

Vocal Strain and Student Teachers: Are You At Risk?  
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### Abstract

Teachers are one of the most at risk populations for developing voice disorders, and are prone to vocal damage due to the nature of their occupations. The primary objectives of this paper were to evaluate pre-existing literature regarding vocal strain in teachers, and apply the information to students in their first semester of student teaching at the State University of New York at New Paltz. A web-based questionnaire was distributed to 150 student teachers at SUNY New Paltz. In total, 65 responses were received. The questionnaire consisted of questions on background information and risk factors for voice damage. The results showed that 92% of the student teachers surveyed had experienced ten or more risk factors for vocal strain on a regular basis. According to the students' answers on the survey, as well as developed research, vocal hygiene education may be useful to help prevent the development of vocal strain in student teachers.

In comparison to other professions, the prevalence of vocal dysfunction among teachers is significantly high. This does not come as a surprise, given the length of time educators are required to talk each school day within the confines of noisy classrooms. Teachers often spend their class periods lecturing, answering questions, and managing behaviors. These tasks lend a hand to vocal damage, if there are no periods of vocal rest. Of greatest concern are the long lasting effects of occupational vocal strain, and the consequences they indicate.

Though prevalent among teachers, vocal dysfunction may be prevented through vocal hygiene education, and the lessening of vocal risk factors. The primary purpose of this review is to ascertain whether there is evidence that student teachers are faced with the same vocal risk factors as established classroom teachers. Teachers develop behaviors that result in vocal strain, and this paper aims to identify behaviors in student teachers that may increase vocal strain.

In the process of this review, it became apparent that there were considerable complaints regarding vocal strain in educators. Most commonly cited was discomfort, and vocal hoarseness. There were several themes regarding vocal risk factors that contributed to vocal strain; these include occupational, personal, and environmental factors. Additionally, teachers' vocal hygiene awareness varied throughout the literature, and is likely a contributing factor to their voice problems.

The scope of this review is limited, as the majority of research is based upon the vocal strain of teachers, rather than student teachers. Most vocal strain literature evaluates treatment, instead of preventative measures. This is most likely due to the expenses associated with longitudinal studies, and the contrastingly accessible format of a cross-sectional study. Unfortunately, this leaves gaps within the research surrounding vocal strain and vocal hygiene.

Further, studies using quantitative methods to examine vocal strain are scarce, as most of the studies relied on qualitative self-assessments. I have included relevant studies that highlight the correlation between teachers and vocal strain, yet it can be acknowledged that these studies need to be improved by the research community.

### **What Constitutes a Voice Problem?**

In order to understand both why and how vocal strain occurs, we must look at the mechanics of voice production. Lumb (2017) explains that phonation is the laryngeal component of speech, and requires the vocal folds to change in position, tension, and mass. The larynx is a structure responsible for sound production, air passage during breathing, and swallowing. The vocal folds are soft tissue structures that are housed within the larynx. The vocal folds open and close, allowing for the vibrations that contribute to speech. The lower respiratory system supplies steady air flow and pressure that contribute to vocal fold motion. This motion creates a mucosal wave, or a pattern of glottal convergence and divergence. The glottis is the opening between the vocal folds, which closes during sound production. (Lumb, 2017).

The mucosal wave aids in the production of sound waves. When the vocal folds elongate, tensioning occurs and affects the pitch of the sound.

A voice disorder occurs when the voice's quality, loudness, or pitch differs from the norms of that individual's age, gender, or cultural background. The American Speech-Language-Hearing Association (ASHA) explains that voice disorders can be organic, or functional in nature. An organic voice disorder is physiological, and occurs when there are alterations in the laryngeal, respiratory, or vocal tract mechanisms. Contrastingly, a functional voice disorder results from improper use of the vocal mechanism while the anatomy and

physiology of the larynx does not change (ASHA, 2018). Voice abuse or misuse, and laryngeal irritations are the main causes for voice disorders (Bolbol, 2016). A study by Nanjundeswaran (2012) indicates that most voice problems are phonogenic in nature, or caused by phonation. This paper focuses on vocal strain, which can consequently result in an organic voice disorder. Teachers have a high occurrence of vocal nodules, which are an organic voice disorder resulting from phonotrauma (Pereira et al., 2015). Phonotrauma occurs during yelling, screaming, or excessive throat clearing. Further, vocal fatigue can cause functional voice disorders due to excessive effort and overuse of the voice (ASHA, 2018).

Though differentiating a health voice from a disordered voice may not be a clear cut process, Ohlsson (2011) defines “voice problems” as an individual having had suffered from two or more voice symptoms weekly, or more frequently. Voice symptoms are varied, and are often generalized as “dysphonia”, a term that encompasses the auditory-perceptual symptoms of voice disorders. The characteristics of dysphonia include an altered voice quality, pitch, vocal effort, or loudness. According to ASHA (2018), the symptoms of dysphonia include vocal roughness (perception of aberrant vocal fold vibration), breathiness (perception of audible air escape in the sound), strained quality (perception of increased vocal effort), abnormal pitch, abnormal loudness, abnormal resonance, aphonia (loss of voice), phonation breaks, hoarse voice (raspy in sound), pulsed voice (audible creaks in sound), shrill voice (high, piercing in sound), and tremulous voice (shaky in sound). Ohlsson et al. (2015) presents several more symptoms of voice disorders in their Screen6 analysis: strained voice, low and hoarse voice, voice breaks, throat clearing, pain or lump in throat, and voice breaks. Screen6 is a self administered assessment tool that quantifies the amount of vocal symptoms present, and determines whether

or not a voice problem is present (Ohlsson, 2011). These symptoms may occur in combination with other voice symptoms, or may occur in isolation. Further, these symptoms may differ in severity. It is important to note that presence of voice symptoms does not necessarily equate to a voice disorder, but can indicate abuse and misuse of the voice.

### **Is Vocal Strain Prevalent in Teachers?**

Individuals that work in voice-demanding occupations rely on their voices as a tool, often experiencing both overuse and misuse. Among individuals experiencing vocal strain, teachers represent a considerably large portion of those affected (Nanjundeswaran et al., 2012), in comparison with both the general population and to other professions (Greve, Bryn & Simberg, 2018).

With approximately one-third of teachers experiencing voice problems (Ohlsson et al., 2012), it is clear that vocal strain is incredibly prevalent among this profession. Rossi-Barbosa et al. (2016) looked at self-reported acute and chronic voice disorders in 226 teachers, and found that 34.5% of teachers within their study reported an acute voice disorder, and 25.7% reported a chronic disorder. A study in Norway surveyed 968 students studying to become elementary school teachers and found that 14.1% of the students presented with voice disorders (Greve et al., 2018).

The prevalence of vocal strain in teachers indicates that student teachers will most likely end up with the same voice problems as their predecessors. Student teachers begin their careers by taking over classrooms and participating in the same vocal load that established classroom teachers are faced with on a daily basis. In assessing vocal symptoms Simberg, Sala & Rönnemaa (2004) found that 58% of student teachers reported no voice symptoms whereas 76%

in their control group reported no symptoms. This comparison shows that student teachers report more vocal symptoms than their peers studying for other professions.

There are less studies examining preservice teachers, but one study evaluated the prevalence of voice symptoms and risk factors in students studying to become teachers. Ohlsson et al. (2011) intended to determine the prevalence of vocal strain in teacher students at the beginning of their education. They found that 208 out of 1250 (17%) of the students had experienced voice problems after describing risk factors.

There are various indicators that an individual may be at risk for developing voice problems. Prolonged voice use, especially misuse, strains the voice and yields negative vocal symptoms. Across research studies on teachers, these factors seem to maintain their presence among teachers and student teachers with vocal strain or disorders. Though the research focuses primarily on established classroom teachers, the risk factors apply to student teachers beginning their careers, as they will be expected to take on the same vocal load as established classroom teachers.

Risk factors can be broken up into several categories: vocal load, personal or lifestyle, and environmental factors (Seifpanahi et al., 2015; Rossi-Barbosa et al., 2016). Vocal load considers the habitual loudness, number of hours teaching per week, number of teaching years, amount of vocal rest throughout the day, and the number of pupils per class (Seifpanahi et al., 2015). Class duration also needs to be taken into consideration for vocal load, as it affects the potential amount of vocal rest for the teacher (Bolbol, 2017). Personal lifestyle factors include water consumption, consumption of alcohol, smoking, and caffeine consumption (Rossi-Barbosa et al., 2016). These factors affect the functionality of the vocal folds, as vocal folds need to be

properly lubricated and hydrated to function safely and effectively. Environmental risk factors include ambient background noise, classroom humidity, chalk and dust exposure, and classroom acoustics (Greve et al., 2018). Factors such as ambient noise can prevent a teacher from being adequately heard, and force the teacher to use excessive loudness to combat background noise. Classroom acoustics can also work in favor of, or against the intelligibility of both the students and the teacher. This can affect the teacher's habitual loudness, which can be damaging to the vocal folds if volume of speech is consistently loud.

Several studies have administered questionnaires to assess risk factors for voice disorders in teachers. Seifpanahi et al., (2017) sought to compare the prevalence of voice disorders among teachers and non-teachers in Iran, and to define the risk factors for voice symptoms. Their study consisted of 104 teachers and 41 non-teacher participants that completed a questionnaire regarding their vocal complaints, and potential risk factors. The collected data indicated that 54.6% of the teachers presented with vocal complaints, while only 21.1 % of the control group experienced vocal complaints. Through further analysis of their data, Seifpanahi et al (2017) found that teachers had a much higher vocal load risk factor than the non-teacher group. Bolbol et al (2016) investigated the risk factors of voice disorders among Egyptian school teachers. They administered a self reported questionnaire to 156 public school teachers in Egypt, and 180 administrative workers. The results of this study found that teachers had significantly more voice symptoms than that of the control group. Specifically, the significance level was high in hoarseness of voice, sore throats, vocal tiredness, and throat clearing among teachers (79.5%, 73.7%, 68.6%, and 66.0%) in comparison with the administrative workers (29.3%, 45.3%, 33.3%, and 46.7%)(Bolbol et al., 2016). The researchers found vocal load to be the most

prevalent risk factor, and concluded that these Egyptian school teachers worked in conditions that yielded vocal symptoms; the large number of students per class, poor ventilation, unprofessional facilities, and limited resources contributed to the voice symptoms among teachers.

### **Survey Administration and Results**

Student teachers are at the very beginning of their career within the classroom, and based on the previous research, have the potential to develop vocal strain. In order to assess whether or not students studying to become teachers at SUNY New Paltz possess the risk factors for vocal strain, a survey was developed and administered via Qualtrics, an online survey distribution website. The survey, titled *Vocal Strain in Teachers*, was approved by the SUNY New Paltz Humans Rights and Ethics Board, and consisted of 29 questions that aimed to identify the presence of both risk factors, and voice symptoms. The survey was distributed to approximately 150 students in their student teaching phase of education at SUNY New Paltz. Age and sex were provided, as they can contribute to laryngeal differences. 65 students anonymously responded to the survey, a response rate of about 45%. This number was higher than anticipated, but added tremendous value to the data obtained. Table 1 presents the participants' age and sex. Table 2 lists the questions used on the survey, as well as the percentages of each response.

Table 1

#### *Survey Demographics*

<u>Age</u>	<u>Sex</u>		
	<u>Male</u>	<u>Female</u>	<u>Total</u>
18-24	6	40	46
25-34	3	11	14
35-44	2	3	5

Table 2

*Student Teacher Survey Question Results*

<u>Question</u>	<u>Response</u>		
	<u>Often</u>	<u>Sometimes</u>	<u>Never</u>
My voice feels tired at the end of the day.	24.62%	63.08%	12.31%
People ask me to repeat myself when speaking face to face.	15.38%	47.70%	36.90%
I talk loudly during the day.	58.46%	35.38%	6.15%
I talk on the phone frequently throughout the day.	10.77%	52.31%	36.92%
I clear my throat frequently.	30.77%	47.69%	21.54%
I have periods of vocal rest throughout the day.	27.69%	55.38%	16.92%
I drink caffeine throughout the day.	52.31%	20.00%	27.69%
There is ambient (background) noise in my classroom.	25%	57.81%	17.19%
My classroom has dry air.	21.54%	64.62%	13.85%
I drink water throughout the day.	76.92%	23.08%	0%
My voice sounds hoarse at night.	17.19%	42.19%	40.63%
I smoke regularly.	6.15%	4.62%	89.23%
I drink alcohol regularly.	10.77%	61.54%	27.69%
I come home from work feeling stressed.	39.06%	56.25%	4.69%
I am exposed to dust.	18.46%	63.08%	18.46%
I am exposed to chalk.	9.23%	33.85%	56.92%
My social life is restricted by my voice problems.	0%	7.69%	92.31%
My classroom is humid.	9.23%	52.31%	38.46%
I teach elementary school (K-8th grade).	64.62%	20.00%	15.38%
There are less than twenty students in my class at a given time.	20.00%	47.69%	32.31%
There are more than twenty students in my class at a given time.	56.92%	32.31%	10.77%
I feel left out of conversations because of my voice.	0%	18.46%	81.54%
I teach secondary school (9th-12th grade).	23.08%	18.46%	58.46%

My mouth is dry during the day	33.85%	58.46%	7.69%
I am exposed to second-hand smoke.	3.08%	23.08%	73.85%
I sleep with a humidifier.	4.62%	16.92%	78.46%
I raise my voice when maintaining order in my class.	41.54%	55.38%	3.08%

Table 1 notes the age and sex of the participants who responded to this survey. Ages 18-24 had 46 participants, with six males and 40 females, ages 25-34 had 14 participants with three males and 11 females, and ages 35-44 had five participants, with two males and three females. An “other” category for sex was provided, as to remain inclusive for all participants. However, zero of the participants chose this category. Additionally, the participants all fell below the age of 44. 54 of the participants were female, and 11 were male. As seen in Table 2, the response percentages for each question are listed. The answers were broken down into “often”, “sometimes”, and “never” as choices per each question. In terms of demographics, Of special interest were the questions: My voice feels tired at the end of the day, I talk loudly during the day, I clear my throat frequently, I drink caffeine throughout the day, My voice sounds hoarse at night, I drink alcohol regularly, My mouth is dry during the day, There are more than twenty students in my class at a given time, and I raise my voice when maintaining order in my class. These questions received higher percentages of “often” or “sometimes” as a response, indicating that the surveyed participants were frequently experiencing or being exposed to these risk factors. Additionally, 60 out of 65 participants noted exposure to ten or more risk factors. This indicates that 92% of the students surveyed had been exposed to factors that could potentially put them at risk for vocal strain, or even a voice disorder later on in their careers. This number was higher than expected, after looking at research done by Van Lierde et al. Van Lierde et al.

presented a cross sectional study in which participants were evaluated to determine their objective vocal quality and vocal characteristics. Only 25% of their surveyed participants reported the presence of vocal risk factors (Van Lierde et al., 2009). In analyzing the data from the SUNY New Paltz participants, it became obvious that the student teachers were being exposed to risk factors relatively regularly. The wording of the questions presented may have possibly confused participants, but the participant exposure rate of 92% indicates that these student teachers are being faced with the same risk factors as established classroom teachers.

### **Prevention of Vocal Strain and Evaluation of Vocal Hygiene Education**

Vocal strain negatively affects teachers within their occupation, and then consequently within their daily lives. The vast majority of research articles focus on treatment, rather than prevention. Nanjundeswaran et al. (2012) explains that student teachers have been the target of “prevention” studies, but inspection of these studies indicate that they were more treatment based, rather than prevention based. The participants would enter studies with vocal problems already present, and so any prevention was minimized, and was focused on preventing the worsening of symptoms, rather than preventing the symptoms from the start (Nanjundeswaran et al., 2012).

Prevention occurs on the primary, secondary, and tertiary levels. Primary prevention is utilized before the voice problem occurs, secondary prevention is used to identify the problem as well as incorporate an early intervention, and tertiary prevention aims to alleviate the voice problem, as to reduce the symptoms (Ohlsson et al., 2016). In the case of prevention, primary is the strongest to ensure that a teacher’s vocal quality remains in tact before any strain can occur.

In addition to physiological damage to their vocal folds, teachers face financial burdens in the wake of vocal strain. Houtte et al. (2011) evaluated the impact of voice disorders on voice related absenteeism, and found that teachers experienced a significantly higher amount of absences from work due to vocal strain than that of the general population. In this study, only 27.4% of the teacher participants had received education on vocal care, which can be hypothesized to have contributed to the vast amount of teachers facing vocal strain. The financial burden associated with excessive absences could be diminished, if voice education and vocal hygiene are introduced to teachers early in their studies (Houtte et al., 2011).

Vocal hygiene education (VH) is a preventative measure that aims to reduce the factors that can contribute to vocal fold inflammation (Behrman et al., 2008). It is a more conceptual approach, that is often referred to as an indirect therapy.

In order to look further at prevention, Nanjundeswaran et al. (2012) presented a study that aimed to assess the prevention quality of vocal hygiene education. Within this particular study, it is suggested that a minimalist and personalized approach to vocal hygiene education is sufficient in preventing the worsening of voice symptoms in student teachers. The participants were vocally healthy at the start of the study, as to truly measure the preventative quality of vocal hygiene education, rather than treatment (Nanjundeswaran et al., 2012). The researchers utilized a pretest and posttest study format to measure the effects of vocal hygiene education (VH) on Voice Handicap Index (VHI) scores. The Voice Handicap Index is a questionnaire developed by Jacobson et al. (1997) to investigate the damages resulting from voice disorders. Further, the vocal hygiene education consisted of presentations regarding hydration, inflammation, and use of heavy voice. Hydration was addressed on the systemic level, as well as the surface level by

discussing the amount of water consumed daily in addition to steaming and the use of humidifiers. Inflammation was discussed in regards to reducing the intake of spicy or acidic food, no exercise after eating, no going to sleep directly after a meal, and smoking. Heavy voice was addressed by educating the participants to talk normally whenever possible, pause while talking, scream control, as well as controlling the loudness of speaking (Nanjundeswaran et al., 2012). Vocal hygiene education was proven to be sufficient in preventing the worsening of symptoms of vocal strain in the participants, all of whom showed symptoms on the VHI after student teaching for 4-8 weeks. This suggests that a personalized and minimalist approach to vocal hygiene may be sufficient to prevent straining of the voice in currently healthy teachers (Nanjundeswaran et al., 2012). This study did not address the preventative quality of VH on student teachers with pre-existing vocal strain, which can be considered a limitation.

Another study evaluating the effect of vocal hygiene education on VHI scores was completed by Behrman et al. (2008). They sought to assess both VH and voice production therapy (VP) in altering the patient's perception of vocal handicap. The Vocal Handicap Index was used at baseline, post-therapy- and post-self-study, and was found to decrease in both groups. However, voice production therapy had a significantly greater improvement than the vocal hygiene education group. The voice production therapy targeted a phonation strategy referred to as resonant voice production, which aims to reduce hyperadduction of the vocal folds (Behrman et al., 2008). This study looked at participants with phonotraumatic lesions within their vocal folds, and did not specifically look at teachers. The participants in the voice production therapy group had more adherence than the participants in the vocal hygiene education group, and the researchers noted that the adherent participants received greater

benefits (Behrman et al., 2008). Behrman et al. (2008) suggests this is related to the clinical notion that voice therapy works when patients adhere to the program, and may have influenced the participants' perception of their own vocal handicaps. However, the findings present that both groups decreased in their VHI scores, indicating the lessening of vocal symptoms and problems.

The existing research suggests that vocal hygiene education is useful in the prevention of voice problems in professional voice users such as teachers (Behrman et al., 2008; Houtte et al., 2011; Nanjundeswaran et al., 2012). Rajasudhakar et al. (2011) explain that “vocal hygiene education addresses the importance of proper care of vocal fold tissue” and suggests changes in behavior, life style, and diet to improve vocal function. These researchers assert that vocal hygiene education is effective in creating awareness, reducing vocal abuse, and preventing both the onset and progression of vocal symptoms among teachers (Rajasudhakar et al., 2011). Additionally, they tested participants before and after detailed presentations on voice anatomy, causes of voice disorders, and care of the voice, and found that the average scores improved from 58% in the pre-test to 73% in the post-test after attending the program (Rajasudhakar et al., 2011). This study looked at the short-term effect of a vocal hygiene awareness program among students training to be teachers, and suggest that regular implementation of vocal hygiene education can be beneficial in maintaining preventative care.

So, why isn't vocal hygiene education typically included in the curriculum student teachers are faced with? In spite of an increase in number of individuals in voice demanding professions, there seems to be little focus on sufficient preventative measures for vocal care

(Bele, 2008). Bele (2008) asserts that the voice is of great importance in human communication, and a great deal of our personality is reflected in our voice. Not only does the voice allow us to socially communicate, it is vital for teachers in advancing within their careers. As mentioned earlier, teachers are absent often in relation to vocal strain (Houtte et al., 2011). It is clear that teachers are often at risk for voice disorders, and these vocal risk factors have been elaborately researched (Houtte et al., 2011), but the findings have been inconsistent and a lot of the risk factors are incapable of being changed (biological sex, age, school type, years of teaching etc). Houtte et al (2011) suggest that attention needs to be focused on the prevention of vocal strain and voice disorders in order for teachers to flourish within their career and safely utilize their voices. Vocal techniques and vocal hygiene education can be used simultaneously to educate teachers on voice risks as well as safe ways to use the voice. It has been interesting to note that although the research exists on voice disorders in teachers, voice education is not often worked into teachers' education curriculum. Houtte et al. (2011) also propose that vocal hygiene be implemented in all teacher programs, in order to reduce the medical care sought as well as the financial burden of vocal strain.

### **Conclusion and Future Implications for Research**

In utilizing the pre-existing research on voice disorders in teachers, and vocal strain in student teachers, as well as my research conducted at SUNY New Paltz, it is evident that teachers are susceptible to voice problems. Data shows that teachers represent a large number of individuals affected by vocal strain in comparison to the general population (Greve, Bryn & Simberg, 2018), and that one third of teachers have voice disorders (Ohlsson et al., 2012). This

research suggests that student teachers are entering a career where they are more likely to have a voice disorder than if they were in a different field. Greve et al. (2018) found that 14.1% of the student teachers within their study presented with voice disorders. Simberg, Sala & Rönnekaa (2004) found that 58% of student teachers in their study reported zero voice symptoms whereas 76% in their control group reported zero symptoms, indicating that student teachers report more vocal symptoms than their peers studying for other professions. Ohlsson et al. (2011) found that 208 out of 1250 (17%) of the students in their study had experienced vocal strain after describing risk factors. These studies suggest that student teachers are not only looking forward to a future of voice disorders, but may start experiencing vocal strain during their semester of student teaching as well. With that being said, there needs to be more quantitative research focused on vocal strain as well as voice disorders in student teachers specifically, in addition to quantitative research assessing the effectiveness of vocal hygiene education. A vast majority of the research relies on self-administered questionnaires (Nanjundeswaran et al., 2012) that assess the patient's perception of their voice, which are useful and indicate functionality on a day to day basis for each individual. It would be important to further research objective measures of the voice, rather than solely looking at perceptual aspects of voice.

In regards to students in their first semester of student teaching at New Paltz, a large percentage (92%) reported that they were exposed to at least ten risk factors for vocal strain regularly. This number was surprisingly high, and though it was a self-reported assessment where the participants may have possibly been confused by question wording or when they should report a risk factor as "often", it suggests that students at New Paltz are exposed to the same risk factors as established classroom teachers. Going forward, it would be wise to

implement either an inservice presentation or workshop, or incorporate vocal hygiene into the core curriculum for teachers. New Paltz, as of 2019, does not offer any specific courses on voice education. However, New Paltz offers speech classes for Theatre Arts majors that are studying performance, and will be utilizing their voices professionally as well. Creating a workshop, or even a simple brochure for students entering their semester of student teaching could be effective in lessening the damage from vocal load they be exposed to in the future. Houtte et al. (2011) inquired to teachers about their pre-existing knowledge on vocal care, and found that only 27.4% of the teachers within their study had received any sort of vocal care information. If we are not educating our teachers on preventative measures for vocal care, we can not be surprised at the prevalence of vocal strain among teachers.

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