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Teaching What We Were Taught: A Survey of Choral Music Educators on Vocal Health, Anatomy, and Pedagogy

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Abstract

The purpose of this investigation was to assess if prior education influenced current teaching practices of choral music educators in terms of vocal health, anatomy, and pedagogy. We utilized a four-part online questionnaire to inquire about music educator's a) personal experience in voice education and teaching/conducting practice in b) general vocal health, c) vocal anatomy and function, and d) healthy vocal pedagogy and perceived amount of rehearsal time spent on these topics. All responses were disaggregated by years of teaching and types of choirs taught. In total, 56 choral teachers/conductors of 65 choirs comprised the results. We applied statistical analysis to determine the extent to which participants' prior education explained teaching behaviors. Two of the three regression analyses proved statistically significant. The non-significant results for the regression concerning the teaching of general voice health in the choral rehearsal illustrated the possibility that choral teacher/conductors spoke about vocal health in the rehearsal regardless of their personal education. The two statistically significant regressions alluded to a moderate correlation between the teacher/conductor's prior education and teaching of vocal anatomy and pedagogy in the choral rehearsal. Results are discussed in terms of teaching vocal health, anatomy, and pedagogy in the choral rehearsal and ideas for future research.

Keywords: choir; music education, questionnaire, vocal health, vocal anatomy, vocal pedagogy

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Choral conductors are often expected to serve not only as the leaders of singing groups but also as voice teachers (Davids & LaTour, 2021; Manning & Blanchet, 2014). Therefore, educating pre-service choral music educators in vocal health, anatomy, and pedagogy is essential and encouraged in the literature (Jordan et al., 2018). The voice education singers receive in choral ensembles can have a long-lasting impact on personal singing, choral teaching, and conducting practices. Voice education, also known as vocal pedagogy, is being taught more frequently across degree programs at universities in the United States; however, some training programs for choral educators/conductors do not contain vocal pedagogy instruction (Chism, 2020).

Training pre-service choral educators the delicate balance between creating memorable musical moments and effectively caring for each singer's vocal health is a difficult undertaking. In this regard, Lowell Mason (1852), a leading figure in the 1830s movement to include vocal music in public school curricula, advised "singing often, but not too long at a time" for adolescent voices (p. 5). This type of recommendation has stood the test of time in many ways and can be seen in current writings on choral music education philosophy. Sources on vocal health in choral settings (Olson, 2010) have more recently seen increased interest and incorporation into academic programs such as music education curricula.

Previous researchers in undergraduate music education curricula (Schmidt, 1989) examined a wide variety of pre-service teacher preparation, including music education (Baumgartner, 2014; Mishra et al., 2011), conducting (Boardman, 2000; Hart, 2019; Manfredi, 2008), and choral methods (Chandler, 2012). Interestingly, of all specializations, comprehensive choral music education appeared to be the least often researched (Drafall & Grant, 1997). In a recent study, Chism (2020) analyzed course syllabi specific to undergraduate vocal pedagogy courses at National Association of Schools of Music (NASM) accredited institutions in the southwestern United States. He found variety in the structure and content of undergraduate vocal pedagogy courses. Further, Chism found that institutions that did not offer a dedicated vocal pedagogy course incorporated the content into other curriculum areas such as choral conducting or methods courses.

Although a relatively small number of empirical research studies targeted undergraduate vocal pedagogy courses' content, authors have addressed vocal pedagogy, voice science, and voice health in practitioner journals (Archambeault & Smith, 2019; Galante, 2011, Hansen 2014a, 2014b; Harris, 2019, Manternach et al., 2019, McCoy, 2011, 2012; Naseth, 2012; Nix, 2013, 2014; Weary, 2011). For example, Dorsey (2016) examined the occurrence of vocal pedagogy topics in practitioner articles by finding and reviewing 207 articles on vocal technique, production, and tone. One such article by Corbin (1986) advocated for applied vocal pedagogy in choral rehearsals, stating that "there are procedures and practices that can be incorporated into large group rehearsals to promote vocal health..." (p. 5). Gorham-Rowan et al. (2017) examined specific strategies for improved vocal health in choral singers, including a tapered rehearsal schedule.

In other texts, several well-known teachers of singing wrote extensively on choral conductor knowledge of vocal pedagogy and health (e.g., Jordan et al., 2017; McKinney, 2005). Nix

and Roy (2018) spoke to choral educators' importance as voice teachers, offering specific strategies including spacing for ideal self-to-other ratio. The application of choral and vocal pedagogies in choral rehearsals was surveyed by Schade (2017). Findings indicated choral conductors and voice teachers both aim to maintain good vocal health and technique in singers. Other sources addressed the solo singer participating in choirs and made recommendations concerning vocal health (Olson, 2010). Still other practitioners wrote about the importance of promoting vocal health during choral rehearsals. For example, Webb (2007) stated, "As choral conductors, we can positively affect the voices in our choirs through our instruction. It is our job to teach the choir not only the music, but also healthy ways of singing it" (p. 26).

Conductors and pedagogues have stressed the importance of vocal pedagogy and vocal health in choral education textbooks as well. Some choral methods textbooks (i.e., Brinson & Demorest, 2014) address vocal health with information on group vocal technique and the adolescent changing voice. However, analysis of choral methods texts (Spurgeon, 2004) demonstrated a limited number (9.8%) of choral methods texts address vocal pedagogy topics.

Although vocal pedagogy in choral methods textbooks is limited, researchers have investigated many facets of voice health and choral singing. For example, Tepe et al. (2002) examined the incidence of vocal problems in young choir singers and correlated vocal problems with demographic and behavioral information such as voice lesson experience, vocal habits, existing voice issues, sleep habits, and hydration. Participants ($N = 129$) were members of youth and church choirs in the eastern United States. They completed a questionnaire addressing vocal habits and hygiene such as hydration, sleep, acid reflux symptoms, and medications. Researchers found over half of the participants experienced vocal and physical difficulties, including strain (43%), hoarseness (42.6%), "oversinging" in rehearsals (31%), change in voice range (19.4%), tickling or choking sensation (17%), volume disturbance (16.3%), and breathiness (15.5%). The researchers concluded that voice care professionals should be aware that self-reported voice difficulties are common among young choral singers. They further recommended that laryngologists communicate with choral conductors and singing teachers to identify and treat children with voice complaints and to develop choral educational strategies to decrease the frequency of vocal health issues.

In another study of voice health in choral singers, Daugherty et al. (2011) assessed singer voice use and voice health perceptions during an all-state high school chorus event. The researchers employed daily surveys, phonation duration data, analysis of rehearsal voice use behaviors, and field notes. Results indicated significant declining changes in five of seven voice health indicator statements and in self-perceptions of singing voice quality between the first and last rehearsal surveys. Specific declining changes included difficulty singing in a high range, straining, vocal fatigue, sore throat, and hoarseness. Field notes contained data on voice use and rest time and conductor comments regarding posture, singer spacing, and vocal fatigue. Singer perceptions indicated most singers (78.8%) believed they took good care of their voices, although self-reported sleep hours decreased significantly throughout the rehearsal weekend.

Similar factors were examined in another study of voice health in choral singing. Bowers and Daugherty (2008) solicited beginning and end of week responses to 12 voice health indicator statements from high school singers ($N = 41$) at a weeklong summer choral music camp. They examined several items related to vocal health, including hoarseness, vocal tiredness, dryness, throat pain, straining to sing, and effort to sing/breathiness. All of the factors demonstrated a significant decline between the beginning of the week and end of week reports. Interestingly, most participants reported they had taken good care of their voices throughout the camp.

Some researchers attribute the potentially harmful impact of voice use during choral rehearsals to environmental and instructional factors. They acknowledge that singers may arrive at choral rehearsals with potential contributing factors, including illness, inefficient habits of vocal production, lack of adequate sleep, and varied nutritional and hydration habits. Further, voice disorders, such as vocal nodules or cysts, can be complicated and attributed to various factors, including voice use, sleep, or illness (Colton et al., 2006; Stemple et al., 2000). Therefore, researchers (Rezende et al., 2015; Williams, 2010) examined voice issues in choral singing, while others explored the effects of specific and commonly-used choral rehearsal practices on vocal health. For example, Hixon (1987) and Norris (2006) suggested that chair seat angles that pitch the knees above the position of the hips adversely affect singer breath management. Daugherty (2003) and Ternström (1994) demonstrated that close spacing between and among singers promoted louder singing and self-perceived inefficiencies in vocal production, whereas Cooksey (2000) found that repertoire choices, particularly for adolescent singers, impacted physiological factors as well as musical challenges. Finally, Titze et al. (2007) examined vocal loading (demands on the voice over time). He recommended time to recover from particular instances of vocal loading by balancing voice use episodes and vocal rest opportunities.

Other choral rehearsal practices such as vocal warm-ups (Falcão et al., 2014; Onofre et al., 2017) have been examined. Falcão et al. examined adolescent female singers' vocal practices ($N = 14$) through acoustic spectrographic analyses before and after a specific vocal warm-up program. The warm-up program consisted of a sequence of body exercises, breathing and articulation training, vocal exercises, and ascending and descending musical scales. Researchers performed a spectrographic analysis of a recorded, sustained vowel. Results of the analyses indicated no significant differences. However, there was a negative correlation between harmonics and noise in the high frequencies post-warm-up. Researchers concluded that the employed vocal warm-up produced a richer acoustic spectrum that indicated more glottic closure or vocal tract adjustment.

Choral conductor practices in singer spacing, repertoire choice, and vocal demand can impact singers' voices. Sataloff and Smith (2006) wrote, "It is essential that choral conductors learn to use their own voices well, thereby forming a frame of reference for vocal matters. Posture, quality, and tone of voice, use of language, and the shape and timing of conducting gestures should each exemplify and encourage good vocal habits" (p. 258).

Teachers and students in choral singing should understand vocal health, anatomy and function of the voice, and appropriate vocal pedagogy. It remains vital for choral conductors

to understand these topics for their singers as well as themselves. Some recent investigations (Daugherty et al., 2009; Schwartz, 2009) indicated that choral music teachers were especially vulnerable to vocal health issues. The extent to which these topics were taught in pre-service music teacher training programs has been examined by some (i.e., Chism, 2020). However, no study to date has examined vocal pedagogy background, training, and application of knowledge in the choral rehearsal. Therefore, this study aimed to survey current choral educators/conductors regarding their background and practices pertaining to vocal health and pedagogy in the choral rehearsal.

The purpose of this investigation was to assess if prior education influenced current teaching practices of choral music educators in terms of vocal health, anatomy, and pedagogy. The research questions that guided this online questionnaire included four aspects of participants' choral history and practice: (a) experience in voice health, anatomy, and pedagogy education, (b) teaching/conducting practice in terms of general vocal health, (c) teaching/conducting practice in terms of vocal anatomy and function, (d) teaching/conducting practice in terms of healthy vocal pedagogy and perceived amount of rehearsal time spent on the topics. All responses were disaggregated by years of teaching and types of choirs.

Method

Participant Recruitment

An Institutional Review Board approved the following research method and online questionnaire. In an attempt to elicit information from choral directors in multiple states and with differing types of choral teaching/directing, we created an online questionnaire. Participants were acquired through online choral music educator forums and direct emails to colleagues. We contacted and received permission to post a short recruitment statement and the questionnaire link on multiple choral music education/conducting websites and forums. We posted the link, waited one week, and posted a second request for submissions. We also utilized a snowball sampling procedure and contacted choral music education colleagues through email to participate in the questionnaire. We asked colleagues who were able to forward the email to other choral teachers and graduate students in choral music education and choral conducting.

We collected 66 questionnaire responses and included 56 in this investigation. We excluded incomplete surveys. Of the 56 participants involved in this investigation, 9 completed the questionnaire's optional repeat with a second choir in mind. In total, 56 choral teachers/conductors and 65 choirs comprised the following results.

Participants

Participants ($n = 56$) comprised 37 females (66%) and 19 males (34%) with a mean age of 43 (range = 23-66 years of age). For the majority, the highest degree earned was a master's degree ($n = 27$, 48%), with a close to even divide between doctoral and bachelor's degrees

($n = 16$, 29%; $n = 13$, 23%, respectively). Teaching experience averaged 10.8 years (range 0-42 years) for solo voice and 12.8 years (range 2-48 years) of choral teaching/directing.

Participants responded to a prompt to select any and all of the six categories of choirs (children's, middle level, high school, collegiate, community, church) that they currently or previously have conducted. The mean number of choirs per participant was 4.3 choir types (range = 1-6). Participants selected the choir type they currently taught/conducted and responded to the questionnaire about their work with that particular choir. Nine participants submitted responses to a second choir, thus we recorded responses for 65 choirs (children's, $n = 2$; middle level, $n = 10$; high school, $n = 23$; collegiate, $n = 16$; community, $n = 9$; church, $n = 5$).

Questionnaire

We used Qualtrics, an online platform that generates and collects questionnaire data, to create the questionnaire for the investigation (Appendix A). We piloted the questionnaire by sending versions and updates to choral music education researchers ($n = 5$) for suggestions and edits. The questionnaire included two sections. Section 1: (a) consent statement, (b) demographic information, (c) types of choirs taught/conducted; and Section 2: (d) personal voice health experiences in education, and teaching/conducting practice during choral rehearsals in terms of (e) general vocal health, (f) vocal anatomy and function, and (g) healthy vocal pedagogy. All questions in Section 2 comprised a 5-point Likert-type scale from *strongly agree* to *strongly disagree*. We further inquired about a percentage of choral rehearsal time utilized to address the topics of general vocal health and vocal anatomy and function. As countless choral educators/conductors wear “many hats” and work with multiple ensembles, we allowed participants the option to respond about more than one choir.

Data Analysis

We disaggregated responses for each part of the questionnaire, first according to years of choral teaching, and then by types of choir that each participant conducted. We selected year delineations according to Gumm et al. (2011) to establish four groups of years of choral teaching experience. Participants comprised: 1-4 years, $n = 6$; 5-10 years, $n = 19$; 11-20 years, $n = 10$; and 20-up years, $n = 21$.

We analyzed the results by completing three linear regressions to determine the extent to which prior education explained vocal health, anatomy, and pedagogy teaching behaviors. All four assumptions for linear regressions were met prior to analysis.

Results

We calculated the three linear regressions by creating composite scores for each of the four variables: prior education as the independent variable and the three dependent variables (teaching vocal health, anatomy and function, and pedagogy in the choral rehearsal).

Lickert responses were scored 1 – 5 from *strongly agree* to *strongly disagree*. Means, standard deviations, and ranges of the four composite scores were: prior education ($M = 1.67$, $SD = 0.56$, range = 1.00 – 2.83), teaching vocal health ($M = 1.18$, $SD = 0.51$, range = 1.00 – 4.00), teaching anatomy and function of the voice ($M = 1.99$, $SD = 0.72$, range = 1.00 – 3.20), and vocal pedagogy ($M = 1.45$, $SD = 0.46$, range = 1.00 – 2.67).

Personal Experience – Voice Education

The first part of Section 2 of the questionnaire requested information about the participants' educational experiences in voice health, anatomy, and pedagogy. Questions also elicited responses concerning where teachers/conductors learned that information. Table 1 shows questions and participant responses according to the 5-point Likert-type scale and years of choral teaching experience. For all voice education questions posed, the large majority of participants either *strongly agreed* or *somewhat agreed* that they had received voice health, anatomy, and pedagogy education through schooling, professional workshops, and previous educators.

Table 1

*Personal Voice Education Questions and Participant Responses
(Number and Percentage) According to Years of Choral Teaching Experience*

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I have experienced education in voice health.	1-4 years	3	3	0	0	0
	5-10 years	14	5	0	0	0
	11-20 years	5	4	0	1	0
	21-up years	12	8	1	0	0
	TOTAL	$n=34$, 61%	$n=20$, 36%	$n=1$, 2%	$n=1$, 2%	$n=0$, 0%
I have experienced voice education in vocal anatomy and physiology.	1-4 years	3	3	0	0	0
	5-10 years	12	7	0	0	0
	11-20 years	5	4	1	0	0
	21-up years	11	7	0	2	1
	TOTAL	$n=31$, 55%	$n=21$, 38%	$n=1$, 2%	$n=2$, 4%	$n=1$, 2%

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I have experienced voice education in healthy vocal pedagogy.	1-4 years	4	2	0	0	0
	5-10 years	12	7	0	0	0
	11-20 years	6	3	0	1	0
	21-up years	15	6	0	0	0
	<i>TOTAL</i>	<i>n=37,</i> <i>66%</i>	<i>n=18,</i> <i>32%</i>	<i>n=0,</i> <i>0%</i>	<i>n=1,</i> <i>2%</i>	<i>n=0,</i> <i>0%</i>
I enrolled in classes that included vocal health, anatomy, and/or pedagogy as part of my college degree(s).	1-4 years	3	1	0	1	1
	5-10 years	11	7	0	0	1
	11-20 years	5	3	0	0	2
	21-up years	9	6	1	3	2
	<i>TOTAL</i>	<i>n=28,</i> <i>50%</i>	<i>n=17,</i> <i>30%</i>	<i>n=1,</i> <i>2%</i>	<i>n=4,</i> <i>7%</i>	<i>n=6,</i> <i>11%</i>
I enrolled in classes/training in vocal health, anatomy, and/or pedagogy at a professional workshop or convention.	1-4 years	1	1	0	2	2
	5-10 years	10	6	2	0	1
	11-20 years	5	3	1	1	0
	21-up years	12	6	1	2	0
	<i>TOTAL</i>	<i>n=28,</i> <i>50%</i>	<i>n=16,</i> <i>29%</i>	<i>n=4,</i> <i>7%</i>	<i>n=5,</i> <i>9%</i>	<i>n=3,</i> <i>5%</i>
I learned about vocal health, anatomy, and/or pedagogy from a private voice or choral teacher.	1-4 years	5	1	0	0	0
	5-10 years	12	4	0	1	2
	11-20 years	4	3	0	2	1
	21-up years	11	9	0	1	0
	<i>TOTAL</i>	<i>n=32,</i> <i>57%</i>	<i>n=17,</i> <i>30%</i>	<i>n=0,</i> <i>0%</i>	<i>n=4,</i> <i>7%</i>	<i>n=3,</i> <i>5%</i>

Teaching/Conducting Practice

The following three parts of the questionnaire inquired about teaching/discussing voice health, anatomy, and pedagogy within the choral rehearsal. Participants responded on the same 5-point Likert-type scale from *strongly agree* to *strongly disagree*, as well as selecting a percentage of rehearsal time dedicated to the first two topics. Results are presented first by years of choral teaching experience and then by choir type.

General Vocal Health

Table 2

Teaching/Conducting Practice in Terms of Vocal Health Questions and Participant Responses (Disaggregated by Years of Choral Teaching Experience, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I talk to my singers in choral rehearsals about basic voice health (i.e., drinking water, not shouting at sporting events)	1-4 years	4	1	0	1	0
	5-10 years	17	2	0	0	0
	11-20 years	8	2	0	0	0
	21-up years	19	2	0	0	0
	TOTAL	n=48, 86%	n=7, 13%	n=0, 0%	n=1, 2%	n=0, 0%

Table 3

Teaching/Conducting Practice in Terms of Vocal Health Questions and Participant Responses (Disaggregated by Choir Type, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I talk to my singers in choral rehearsals about basic voice health (i.e., drinking water, not shouting at sporting events)	Children's	2	0	0	0	0
	Middle Level	7	2	0	1	0
	High School	21	2	0	0	0
	Collegiate	13	3	0	0	0
	Church	4	1	0	0	0
	Community	8	0	0	0	1
TOTAL	n=55, 85%	n=8, 14%	n=0, 0%	n=1, 2%	n=1, 2%	

Responses to teaching/discussing basic vocal health during the choral rehearsal were similar when comparing years of teaching and types of choir. The majority of participants (86%, 85% respectively) in this investigation responded: *strongly agree*. We requested participants submit a “percentage of rehearsal time spent” on basic voice health topics. Overall participant responses ranged from 0-80% ($M = 12.67$, $SD = 15.97$) of rehearsal spent on the topic. After removing the extreme outliers (0%, 70%, 80%, 80%) the range reduced to

2-32% of rehearsal time with a mean of 9.72% ($SD = 7.38$). When disaggregated by years of teaching, results showed: 1-4 years, $M = 8.33\%$; 5-10 years, $M = 11.63\%$; 11-20 years, $M = 10.3\%$; and 21-up years, $M = 13.76\%$ of rehearsal time spent on topics concerning general voice health.

A linear regression was calculated to predict the teaching of vocal health topics based on prior education. Prior education served as the independent variable, and teaching voice health was the dependent variable (1 of 3 DVs). We found a non-significant regression equation [$R^2 = .010$, $F(1,54) = .551$, $p = .461$]. See Appendix B.

Vocal Anatomy and Function

Table 4

Teaching/Conducting Practice in Terms of Vocal Anatomy and Function Questions and Participant Responses (Disaggregated by Years of Choral Teaching Experience, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I talk to my singers in choral rehearsals about vocal anatomy and function.	1-4 years	2	3	1	0	0
	5-10 years	9	10	0	0	0
	11-20 years	6	3	1	0	0
	21-up years	8	10	2	1	0
	TOTAL	$n=25$, 45%	$n=26$, 46%	$n=4$, 7%	$n=1$, 2%	$n=0$, 0%
I talk to my singers about the structure of the larynx (i.e., cartilages, location).	1-4 years	1	1	0	3	1
	5-10 years	3	8	2	6	0
	11-20 years	3	5	0	1	1
	21-up years	6	5	4	4	2
	TOTAL	$n=13$, 23%	$n=19$, 34%	$n=6$, 11%	$n=14$, 25%	$n=4$, 7%
I talk to my singers about the movement of muscles involved in singing.	1-4 years	2	3	0	1	0
	5-10 years	5	11	2	1	0
	11-20 years	4	4	0	2	0
	21-up years	6	10	2	3	0
	TOTAL	$n=17$, 30%	$n=28$, 50%	$n=4$, 7%	$n=7$, 13%	$n=0$, 0%

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I talk to my singers about life voice changes (adolescent voice change and/or aging voice).	1-4 years	2	4	0	0	0
	5-10 years	11	7	1	0	0
	11-20 years	5	5	0	0	0
	21-up years	11	6	3	0	1
	<i>TOTAL</i>	<i>n=29,</i> 52%	<i>n=22,</i> 39%	<i>n=4,</i> 7%	<i>n=0,</i> 0%	<i>n=1,</i> 2%
I talk to my singers about acoustics of singing as related to anatomy and physiology.	1-4 years	2	1	0	3	0
	5-10 years	9	6	1	1	2
	11-20 years	4	6	0	0	0
	21-up years	7	8	4	2	0
	<i>TOTAL</i>	<i>n=22,</i> 39%	<i>n=21,</i> 38%	<i>n=5,</i> 9%	<i>n=6,</i> 11%	<i>n=2,</i> 4%

Table 5

Teaching/Conducting Practice in Terms of Vocal Anatomy and Function Questions and Participant Responses (Disaggregated by Choir Type, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I talk to my singers in choral rehearsals about vocal anatomy and function.	Children's	1	1	0	0	0
	Middle Level	4	5	1	0	0
	High School	7	13	2	0	0
	Collegiate	8	6	1	1	0
	Church	2	3	0	0	0
	Community	5	3	0	1	1
	<i>TOTAL</i>	<i>n=27,</i> 48%	<i>n=31,</i> 55%	<i>n=4,</i> 7%	<i>n=2,</i> 4%	<i>n=1,</i> 2%
I talk to my singers about the structure of the larynx (i.e., cartilages, location).	Children's	0	1	1	0	0
	Middle Level	1	5	0	4	0
	High School	6	9	2	3	3
	Collegiate	4	3	2	5	2
	Church	1	0	1	3	0
	Community	1	6	1	1	0
	<i>TOTAL</i>	<i>n=13,</i> 23%	<i>n=24,</i> 43%	<i>n=7,</i> 13%	<i>n=16,</i> 29%	<i>n=5,</i> 9%

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I talk to my singers about the movement of muscles involved in singing.	Children's	1	1	0	0	0
	Middle Level	4	3	0	3	0
	High School	4	15	3	1	0
	Collegiate	5	7	1	3	0
	Church	1	3	0	1	0
	Community	4	3	1	1	0
	<i>TOTAL</i>	<i>n=19,</i> 34%	<i>n=32,</i> 57%	<i>n=5,</i> 9%	<i>n=9,</i> 16%	<i>n=0,</i> 0%
I talk to my singers about life voice changes (adolescent voice change and/or aging voice).	Children's	1	1	0	0	0
	Middle Level	6	3	1	0	0
	High School	14	6	3	0	0
	Collegiate	4	10	1	0	1
	Church	1	4	0	0	0
	Community	5	2	1	1	0
	<i>TOTAL</i>	<i>n=31,</i> 55%	<i>n=26,</i> 46%	<i>n=6,</i> 11%	<i>n=1,</i> 2%	<i>n=1,</i> 2%
I talk to my singers about acoustics of singing as related to anatomy and physiology.	Children's	0	1	1	0	0
	Middle Level	4	2	1	3	0
	High School	9	10	2	1	1
	Collegiate	6	7	2	1	0
	Church	1	1	0	1	2
	Community	4	4	0	1	0
	<i>TOTAL</i>	<i>n=24,</i> 43%	<i>n=25,</i> 45%	<i>n=6,</i> 11%	<i>n=7,</i> 13%	<i>n=3,</i> 5%

Participants responded about their perceived percentage of rehearsal time spent on vocal anatomy and function. The mean response was 11.63% ($SD = 9.75$, range 0-50%) of rehearsal time. After removing outliers (0, 40%, 40%, 50%), the mean was 10.26% ($SD = 6.77$, range 1-32%), When disaggregated by years of teaching: 1-4 years, $M = 18.33\%$; 5-10 years, $M = 13.11\%$; 11-20 years, $M = 10.0\%$; and 21-up years, $M = 9.0\%$ of rehearsal time spent on vocal anatomy and function topics. A linear regression established that previous education (IV) could statistically significantly predict teaching of anatomy and function (DV2), $F(1,54) = 8.406$, $p = .005$, and previous education accounted for 13.5% of the time spent explaining variability of teaching anatomy and function (See Appendix B).

Healthy Vocal Pedagogy

Table 6

Teaching/Conducting Practice in Terms of Healthy Vocal Pedagogy Questions and Participant Responses (Disaggregated by Years of Choral Teaching Experience, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I aim to apply healthy voice pedagogy practice in my choral rehearsals.	1-4 years	5	1	0	0	0
	5-10 years	18	1	0	0	0
	11-20 years	9	1	0	0	0
	21-up years	19	2	0	0	0
	TOTAL	n=51, 91%	n=5, 9%	n=0, 0%	n=0, 0%	n=0, 0%
I actively seek out/research vocal pedagogy ideas and practices.	1-4 years	3	0	2	1	0
	5-10 years	8	11	0	0	0
	11-20 years	5	4	1	0	0
	21-up years	13	7	0	1	0
	TOTAL	n=29, 52%	n=22, 39%	n=3, 5%	n=2, 4%	n=0, 0%
I teach vocal pedagogy pertaining to the choral rehearsal.	1-4 years	2	3	0	1	0
	5-10 years	10	8	0	0	1
	11-20 years	7	1	1	1	0
	21-up years	13	6	0	2	0
	TOTAL	n=32, 57%	n=18, 32%	n=1, 2%	n=4, 7%	n=1, 2%

Table 7

Teaching/Conducting Practice in Terms of Healthy Vocal Pedagogy Questions and Participant Responses (Disaggregated by Choir Type, Total Number, and Percentage)

		Strongly Agree	Somewhat Agree	Neither Agree nor Disagree	Somewhat Disagree	Strongly Disagree
I aim to apply healthy voice pedagogy practice in my choral rehearsals.	Children's	2	0	0	0	0
	Middle Level	8	2	0	0	0
	High School	21	2	0	0	0
	Collegiate	15	1	0	0	0
	Church	4	1	0	0	0
	Community	9	0	0	0	0
	<i>TOTAL</i>	<i>n=59,</i> <i>91%</i>	<i>n=6,</i> <i>9%</i>	<i>n=0,</i> <i>0%</i>	<i>n=0,</i> <i>0%</i>	<i>n=0,</i> <i>0%</i>
I actively seek out/research vocal pedagogy ideas and practices.	Children's	1	1	0	0	0
	Middle Level	5	3	1	1	0
	High School	7	13	2	1	0
	Collegiate	11	4	1	0	0
	Church	3	2	0	0	0
	Community	7	2	0	0	0
	<i>TOTAL</i>	<i>n=34,</i> <i>52%</i>	<i>n=25,</i> <i>38%</i>	<i>n=4,</i> <i>6%</i>	<i>n=2,</i> <i>3%</i>	<i>n=0,</i> <i>0%</i>
I teach vocal pedagogy pertaining to the choral rehearsal.	Children's	2	0	0	0	0
	Middle Level	4	4	0	2	0
	High School	12	10	0	0	1
	Collegiate	10	4	1	1	0
	Church	3	1	0	1	0
	Community	7	0	0	2	0
	<i>TOTAL</i>	<i>n=38,</i> <i>58%</i>	<i>n=19,</i> <i>29%</i>	<i>n=1,</i> <i>2%</i>	<i>n=6,</i> <i>9%</i>	<i>n=1,</i> <i>2%</i>

The majority of participants (91%) selected that they *strongly agreed* that their goal was to apply healthy vocal pedagogy in choral rehearsals. About half of the participants *strongly agreed* that they actively looked for research and new ideas pertaining to vocal pedagogy and taught vocal pedagogy in the choral rehearsal. We calculated a linear regression to predict vocal pedagogy (DV3) discussion in choral rehearsals based on the teacher/conductor's prior education (IV). The teacher's previous education could explain 20% of the variation in the discussion of vocal pedagogy in rehearsal per a significant regression equation [$F(1,54) = 13.511, p = .001$]. See Appendix B.

Discussion

This questionnaire-based investigation contributes to a small but essential set of studies concerning voice health and the choral rehearsal. We specifically targeted choral teachers/conductors to ascertain prior vocal health, anatomy, and pedagogy education and to discover if teachers shared and discussed that knowledge in the choral rehearsal. The results and conclusions herein represent a specific population of conductors/educators that responded to the survey and cannot be attributed to the larger population. However, there remain implications for choral music education in school and community choruses and instruction of pre-service collegiate choral music education courses.

As we, the researchers, are choral music education teachers at large universities, we chose our questionnaire categories and subsequent questions according to our own university educations and a reflection of our current teaching practices for pre-service choral teachers. We wanted to know if choral teachers/conductors' prior collegiate education (and thus the types of classes we teach) affected the quantity of vocal health, anatomy, and pedagogy topics incorporated into the choral rehearsal. The questions we decided upon were intended to serve as a "first step" in assessing choral teachers/conductors' current practice. Our objective for future investigations is to discover the subsequent "steps" of how educators in choral rehearsals and pre-service choral music education courses can actively incorporate vocal health topics. Although we revised the questions and categories with choral music educators' assistance, the chosen questions were not comprehensive of choral teaching.

To focus participant responses, we provided examples for each of our chosen categories: general vocal health, vocal anatomy and function, and healthy vocal pedagogy. Although we attempted to clarify our categories through these examples, participants could hold different ideas and definitions of these topics. Future investigators should either provide detailed definitions or investigate how choral teachers/conductors define these terms and categories themselves.

Due to COVID-19 related concerns in our own teaching and lives, we did not pursue nor obtain the number or variety of participants that we intended for this investigation. We acquired our participant pool through online solicitations and personal connections. As many of our personal connections are of a similar educational and philosophical background,

our results should not be transferred to the broader populations of choral music educators/conductors. Within our selected online forums, we advertised our questionnaire as a “voice health in the choral rehearsal” survey; thus, it could be assumed that our online respondents were interested in voice health per our description. Although our intention was a “broad scope” of choral music educators, we have possibly created a specific type of participant population through our personal contacts and online efforts. This is a variable for consideration, but one that we do not feel invalidates the results herein.

These particular choral teacher/conductor participants represented a wealth of experience teaching multiple types of choirs. On average, they had rehearsed four of the six types of choirs that we included in the questionnaire (children’s, middle level, high school, collegiate, community, church). We feel our participants’ extensive experience in teaching various choirs bolsters our participant population and lends some credence to the results. Along with the types of choirs they taught, we were interested in identifying if those who taught younger and/or older changing voices addressed healthy vocal pedagogy and anatomy more than their counterparts. As it turns out, in this investigation, with this population of teacher/conductor respondents, the age of the choir did not seem to influence the teaching of voice health, anatomy, and pedagogy topics. The participants that reported teaching these topics responded so for choirs of all ages and types. Future researchers could examine if vocal health, anatomy, and pedagogy topics are specifically and intentionally addressed in choirs that include adolescent changing voices and aging voices.

We inquired about the number of types of choirs that conductors rehearsed during their careers, yet we only requested that they respond to the survey for at least one current choir. Less than 20% of the participants responded to the questionnaire with more than one current choir. We are choral conductors who both currently work with more than one choir, and we were surprised that more teachers/conductors did not respond to the questionnaire for more than one choir. Perhaps respondents completed the questionnaire and then decided that they did not want to spend the time to complete it a second time. Future researchers could examine if teachers/conductors rehearse and instruct their “secondary” choirs differently from their “main” choir.

In an attempt to parse out the influence of teaching experience on the inclusion of vocal health and pedagogy topics in the choral rehearsal, we disaggregated all respondents by years of teaching. In considering this particular population of participants, we discovered that years of teaching, in itself, was not a determining factor for whether they taught voice health topics in rehearsal. Future investigators could more closely examine the impact of years of teaching on various choral rehearsal topics.

In the most current research literature (i.e., Archambeault & Smith, 2019; Chism, 2020; Harris, 2019; Hart, 2019; Nix & Roy, 2018) and choral methods textbooks (Davids & La-Tour, 2021; Phillips, 2016), voice science, including voice health, anatomy and function of the larynx, and pedagogy, is gaining popularity. Nearly 20% of our participants reported never enrolling in a course concerning vocal pedagogy during their college education. The majority engaged in some vocal pedagogy experiences. It seems that teachers/conductors

recently enrolled in collegiate courses at either the undergraduate or graduate levels have more current education and experience in healthy vocal pedagogy to disseminate to their choral singers.

Almost half of our participants received a master's degree as their highest degree, and another third received a doctoral degree, providing a highly educated population of choral music teachers/conductors. Again, these findings validate our current research, and yet they offer future research questions. We inquired about the degree(s) earned and classes/seminars in vocal pedagogy and voice science topics, but we did not ask when those degrees and classes occurred. Future researchers should investigate if a further connection exists between when choral teachers/conductors completed their most recent education in voice health, anatomy, and pedagogy topics and their reference to those topics in the choral rehearsal.

We utilized a statistical analysis in this investigation to determine the extent to which participants' prior education explained their teaching behaviors. Two of the three regression analyses proved statistically significant. The non-significant results for the regression concerning general voice health teaching in the choral rehearsal illustrate that choral teachers/conductors speak about vocal health during the rehearsal regardless of their personal education. The two statistically significant regressions demonstrate a moderate correlation between the teacher/conductor's prior education and teaching of vocal anatomy and pedagogy in the choral rehearsal. Future investigations into the origins of choral teachers' voice education, be it collegiate courses, or seminars, conventions, and workshops, could inform educational practices at both the collegiate and practitioner levels.

The teachers/conductors we surveyed for this investigation either chose to include topics of vocal health, anatomy, and pedagogy in their rehearsals, or they did not. The deciding factors did not seem to include the number of years they taught choirs, their degrees earned, or the types of choirs they taught. The main factor, per this investigation, was the prior education of the teacher/conductor. Whether in the collegiate classroom or at a convention or symposium, these teachers' most recent learning seemed to influence their classroom teaching and topics. As educators of choral music teachers, we find this result to be of the utmost importance concerning our own teaching of pre-service and graduate choral music educators. Maybe we do teach what we were (most recently) taught (Calderhead & Robson, 1991; Ernst, 1989).

In this investigation, teachers/conductors responded to the questionnaire concerning the voice health topics they included in the choral rehearsal. Still, we did not inquire as to how they incorporated these topics. Future researchers could investigate the best means to include voice health, anatomy, and pedagogy in choral rehearsals. Practical means of adding these topics to choral rehearsals could benefit teachers/conductors, their singers, and overall healthfully-produced choral sound.

Finding an appropriate balance between making memorable music and caring pro-actively for the neurobiological instruments employed for that purpose remains an ongoing task for music educators. Beginning with Mason (1852), teachers of group singing have

touted singing as a healthy endeavor for adolescents. Choral pedagogy textbooks commonly used in pre-service choral music education courses in the collegiate setting have progressed through the years. Whereas most textbooks contain some information concerning teaching adolescent changing voice (Brinson, 1996; Collins, 1999; Phillips, 2004), more recent texts include information about vocal health, vocal function, and healthy vocal pedagogy (Brinson & Demorest, 2014; Davids & LaTour, 2021; Phillips, 2016). These textbooks are used in collegiate classrooms; however, not all of those currently teaching choral music have had access to the information, nor are teaching with these topics in mind. Future investigators should find means to incorporate modern research into established pedagogical environments, including workshops and local, regional, and national conventions to impart current vocal health pedagogy to teachers teaching for a longer tenure.

Educators, and in our case, choral music educators, tend to teach what they are taught (Calderhead & Robson, 1991; Dixon et al., 2014; Ernst, 1989; Friesen & Besley, 2013). With the increased use of texts and articles on the importance of vocal health and pedagogy in university programs, and as evidenced by the findings, some choral directors are utilizing these practices and philosophies in choral rehearsals. Jordan, McCarther, and Price (2018) wrote about the application of voice science and pedagogy in choral ensembles stating, “few choral singers have or will study voice privately; therefore, you (choral conductor) become the source of their knowledge for healthy and beautiful singing. With that responsibility in mind, it makes sense intellectually and ethically that you know as much as possible how to guide your singers’ vocal production” (p. xi). To serve the roles of both choral pedagogue and voice teacher is a weight that choral music educators generally expect. It is an expectation that we, the researchers, hope is embraced by choral music educators, within collegiate education, and in workshops and conference sessions. The longevity of healthy singing depends on choral music educators/conductors’ continued learning and applying best practices in vocal health and pedagogy for all singers.

Appendix A

Qualtrics Survey

Age: _____

Sex: _____ Male _____ Female _____ Other

Highest Degree: _____ Bachelor’s _____ Master’s _____ Doctorate

Total years of voice teaching experience: _____

Total years of choral teaching/conducting experience: _____

Select all types of choirs you have conducted/taught in your career:

_____ Children's _____ Middle Level _____ High School

_____ Collegiate _____ Church _____ Community

Select the type of choir you currently conduct/teach (or most recently worked with, if retired). Please respond to the following questionnaire according to your work with this particular choir.

_____ Children's _____ Middle Level _____ High School

_____ Collegiate _____ Church _____ Community

QUESTIONNAIRE INTRODUCTION AND OUTLINE

The following questionnaire is meant to elicit responses about vocal health (including, but not limited to anatomy, physiology, pedagogy) in terms of your background and practice.

Questions will be posed in four main categories:

- 1) Your personal experience - voice education
- 2) Your teaching/conducting practice - general vocal health
- 3) Your teaching/conducting practice - vocal anatomy and function
- 4) Your teaching/conducting practice - healthy vocal pedagogy

1) Your personal experience - voice education

I have experienced education in vocal health

_____ Strongly agree _____ Somewhat agree _____ Neither agree nor disagree

_____ Somewhat disagree _____ Strongly disagree

I have experienced voice education in vocal anatomy and physiology.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I have experienced voice education in healthy vocal pedagogy.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I enrolled in classes that included vocal health, anatomy, and/or pedagogy as part of my college degree(s).

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I enrolled in classes/training in vocal health, anatomy, and/or pedagogy at a professional workshop or convention.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I learned about vocal health, anatomy, and/or pedagogy from a private voice or choral teacher.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

2) Your teaching/conducting practice - general vocal health

I talk to my singers in choral rehearsals about basic voice health (i.e., drinking water, not shouting at sporting events).

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

What percentage of overall rehearsal time do you use to address the topic of voice health?

3) Your teaching/conducting practice - vocal anatomy and function

I talk to my singers in choral rehearsals about vocal anatomy and function.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I talk to my singers about the structure of the larynx (i.e., cartilages, location).

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I talk to my singers about the movement of muscles involved in singing.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I talk to my singers about life voice changes (adolescent voice change and/or aging voice).

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I talk to my singers about acoustics of singing as related to anatomy and physiology.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

What percentage of overall rehearsal time do you use to address the topics of vocal anatomy and function?

4) Your teaching/conducting practice - healthy vocal pedagogy

I aim to apply healthy voice pedagogy practice in my choral rehearsals.

____ Strongly agree ____ Somewhat agree ____ Neither agree nor disagree
____ Somewhat disagree ____ Strongly disagree

I actively seek out/research vocal pedagogy ideas and practices.

_____ Strongly agree _____ Somewhat agree _____ Neither agree nor disagree
 _____ Somewhat disagree _____ Strongly disagree

I teach vocal pedagogy pertaining to the choral rehearsal.

_____ Strongly agree _____ Somewhat agree _____ Neither agree nor disagree
 _____ Somewhat disagree _____ Strongly disagree

Appendix B

Table 1

Regression Analysis Summary for Prior Education Predicting Teaching of Vocal Health

Variable	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
(Constant)	1.046	.192		5.455	.000
Education	.016	.022	.100	.742	.461

Note: $N = 56$. We examined the impact of the teacher's prior education on their inclusion of vocal health topics in the choral rehearsal.

Table 2

Regression Analysis Summary for Prior Education Predicting Teaching of Anatomy and Function of the Larynx

Variable	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
(Constant)	6.551	1.253		5.228	.000
Education	.409	.141	.367	2.899	.005

Note: $N = 56$. We examined the impact of the teacher's prior education on their inclusion of anatomy and function of the larynx topics in the choral rehearsal.

Table 3

Regression Analysis Summary for Prior Education Predicting Teaching of Vocal Pedagogy

Variable	Unstandardized Coefficients		Standardized Coefficients		
	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
(Constant)	2.734	.467		5.850	.000
Education	.193	.053	.447	3.676	.001

Note: *N* = 56. We examined the impact of the teacher's prior education on their inclusion of vocal pedagogy topics in the choral rehearsal.

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