about their struggles saying, “Of course I struggle singing through the passagio. But who doesn’t?” (Laura). Working through these areas is a long journey of vocal progression. In secondary choral ensembles, this passagio could be very obvious with a breathier head voice above and a louder, more resonant chest voice below. The opposite could be true as well. Respondents also said that they are able to work through the passaggio just now in college: “I would say that I am just now being able to transition very more fluidly” (Hailey).

Technique

Technique is the basis of how students will use their voice. Respondents spoke both on their overall vocal usage and their technique in both positive and negative ways. Respondents speaking about good technique brought up general topics such as breath support and posture. When asked to describe how they know she knows that she is using good technique, Kimberly responded with, “It should be natural… It shouldn’t hurt… There should not be a bad pressure.” Using your core muscles to support the air stream and regulate subglottal pressure is also crucial to having good technique. Without proper support and usage of core muscles, the sound that is produced is less likely to have a core, closed tone. Respondents were aware that they should be using these muscles saying, “I’m supposed to use my core, like my whole body to sing” (Kimberly).

Poor technique circled around the sense of strain and being tired after singing. Respondents noted that if they felt either of these, something was incorrect with their technique. Poor technique can eventually lead to many vocal issues in the future but the causes were focused on more in interviews. Respondents stated that a lack of knowledge in high school about belting or Contemporary Commercial Music (CCM) techniques lead to vocal strain and poor technique. “I think the unhealthiness really stems a lot from singing in a contemporary church. I had no idea how to do it” (Raegan). Respondents also noted a feeling like they needed to be heard in their secondary classroom ensembles. This shows signs of cognitive dissonance when compared to the results of *fear* and *the imaginary audience*. This response was given in the context of speaking about an ensemble rehearsal, “I guess in the higher range I would strain. I just wanted to be heard” (Kimberly).

Overall vocal usage was also considered to be a large factor in how respondents felt about their technique and their singing ability. Many respondents spoke about how being on sports teams was detrimental for their vocal health. This was due to screaming, being in a loud environment, and general misuse and abuse of the folds during practice and games.

> I never really had a healthy voice up until the last couple, couple of months when I quit playing soccer, but so that definitely contributed into it. And like not having the ability to have a good upper range in the first place just because A. lack of training and B. my chords were always so swollen, it was just it couldn't come out. (Ethel)

Pain was a key marker for identifying unhealthy vocal usage for respondents. If there was pain involved with phonation or pain emerged afterward, it was more likely that respondents would classify this usage as unhealthy. Hailey said, “I would try to get the notes out and sometimes I would feel like I sound great but then I would hurt

afterwards. I'm like, how? Why am I hurting if I thought I was doing great?" This not only demonstrates a lack of knowledge of proper technique, but also how it can lead to unhealthy usage in adolescent voices.

Tone

The tone of the voice also influenced how respondents perceived their own vocal progression. Respondents struggled with a breathy tone throughout middle and high school. This breathiness is natural among that age group and is a part of the voice change process, but many respondents stated that they still struggle with it because they never had the education and knowledge to help themselves. Teachers talking about breath support without explaining the root cause of voice change has been ineffective for respondents.

> I had my audition tapes and I listened to all that. And my teacher would always just talk about getting your breath underneath you, supporting it. And I would think I was doing it and just not happen. But now I'm having to learn about what vowels can help me through that, and my teacher talk about closing my vocal folds together. Onset is still really difficult for me with breathiness. (Hailey)

Respondents also connected a breathy tone to being quiet and softspoken. This lack of projection was noticeable for respondents in the context of their choral ensembles in middle and high school. Blakely said, "I have a very breathy tone. There wasn't much sound behind it. I would speak, and I'm very quiet. I didn't project as much as I do now. It was very soft spoken, and that carried through to choir."

Respondents also spoke about working toward a mature tone in their voice. When asked to define mature tone, most respondents could only give details as to what does not constitute maturity. Breathiness in the tone was brought up by all respondents to define what marked immaturity. When trying to define maturity, Elizabeth said, "I think mature is mostly fully developed, like what you would expect an adult professional female singer

to sound like. Past the challenges of going through puberty." Even here, there is no true definition that respondents could give besides being past puberty.

There is a large disparity between ensemble tone and solo tone for this group of respondents. Many stated that they are ensemble singers and there has been tension in their sound and tone because of it. Laura said, "I just kind of saw myself more just like your average choir singer, right? Nothing special." This quote is particularly concerning because this is causing a further separation between ensemble singing and solo singing in respondents' minds. When talking about her voice Ethel identified herself as an ensemble singer:

> Even when I was training for college auditions or All-State chorus audition, I never did solo rep until college. I was always an ensemble singer. Even now my private voice teacher still says that I just have to relax more.

Belt and mixed registers were also brought up by respondents as an area that they frequently found trouble in singing. A connection was revealed between poor technique and belting in interviews. This connection was due to a lack of support in teachers and a lack of knowledge on correct belting techniques. Students started to teach themselves by searching online and practicing without guidance because it was not offered to them anywhere else.

> I started diving on YouTube for how to belt videos and I wasn't teaching myself properly. It's like "please stop because you're going to have to do a lot to combat singing so bright and so nasally. It did not sound great." (Raegan)

Respondents also noted that they wanted to belt and use mixed registers because they wanted to "keep up" with everyone around them. There was competition between students to see who would be the most impressive. Raegan showed a deep connection between belting and being better than others saying, "I was struggling to find that mix and belt area and it made it hard for me because I was wanted to be good enough to keep

up with my competition." This stems from her involvement in theatre and CCM where mixed register and belt styles are commonplace and sought after.

Choral Teacher Attitudes

The last question of the current secondary choral educator survey was open ended allowing for further explanation on how they approach the female voice change in their own classrooms. Teachers offered a wide variety of responses ranging from no experience, knowledge, and pedagogy, to full acknowledgement of the voice change and offering pedagogical insight on how they navigate this with their students. Most respondents avoided answering the question by simply acknowledging that the voice change occurs saying "Most times when singers produce overly breathy, weaker sounds it is often due to the female voice change." A more concerning answer was given that acknowledges the voice change, affirms that the student does not understand what to do and then offers so solutions outside of damaging the voice or quitting choir:

> There is a moment in 7th,8th,9th grade when girls say their voices are fuzzy or breathy, and they don't love it. They don't understand how to deal with the change and end up doing things that might damage their voices. Or they quit singing.

These comments suggest that there may be a knowledge base in current teacher but a lack of pedagogy to implement changes in the classroom.

Current secondary choral educators also spoke about having open and honest conversations about the voice change with students. In an effort to best support their students, teachers may choose to address this as a group as one teacher did who said, "Every year, we talk about the vocal quality of the female voice during the voice change. We celebrate the cracks and breathiness to demystify the process." Respondents also spoke about trying to normalize the voice change within their classroom. This is first

done by having the honest conversations from before and then speaking specifically on voice cracks, breathiness, and range. One educator offered this insight:

> Students will have voice cracks from time to time. I support students and tell them that it is normal. Sometimes students are more intimidated by it and are less likely to sing out. If you create a class environment that is positive, supportive, and loving they will be more likely to sing out regardless of whether their voice will crack or not.

By normalizing the voice change in the classroom, current secondary choral educators believe that they are doing their part in disrupting the negative self-efficacy trend associated with the voice change process.

Current secondary choral educators also cited a lack of research and resources available to them specifically tailored for the female voice change process. A lack of resources translates to educators reverting to what they remember from their education or their own experiences.

> I easily found many resources for the boys but had to go off my own knowledge as a female singer and revert back to my own experience as an adolescent. Young treble singers need constant modeling and reminders that their voice is changing and developing.

Even though having conversations with students about their voice change occurred often in teacher respondent results, limited pedagogical information was given. Current secondary choral music educators recommended using warmups in the upper range as well as singing across the passaggio evident in the following quotes: “Warmups are crucial during this time, the more time they spend singing those notes and accessing their upper register then it's more practice for them. They gain more confidence with these notes,” and “They need to sing in many vocal styles so that the full range of their vocal mechanism is developing. Singing in both head and chest voice and then working on middle voice to bridge the gap.”

Discussion

This study was designed to continue to develop the understanding of the psychological effects of the voice change in female students as well as to connect how the attitudes and pedagogy of current secondary choral music educators may be affecting students journeying through the voice change process. The findings indicate that the psychological implications of the voice change process are highly complex and intertwined at many levels. Above all, the vocal experience that students have in secondary classrooms and adolescent psychological factors were the overarching forces for the voice change process to occur. Although two overarching themes, five subsequent themes, and teacher attitudes and pedagogy have been addressed separately, the combined effect on students' psychological state has lasting impacts on their perception of the voice.

Respondents demonstrated a wide variety of thoughts on their voice. Many respondents spoke about fear that was influenced by several causes such as range, teachers, ensemble settings, and failure. These feelings are supported when viewed through the lens of adolescent egocentrism and the imaginary audience (Elkind, 1967). The combination of the imaginary audience and fear can lead to students withholding their voice and demonstrating a fear of violating the unified sound of the ensemble (Sweet, 2015). Withholding their voice for the sake of the ensemble setting that they were in was a main factor in reducing their self-efficacy and causing a lack of confidence. Respondents spoke about this specific fear as far back as middle school ensembles when their voices started to change and continued to speak on them to the present as college students. Voice part identities were also mentioned numerous times by multiple

respondents. Strong identities formed in respondents as early as 6th grade when they were first assigned to sing soprano or alto. It is important to note that the identities are not formed solely by the student. Respondents were placed as soprano or alto by a teacher first and the identity formed around that placement. For many respondents these identities formed at the same time as the onset of puberty. Gaining an identity in relation to your voice, only for it to change over the course of the next few years will cause "feelings of fear, frustration, and/or a lack of confidence" (Sweet, 2015) as demonstrated in these respondents.

Current secondary choral music educator respondents displayed a strong confidence in their knowledge base encompassing the female voice change process. This knowledge was mostly gained in their experience in their Teacher Education Programs in college or through personal experiences as teachers. Although this knowledge is useful, the pedagogy necessary to implement successful strategies was lacking in most responses. The few current secondary choral music educators who did have pedagogy in their responses spoke mainly on warmups that coincided with current research. This research, although limited, suggests using warm-ups that focus on both pitch production and breathing are necessary to build confidence young treble voice singers (Owen, 2017). Teacher respondents acknowledged that there is a lack of professional resources that specifically address the female voice change process but there is a plethora of resources for the male voice change. This hole in resources and literature may stem from time gap from when research began on the male voice change process versus the female voice change process. It is important to account for the physical and mental maturity rates of male and female students. Female students begin puberty earlier and experience physical

and emotional maturity at a quicker pace than male students. Therefore, research on supporting male students through the voice change in secondary choral settings is not transferable to female students of the same age range.

The results of this study indicate that the perception and psychological effects of the voice change process in female students largely stems from adolescent psychological factors, fear, and outside influences such as family and teachers. Experiences in choral classrooms were the foundations of how respondents felt about their voice through the voice change process. Fear of sticking out, being too loud, or being heard as individual in an ensemble setting suggests that respondents were feeling the effects of adolescent egocentrism specifically for their own voice.

Although the results of this study cannot be generalized, teachers should consider the impacts of valuing the sound of the ensemble over the vocal health and growth of individual students. Respondents gained confidence in their voice when they received positive reinforcement and knowledge of the voice change process. Knowledge of influences and the psychological effects of teacher actions can further inform educators on how to approach the voice change process in classrooms and how to encourage students who face difficulties during this time. Additional research might include the effectiveness of pedagogical approaches in use by secondary choral music educators or analyzing the adolescent psychological factors in real time with students.

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Appendix A

Choral Music Education Student Survey

Question
Are you a Choral Music Education Major?
Did you experience a female voice change?
Please identify all voice parts you have sun since the age of 11.
I could sing well.
I could sing in tune.
I could sing easily in my high voice.
I could sing loud in low voice when asked to.
I could sing loud in high voice when asked to.
I could sing without a breathy tone in middle voice.
I could sing in my high voice comfortably.
I could control my singing my mid voice.
I could change notes quickly when I sang.
I could sing with a good sound in my low voice.
I could sing with full voice in all parts of my range.
I could sing without a breathy tone in my high voice.
I could sing higher notes without straining.
I could sing a long phrase of music without having to take extra breaths.

Appendix B

Current Secondary Choral Music Educators Survey

Question
What grade levels do you teach?
When the choral director addresses the female voice change in the ensemble rehearsal, it helps adolescent females successfully sing through during the time of vocal change.
As female adolescent voices change and develop, unique challenges, relative to female vocal change, are present for the choral director.
Choral directors spend too much time addressing female voice change.
Female adolescent vocal change is over-emphasized within middle school and early high school level choral literature.
Choral directors should continually look for new ways to help female students understand their vocal change process.
When middle school and high school choral directors choose literature with the female changing voice in mind, female adolescent singers are more successful.
The female adolescent changing voice and its challenges within the choral classroom are represented well within professional development resources (journals, conference presentations, books, webinars, blogs, and online resources).
Choral directors are familiar with the challenges of teaching the female adolescent changing voice.
I feel that I have adequate knowledge/preparation to manage the vocal change of female adolescent singers.

Appendix C

IRB Approval Letter

GEORGIA SOUTHERN UNIVERSITY
RESEARCH INTEGRITY

Institutional Review Board (IRB)
PO Box 8005 • STATESBORO, GA 30460
Phone: 912-478-5465
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu

To: Kennedy, Brendan
Langley, David

From: Georgia Southern Institutional Review Board

Approval Date: August 29, 2022

Subject: Institutional Review Board Exemption Determination - Limited Review

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The following protocol involves activities that do not require full approval by the Institutional Review Board (IRB) according to federal guidelines.

Protocol #: H23024

Title: The Psychological Effects of the Voice Change in Female Students and the Implication of Current Pedagogy

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s):

Review Type: E3

Exemption 3 Research involving benign behavioral interventions in conjunction with the collection of information from an adult subject through verbal or written responses (including data entry) or audiovisual recording if the subject prospectively agrees to the intervention and information collection and at least one of the following criteria is met: (A) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained, directly or through identifiers linked to the subjects; (B) Any disclosure of the human subjects' responses outside the research would not reasonably place the subjects at risk of criminal or civil liability or be damaging to the subjects' financial standing, employability, educational advancement, or reputation; or (C) The information obtained is recorded by the investigator in such a manner that the identity of the human subjects can readily be ascertained, directly or through identifiers linked to the subjects, and an IRB conducts a limited IRB review to make a determination of exemption

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research **with the understanding that you will abide by the following conditions:**

Form D The IRB has approved your safety plan for in person research for this protocol. You may proceed with the research as described in the above protocol as long as you continue to follow the submitted safety plan and local conditions remain manageable by that plan. Any changes to the protocol and/or safety plan must be approved by the IRB before the changes are initiated. It is the researcher's responsibility to maintain awareness of the current COVID Phase (as defined by the CDC) in the community where the research is taking place and to follow applicable safety precautions for that phase. The research must also remain aware of any changes to the University's COVID policies as it relates to research.

Incentives: No monetary incentives are approved for this protocol.

Special Conditions: None

Any alteration in the terms or conditions of your involvement may alter this approval. Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that your research, as submitted, is exempt from IRB Review. No further action or IRB oversight is required, as long as the project remains the same. If you alter the project, it is your responsibility to notify the IRB and acquire a new determination of exemption. Because this project was determined to be exempt from further IRB oversight, this project does not require an expiration date.

Appendix D

Choral Music Education Student Informed Consent Form

COLLEGE OF ARTS AND HUMANITIES

FRED AND DINAH GRETSCH SCHOOL OF MUSIC

Informed Consent for
The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy

1. This consent form is produced and distributed by Brendan Kennedy, Undergraduate Student of Music Education at the Gretsch School of Music at Georgia Southern University. I am the Principal Investigator (P.I) on a research study involving the Psychological Implication of the voice change in female students. This project is for partial completion of the requirements of the Honors College and is overseen by Dr. David Langley. The following form provides evidence that you consent to become a part of a research study conducted by Brendan Kennedy, entitled “The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy”. Please read the following information below before you consider providing your signature at the bottom to indicate consent.

2. Purpose of the Study: The purpose of this research is to explore the psychological effects of the voice change process in female students and identify current pedagogical trends in voice change education.

3. Procedures to be followed: Participation in this research will include completion of a survey and an interview that will last approximately 1 hour. Once transcribed, you will receive a transcription of your interview to review and edit as you see fit.

4. Discomforts and Risks: Risks for this study are believed to be comparable to risks experienced on a daily basis. For those who wish to seek assistance can contact the counseling center at (912) 4785541 or Health Services at (912) 478-5641.

COVID:

a. Precautions will be taken in accordance with current Georgia Southern policies to reduce the risk of the spread of communicable diseases (including COVID-19). However, consenting to participate in this research indicates your acknowledgement of the risk of disease transmission. You also acknowledge your requirement to notify the researchers if you are symptomatic prior to or at the time of participation. Contact information and appointment information may be held by the researcher and provided to health officials for the purpose of contact tracing in the event the research team is notified of a positive exposure to COVID19. We encourage participants to wear a mask or face covering while participating in the research. The CDC has provided a COVID Data Tracker that records COVID cases and can provide a current transmission risk assessment by state and county.

5. Benefits:
   a. There are no direct benefits to you as a participant.
   b. The benefits to society include an increased understanding of the pedagogical approaches of P-12 teachers regarding the female changing voice.

6. Duration/Time required from the participant: Approximately 1 hour total. The interview will last approximately 1 hour.

7. Statement of Confidentiality The only people who have access to the information collected in this study will be the researcher and the researcher's faculty advisor. All data will be stored in a secure location for 3 years following the completion of the study and will be discarded immediately after.

8. Future use of data: Deidentified or coded data from this study may be placed in a publicly available repository for study validation and further research. You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

9. Right to Ask Questions: You have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions

concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at 912-478-5465 or irb@georgiasouthern.edu.

10. Compensation: There is no compensation for participating in this study.

11. Voluntary Participation: Participation in this study is completely voluntary. You may end your participation at any time by telling the P.I or not returning surveys. You do not have to answer any questions that you do not wish to answer.

12. Penalty: There is no penalty for deciding not to participate in the study; You may decide at any time that you do not want to participate further and may withdraw without penalty or retribution.

13. All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues.

14. You must be 18 years of age or older to consent to participate in this research study.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GS Institutional Review Board under tracking number H23024.

Title of Project: The Psychological Effects of the Voice Change in Female Students and the Implications of
Current Pedagogy
Principal Investigator: Brendan Kennedy, (404) 824-1211,
bk05602@georgiasouthern.edu Research Advisor: Dr. David Langley,
dlangley@georgiasouthern.edu

If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below:

_____ _____

Participant Signature Date

Appendix E

Current Secondary Choral Music Educator Informed Consent Form

COLLEGE OF ARTS AND HUMANITIES

FRED AND DINAH GRETSCH SCHOOL OF MUSIC

Informed Consent for
The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy

1. This consent form is produced and distributed by Brendan Kennedy, Undergraduate Student of Music Education at the Gretsch School of Music at Georgia Southern University. I am the Principal Investigator (P.I) on a research study involving the Psychological Implication of the voice change in female students. This project is for partial completion of the requirements of the Honors College and is overseen by Dr. David Langley. The following form provides evidence that you consent to become a part of a research study conducted by Brendan Kennedy, entitled "The Psychological Effects of the Voice Change in Female Students and the Implications of Current Pedagogy". Please read the following information below before you consider providing your signature at the bottom to indicate consent.

2. Purpose of the Study: The purpose of this research is to explore the psychological effects of the voice change process in female students and identify current pedagogical trends in voice change education.

3. Procedures to be followed: Participation in this research will include completion of a survey.

4. Discomforts and Risks: Risks for this study are believed to be comparable to risks experienced on a daily basis. For those who wish to seek assistance can contact the counseling center at (912) 4785541 or Health Services at (912) 478-5641.

   COVID:

a. Precautions will be taken in accordance with current Georgia Southern policies to reduce the risk of the spread of communicable diseases (including COVID-19). However, consenting to participate in this research indicates your acknowledgement of the risk of disease transmission. You also acknowledge your requirement to notify the researchers if you are symptomatic prior to or at the time of participation. Contact information and appointment information may be held by the researcher and provided to health officials for the purpose of contact tracing in the event the research team is notified of a positive exposure to COVID19. We encourage participants to wear a mask or face covering while participating in the research. The CDC has provided a COVID Data Tracker that records COVID cases and can provide a current transmission risk assessment by state and county.

5. Benefits:
   a. There are no direct benefits to you as a participant.
   b. The benefits to society include an increased understanding of the pedagogical approaches of P-12 teachers regarding the female changing voice.

6. Duration/Time required from the participant: Approximately 20 minutes total.

7. Statement of Confidentiality The only people who have access to the information collected in this study will be the researcher and the researcher's faculty advisor. All data will be stored in a secure location for 3 years following the completion of the study and will be discarded immediately after.

8. Future use of data: Deidentified or coded data from this study may be placed in a publicly available repository for study validation and further research. You will not be identified by name in the data set or any reports using information obtained from this study, and your confidentiality as a participant in this study will remain secure. Subsequent uses of records and data will be subject to standard data use policies which protect the anonymity of individuals and institutions.

9. Right to Ask Questions: You have the right to ask questions and have those questions answered. If you have questions about this study, please contact the researcher named above or the researcher's faculty advisor, whose contact information is located at the end of the informed consent. For questions concerning your rights as a research participant, contact Georgia Southern University Institutional Review Board at 912-478-5465 or irb@georgiasouthern.edu.

10. Compensation: There is no compensation for participating in this study.

11. Voluntary Participation: Participation in this study is completely voluntary. You may end your participation at any time by telling the P.I or not returning surveys. You do not have to answer any questions that you do not wish to answer.

12. Penalty: There is no penalty for deciding not to participate in the study; You may decide at any time that you do not want to participate further and may withdraw without penalty or retribution.

13. All information will be treated confidentially. There is one exception to confidentiality that we need to make you aware of. In certain research studies, it is our ethical responsibility to report situations of child or elder abuse, child or elder neglect, or any life-threatening situation to appropriate authorities. However, we are not seeking this type of information in our study nor will you be asked questions about these issues.

14. You must be 18 years of age or older to consent to participate in this research study.

You will be given a copy of this consent form to keep for your records. This project has been reviewed and approved by the GS Institutional Review Board under tracking number H23024.

Title of Project: The Psychological Effects of the Voice Change in Female Students and the Implications of
Current Pedagogy
Principal Investigator: Brendan Kennedy, (404) 824-1211,
bk05602@georgiasouthern.edu Research Advisor: Dr. David Langley,
dlangley@georgiasouthern.edu

If you consent to participate in this research study and to the terms above, please sign your name and indicate the date below:

☐ **I consent to participate in this research study and to the terms above.**

Appendix F

Interview Questions

1. Talk to me about how you have used your voice since you were 11 years old. How involved with singing have you been over the years?
2. How have you noticed that your voice has changed since you were 11 years old?
3. What significant vocal challenges or difficulties do you remember when you were in middle school?
    a. High school?
    b. Currently as a college student?
4. How have challenges you encountered with your voice (since age 11) influenced how you have used or currently use your voice?
    a. Did challenges that you have experienced influence how others have perceived your voice or worked with your voice (such as peers, music teachers, private teachers, so forth)?
    b. How have challenges that you encountered made you feel about your voice and/or singing (short term and/or long term)?
5. What voice part(s) have you sung since you were 11 years old?
    a. When did you sing what?
    b. How have different vocal ranges felt for you over the years?
    c. How have ranges *other* than those to which you have been assigned felt to you (since age 11)?
6. How did your music teachers work with you and/or treat you during various stages of voice change?
    a. Peers and/or friends?
    b. Family?
7. If you could go back and talk to your past self at one or more points in your life or stage of voice change, when would you go back and what would you say?
    a. What do you wish that you had known about your singing voice *then* that you know *now*?

Appendix G

Code Book

Background
Belt/Theatre
Breathy Tone
Chest Voice vs Head Voice
Dissatisfaction in class
Erroneous
Fear
Good Technique
Healthy Vocal Usage
High Voice
Invisible Audience
Low Voice
Maturity/Mature Tone
Negative Family Influence
Negative Teacher Influence
Passagio
Pedagogy
Poor Technique
Positive Reinforcement
Range Expansion
Repertoire
Self-efficacy
Solo vs Ensemble
Unhealthy Vocal Usage
Vibrato
Violation of the Ensemble
Vocal Part Identity
Vocal Stamina
Voice Training