



**EFFECTS OF TELE MUSIC-BASED VOICE INTERVENTION PROTOCOL
ON VOCAL FATIGUE, VOICE IMPAIRMENTS, VOICE-RELATED
PHYSICAL SYMPTOMS, AND EMOTIONAL WELL-BEING OF SCHOOL
TEACHERS IN MALAYSIA**

By

HOW DIM SY

**Thesis Submitted to the School of Graduate Studies, Universiti Putra Malaysia,
in Fulfilment of the Requirements for the Degree of Master of Science**

November 2024

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Abstract of thesis presented to the Senate of Universiti Putra Malaysia in fulfilment of the requirement for the degree of Master of Science

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November 2024

Chairman : Ang Mei Foong, PhD
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School teachers (ST) constitute the largest group of professional voice users. In the teaching profession, teachers have a higher risk of developing voice discomfort and problems compared to the general population. Numerous research studies have documented the positive effect of singing on voice problems since voicing and singing share the same physiological mechanism. Although singing has been observed and shown to improve the functional use of the voice, there have been no studies that reported the efficacy of singing on school teachers' voice in Malaysia. **Method:** This study investigates the effect of a Tele Music-based Voice Intervention Protocol (Tele MusVIP) on the vocal fatigue, voice impairments, voice-related physical symptoms, and emotional well-being of school teachers in Malaysia. A quantitative approach was used for the investigation. The study utilized an interventional, one-group, repeated measure research design. Purposive sampling was selected with a targeted population of 39 full-time school teachers across different states in Malaysia. The school teachers received two hours of singing sessions weekly for 12 consecutive weeks. The tools

used for the research were the Vocal Fatigue Index (VFI) and Voice Symptoms Scales (VoiSS), and the measurements were taken at pre-, co-, and post-intervention. The data was statistically analyzed through one-way repeated measures ANOVA using SPSS. At the same time, pre- and post-intervention interviews were conducted to find out the school teachers' perception of their voice and voice-related problems, as well as their perception of Tele MusVIP. **Results:** Statistical tests revealed positive significant outcomes on all voice parameters in this study ($p \leq 0.05$). Empirical data on school teachers' perception of their voice and voice-related problems, as well as their perception of Tele MusVIP, were documented. **Implications:** The results suggest that Tele MusVIP is effective in improving school teachers' voices. The evidence obtained from the study suggests that Tele MusVIP is a feasible and effective intervention for school teachers, and it potentially can be used as an alternative to traditional voice care programs to incorporate these principles and provide an alternative to traditional voice care programs.

Keywords: Singing Intervention, Teacher's Voice, Tele MusVIP, Telepractice, Vocal Health.

SDG: GOAL 3: Good Health and Well-Being

Abstrak tesis yang dikemukakan kepada Senat Universiti Putra Malaysia sebagai memenuhi keperluan untuk ijazah Master Sains

KESAN PROTOKOL INTERVENSI SUARA BERDASARKAN TELE MUZIK KE ATAS KELETIHAN SUARA, GANGGUAN SUARA, SIMPTOM FIZIKAL BERKAITAN SUARA DAN KESEJAHTERAAN EMOSI GURU SEKOLAH DI MALAYSIA

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Guru sekolah (ST) merupakan kumpulan terbesar pengguna suara profesional. Dalam profesion pengajaran, guru mempunyai risiko yang lebih tinggi untuk mengalami ketidakselesaan dan masalah suara berbanding dengan populasi umum. Banyak kajian telah mendokumentasikan kesan positif menyanyi terhadap masalah suara kerana pertuturan dan nyanyian berkongsi mekanisme yang sama. Walaupun telah diperhatikan bahawa menyanyi dapat meningkatkan penggunaan suara secara fungsional, namun tidak ada kajian yang melaporkan keberkesanan menyanyi terhadap suara bercakap guru sekolah di Malaysia. **Kaedah:** Kajian ini meneroka kesan Protokol Intervensi Suara Berasaskan Muzik secara Tele (Tele MusVIP) terhadap keletihan vokal, gangguan suara, dan kesejahteraan emosi guru-guru sekolah di Malaysia. Pendekatan kuantitatif digunakan untuk penyelidikan ini. Kajian menggunakan reka bentuk penyelidikan intervensi, satu kumpulan, ukuran berulang. Sampel bertujuan telah dipilih dengan populasi sasaran sebanyak 39 orang guru sepenuh masa di pelbagai negeri di Malaysia. Guru sekolah menerima dua jam sesi

menyanyi setiap minggu selama 12 minggu berturut-turut. Alat yang digunakan untuk penyelidikan ini adalah Indeks Keletihan Suara (VFI) dan Skala Simptom Suara (VoiSS), dan pengukuran diambil sebelum, semasa, dan selepas intervensi. Data ini dianalisis secara statistik melalui analisis varians ukuran berulang satu hala menggunakan SPSS. Pada masa yang sama, temubual pra- dan pos-intervensi telah dijalankan untuk mengetahui persepsi guru sekolah tentang suara mereka dan masalah berkaitan suara, serta persepsi mereka tentang Tele MusVIP. **Keputusan:** Ujian statistik menunjukkan hasil positif yang signifikan terhadap parameter-parameter suara dalam kajian ini ($p \leq 0.05$). Data empirikal mengenai persepsi guru sekolah tentang suara mereka dan masalah berkaitan suara, serta persepsi mereka tentang Tele MusVIP telah didokumentasikan. **Implikasi:** Keputusan ini menunjukkan bahawa Tele MusVIP berkesan dalam meningkatkan suara guru sekolah. Bukti yang diperoleh daripada kajian ini mengesyorkan bahawa Tele MusVIP adalah intervensi yang berkebolehan dan berkesan untuk guru sekolah, dan ia boleh digunakan sebagai alternatif kepada program penjagaan suara tradisional untuk menggabungkan prinsip-prinsip ini dan menyediakan alternatif kepada program penjagaan suara tradisional.

Kata Kunci: Intervensi Nyanyian, Kesihatan Vokal, Suara Guru, Tele MusVIP, Telepraktik,

SDG: MATLAMAT 3: Kesihatan yang Baik dan Sejahtera

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This thesis was submitted to the Senate of Universiti Putra Malaysia and has been accepted as fulfilment of the requirement for the degree of Master of Science. The members of the Supervisory Committee were as follows:

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LIST OF ABBREVIATIONS

ST	School Teacher
HSM	Helping Skill Model
Tele MusVIP	Tele Music-based Voice Intervention Protocol
JKEUPM	Jawatankuasa Etika Universiti untuk Penyelidikan Melibatkan Manusia
MCO	Movement Control Order
CMD	Common Mental Disorder
Covid-19	Corona Disease of 2019
RVT	Resonance Voice Therapy
VFE	Vocal Function Exercises
MIT	Melodic Intonation Therapy
MT-SV	Music Therapy-Assisted Speech and Voice Therapy
VFI	Vocal Fatigue Index
VoiSS	Voice Symptoms Scale



CHAPTER 1

INTRODUCTION

1.1 Background of the Study

School teachers (ST) represent the largest cohort of professional voice users,. The inherent demands of their profession expose them to an elevated risk of developing vocal problems when compared to the general population (Gautam, Nayak, Devadas, et al., 2022). Extended vocal loading and inappropriate use of the voice can cause symptoms such as fatigue, loss of voice, voice break, reduction in loudness, hoarseness, and physical discomforts such as sore throat or voice strain (Deborah et al., 2023; Remacle et al., 2018). If left untreated, these symptoms can develop into voice disorders that may have an impact on a teacher's social interactions, physical health, and emotional well-being (Barbosa et al., 2019; Nusseck et al., 2020)

Voice disorders are prevalent among school teachers (ST), with reported rates ranging from 8.7% to 66% (Angelillo et al., 2009; Gautam, Nayak, Devadas, et al., 2022; Liu et al., 2020; Vertanen-Greis, Loyttyniemi, & Uitti, 2020), Furthermore, the perceived recurrence of voice disorders among school teachers after a three-year period can be notably high, reaching up to 69.1%, according to findings from Vertanen-Greis et al. (2020). This spectrum of prevalence underscores the significance of understanding and addressing the challenges posed by voice disorders within the teaching profession.

A study conducted in Malaysia reveals that 53.8% of primary school teachers suffer from voice disorders within a 12-month period (Abdul Rahman, 2016), Additionally,

another study documents the prevalence of voice disorders among Malaysian secondary school teachers at 10.4% (Ming Moy et al., 2015).

Voice, being a primary form of communication for both teachers and students, is crucial for teachers to maintain. In recent decades, there has been growing interest in using singing to enhance voice. It has been utilized with quadriplegics with abnormalities in respiratory function and phonation (Tamplin et al., 2014), Parkinson's patient dealing with vocal challenges (Good et al., 2023; Stegemöller et al., 2017) individual stuttering (Falk et al., 2020), geriatric voice issues (Lortie et al., 2017; Moon et al., 2022; Perfitt, 2016), and more. Singing contributes to producing a voice with increased fluency and ease by strengthening and improving the voice mechanism in these programs.

During the Covid-19 pandemic crisis, face-to-face singing has been restricted to prevent the spread of the virus, leading to an increased reliance on telepractice. Telepractice involves utilizing telecommunication technology, such as mobile devices, telephones, and smartphones, to deliver health and medical services. The earliest article on telepractice dates back to the 1970s (Glazer et al., 1978), focusing on delivering health services through phone consultations. Historically, telepractice has overcome the barrier of a lack of professionals available to provide services to clients in different physical locations, especially in rural remote areas. Additionally, telepractice reduces client expenditures, travel time, and work lost (Cason & Cohn, 2014).

In the COVID-19 pandemic era, however, the primary advantage of telepractice has shifted. It now serves as a crucial tool to prevent the risk of viral spread or exposure through travel and to reduce face-to-face contact, thereby promoting physical distancing (Blue et al., 2020; Krajewska et al., 2020). Notably, this change has lead telepractice to be utilize as a tool for music interventions and therapeutic singing programs (Dekalb, 2021; Dowson & Schneider, 2021; Knott, 2020) . While the use of telepractice for music intervention and singing programs has always been there, the pandemic has made it more important, leading to a closer look at this area than ever before

1.2 Statement of Problem

School teachers often experience vocal overload due to the demands of their profession, which require them to speak throughout the day. Their responsibilities encompass teaching, providing instructions to students, maintaining classroom discipline, attending staff meetings, and participating in extracurricular activities. Moreover, environmental factors such as inadequate classroom acoustics, loud external noise, poor ventilation, and subpar teaching aids can exacerbate the challenges they face with their voices (Byeon, 2019; Redman et al., 2022; Vertanen-Greis, Loyttyniemi, Uitti, et al., 2020). These demands often manifest in symptoms such as vocal fatigue, dry throat, and hoarseness (Przysieczny & Przysieczny, 2015; Redman et al., 2022). While the recovery time for vocal symptoms may differ among individuals, the persistence of chronic symptoms can result in voice disorders that adversely impact teaching quality, lead to increased school absences, or prompt individuals to contemplate a career change (Chen et al., 2022; Putus et al., 2021; Sharp & Cook, 2022).

To reduce the risk of voice disorders among teachers, various voice-related programs have been implemented. These encompass voice training programs specifically designed to alter vocal functioning, enhance resonance, address specific laryngeal relaxation, incorporate diaphragmatic breathing, and coordinate breathing with phonation (Liu et al., 2020, 2021; Meier & Beushausen, 2019). Other voice training programs focus on vocal hygiene training, which provides education on voice functionality and care strategies such as diet, lifestyle, hydration, and medication (Faham et al., 2015; Liu et al., 2020).

In the context of Malaysia, a study evaluating a vocal care program, which included technical skills training on the use of voice amplifiers and an informative session on vocal hygiene, demonstrated evidence of effectiveness in preventing vocal disorders (Sundram et al., 2019). These programs collectively contribute to a holistic approach aimed at preserving and promoting the vocal health of teachers.

While there is evidence supporting the positive effects of singing on voice symptoms—such as strengthening the respiratory system, improving voice strain and breathiness, and reducing voice fatigue (Bingham, 2019; Imaezue, 2017; Walstrom et al., 2021), limited research exists on the use of singing as an intervention to improve vocal symptoms in school teachers. Additionally, no studies have reported the efficacy of music-based interventions on the voices of school teachers in Malaysia.

The term "telepractice," as defined by the American Speech-Language-Hearing Association (ASHA) as “the application of telecommunications technology to the delivery of speech-language pathology and audiology professional services at a

distance by linking clinician to client or clinician to clinician for assessment, intervention, and/or consultation” (ASHA, 2018a), has assumed increased significance in the era of Covid-19. This is particularly notable in Malaysia, where a nationwide Movement Control Order (MCO) has been in effect since March 2020, with specific states under MCO since January 2021, posing challenges for clients to travel for in-person sessions. The use of telepractice addresses these challenges, making sessions more accessible and sustainable, enabling clients to consistently attend sessions despite movement restrictions (Smith et al., 2020).

During the COVID-19 pandemic, telepractice has seen a surge in use for music-based therapy, including activities like singing, therapeutic music listening, songwriting, dance, and physical movement (Spooner et al., 2019; Vaudreuil et al., 2020). While telepractice has proven effective for music-based interventions and voice-related therapeutic sessions, there's limited research on using telepractice specifically for singing as a model for voice symptoms interventions. Therefore, it's crucial to explore the potential of telepractice-based singing interventions to improve the vocal symptoms of school teachers. This exploration could shed light on whether telepractice with singing is a practical and effective way to enhance teachers' vocal health.

1.3 Theoretical Background

The theoretical framework was developed as a result of the adoption of the theory of neuroplasticity and helping skills model (HSM).

Theory of Neuroplasticity

The concept of neuroplasticity has a rich history dating back to the work of William James about 120 years ago. In his seminal work, "Principles of Psychology," James proposed that "Organic matter, especially nervous tissue, seems endowed with a very extraordinary degree of plasticity," suggesting the remarkable capacity of the human brain for reorganization (James et al., 1890). However, it wasn't until later that the term 'neuroplasticity' was formally defined, and this credit goes to Polish neuroscientist Jerzy Konorski in 1948. Konorski introduced the idea that neurons, over time, could undergo changes due to coincidental activations caused by their proximity to firing neurons (Konorski, 1948).

The term 'neuroplasticity' itself is a combination of two words: 'neuron' and 'plastic.' Neurons are the fundamental nerve cells that comprise a soma, axon, and dendrites. These cells communicate through synapses, transmitting chemical signals and enabling neurons to form electrically excitable networks. These networks are crucial for the brain's processing and transmission of information. The word 'plastic' in 'neuroplasticity' denotes the brain's remarkable ability to change, adapt, and mold itself, much like sculpting or modifying (MyDowel, 2013)

Demarin (2014) provides a concise definition of neuroplasticity as the brain's capacity to adapt to new situations through change, remodeling, and reorganization. This definition underscores the dynamic nature of neural networks within our brains, emphasizing their non-static, adaptable nature shaped by our daily experiences (Demarin et al., 2014).

In the course of an individual's lifespan, the brain constantly undergoes reorganization and reshaping of neural patterns. Simultaneously, the systems that an individual employs for retrieving information continually adapt based on experiences and new learning. Repetition plays a role in strengthening the connections between neurons formed during new learning. However, repetition alone is often insufficient to retain what has been learned. To consolidate learning, physical exercises can be introduced. These exercises enhance the functional connectivity within the electrically excitable network and increase the numbers of neurons, synapses, and axons (Voss et al., 2010).

Furthermore, when individuals participate in enriched and engaging environments that introduce tasks of varying complexity, they further reinforce the neural connections that have been established as a result (Baker & Roth, 2004).

In music therapy, particularly Neurologic Music Therapy (NMT), the principles of neuroplasticity are effectively harnessed to aid patient recovery. NMT uses music to engage and rehabilitate brain areas responsible for voice production, auditory processing, and emotional regulation, fostering the creation of new neural connections. This method has been clinically proven to improve vocal strength, control, pitch accuracy, and emotional expression in individuals facing voice-related challenges, such as vocal disorders, Parkinson's patients with voicing difficulties, and others with impaired vocal function (Altenmüller & Schlaug, 2015; Fiorente & Calabrò, 2023; Martínez-Molina et al., 2021; Thaut & Hoemberg, 2014).

Research has shown that specialized singing exercises can significantly enhance connectivity between the insula and the voice and respiratory sensorimotor regions.

This improved neural integration strengthens brain areas critical for vocal control, offering an innovative approach to treating voice disorders (Zamorano et al., 2023).

In addition, research, including work by Fiorente & Calabrò (2023), has demonstrated that singing training can substantially boost vocal quality and clarity. This approach serves as an effective means to improve voice projection and reduce voice-related issues, providing tangible benefits for those struggling with vocal impairments.

These collective insights underscore the profound impact that singing, grounded in the principles of neuroplasticity, can have on vocal symptom alleviation. The neuroadaptive changes spurred by singing training illustrate the brain's remarkable ability to modify and enhance vocal health and functionality.

At its core, leveraging neuroplasticity via music and singing offers a transformative and hopeful avenue for enhancing habit formation, aiding improvement from vocal impairments, and boosting mental well-being. This innovative approach, by engaging the brain through singing, naturally promotes the development of new neural pathways, leading to improved vocal abilities and an enriched quality of life.

Singing not only fine-tunes vocal skills but also stimulates the brain's capacity for change, supporting the formation of healthy habits, aiding in the rehabilitation of voice-related conditions, and fostering mental health benefits. Through such practices, individuals can experience profound improvements in both their vocal capabilities and overall well-being, underscoring the profound impact of music and singing on human health and quality of life.

Helping Skills Model (HSM)

The Helping Skills Model (HSM) is a widely used counseling approach that provides a structured framework for therapists to guide their clients through three key stages of the therapeutic process: exploration, insights, and actions. This model offers a flexible yet structured way for counselors to address the unique needs of each client.

During the exploration stage, the counselor's primary focus is to create a safe and non-judgmental environment where clients can openly express their thoughts and emotions. By actively listening and offering empathy, the counselor encourages clients to delve deeper into their concerns. Non-verbal cues like nods and maintaining eye contact further facilitate the client's willingness to share, while open-ended questions prompt deeper self-reflection.

Moving into the insights stage, the counselor collaborates with the client to help them gain fresh perspectives and understandings about their issues. This phase involves a thorough exploration of the client's thoughts and emotions, often revealing recurring patterns or themes. To assist clients in gaining new insights into their situations, counselors may employ various techniques, such as cognitive restructuring or reframing.

Finally, during the action stage, the counselor and client work together to formulate a practical plan that empowers the client to achieve their objectives. This plan may involve acquiring new skills, setting goals, or implementing novel behaviors. Throughout this process, the counselor provides unwavering support and motivation,

enabling the client to maintain their enthusiasm and make meaningful progress toward their desired outcomes.

In summary, the Helping Skills Model (HSM) underscores the significance of building a strong therapeutic alliance grounded in trust and cooperation. By cultivating a nurturing and secure environment, counselors can facilitate more profound exploration of clients' concerns, foster new insights, and guide them towards positive steps to achieve their goals. This adaptable model can be customized to accommodate the diverse backgrounds, cultures, and experiences of clients, making it a valuable approach across various counseling settings (Hill & Kellems, 2002).

Applying the Helping Skills Model (HSM) in singing interventions for school teachers experiencing voice symptoms can be highly beneficial. In the exploration stage, teachers can safely express their vocal challenges and experiences, fostering a supportive atmosphere. The insight phase allows for identifying patterns and triggers of voice strain, enabling teachers to gain awareness about their vocal health. Finally, in the action stage, tailored strategies such as vocal exercises, relaxation techniques, and voice care practices can be developed. This structured approach not only addresses immediate symptoms but also equips teachers with long-term skills to maintain vocal health, crucial for their profession.

1.4 Conceptual Framework

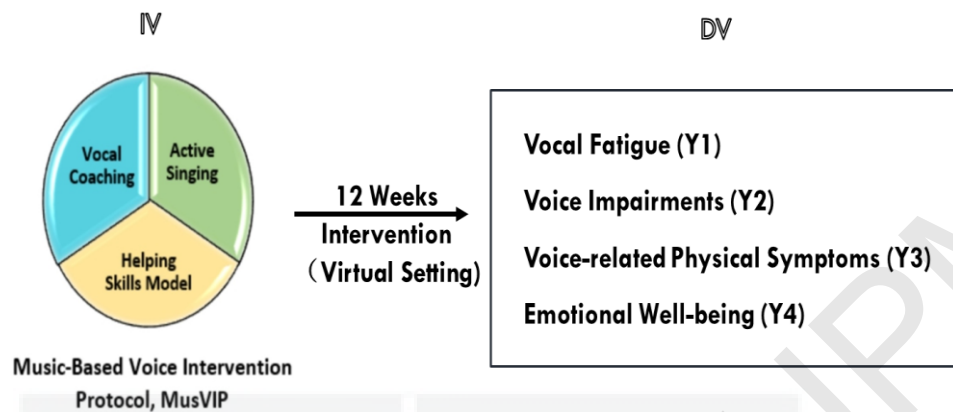


Figure 1.1 : Conceptual Framework of the Research

The conceptual framework presented in the study depicts an independent variable (X1) - the Music-based Voice Intervention Protocol (MusVIP), and 4 dependent variables - vocal fatigue (Y1), voice impairments (Y2), voice-related physical symptoms (Y2), and emotional well-being (Y3). The intervention was conducted for 12 weeks in a tele setting (Tele MusVIP) with each session lasting two hours.

Tele MusVIP was developed based on 2 theories, namely neuroplasticity, and helping scale model. The protocol consists of three main components - Vocal Coaching, Active Singing, and the HSM approach. The vocal coaching component involves physical exercises, breathing exercises, and vocalizing exercises for half an hour each week.

Active singing, the second component, comprises two parts. In the initial 45-minute segment, participants engage in singing short songs meticulously chosen by the researcher. They synchronize singing with rhythmic movements, concentrate on articulating text clearly, hitting precise pitches, and improvising with the lyrics. The

objective is to enhance vocal strength and reinforce the techniques acquired. The subsequent 45-minute session aims to broaden participants' vocal range, enhance their enjoyment of song melodies, and cultivate a positive emotional state.

To measure the effectiveness of Tele MusVIP, the study employed two self-administered questionnaires: the Voice Fatigue Index (VFI) and the Voice Symptoms Scale (VoiSS). Data on the dependent variables Y1, Y2, Y3, and Y4 were collected before the intervention, at the 6th week mark, and at the conclusion of the 12-week intervention period.

Interviews were also conducted before and after the intervention to obtain the participants' demographic details, their perceptions of their voice, voice-related problems, concerns, and expectations of the intervention. The post-intervention interviews aimed to collect empirical data on the participants' voice, voice-related problems after the intervention, and feedback on the intervention's efficacy and the virtual sessions. Overall, this conceptual framework outlines the various components and approaches used in this study to improve the participants' voice-related problems.

1.5 Research Objectives

The research objectives of this study are twofold: first, to evaluate the effectiveness of the Tele Music-based Voice Intervention Protocol (MusVIP) in addressing vocal fatigue, voice impairments, voice-related physical symptoms, and emotional well-being among school teachers in Malaysia; and second, to explore teachers' perceptions of their vocal problems and their views on the Tele MusVIP program.

Initially developed to aid individuals with Parkinson's disease in overcoming voice-related challenges, MusVIP has shown success and adaptability within this population. Expanding upon this success, our study seeks to determine whether MusVIP can effectively address similar voice-related issues experienced by school teachers.

Quantitative data will be collected to investigate and answer specific research questions, while qualitative data will complement the quantitative findings. This study aims to assess whether a music-based protocol, initially designed for neurological patients, can also mitigate the risk of teachers developing voice issues. Insights gathered from teacher feedback will help assess the feasibility of implementing a singing-based intervention in a virtual setting, laying the groundwork for potential telepractice applications in future studies.

1.6 Research Questions

The research questions are listed as below:

1. Does measurement change significantly pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3)?
2. Does measurement change significantly pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3)?
3. Does measurement change significantly p pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3)?
4. Does measurement change significantly pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3)?

5. What are the perceptions of teachers on their voice and voice-related problems before and after the intervention?
6. What are the perceptions of teachers on Tele MusVIP?

Hypotheses are as below:

1. There are significant changes in the mean score on vocal fatigue after weekly sessions from pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3).
2. There are significant changes in the mean score on voice impairments after weekly sessions from pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3).
3. There are significant changes in the mean score on voice-related physical symptoms after weekly sessions from pre-intervention (T1) to co-intervention on the 6th week (T2) and from T1 to 12 weeks after intervention (T3).
4. There are significant changes in the mean score of emotional well-being after weekly sessions from pre-intervention (T1) to co-intervention on the 6th weeks (T2) and from T1 to 12 weeks after intervention (T3).

1.7 Significant of Study

Vocal fatigue and other voice impairments, including breathiness, strain, and hoarseness, are prevalent challenges encountered by school teachers (ST). Yet, the exploration of singing as an intervention for ST voice issues remains limited and poorly understood. This study fills this gap by offering statistical evidence of singing's efficacy in mitigating vocal fatigue, alleviating voice symptoms, and enhancing voice-related emotional well-being among ST

The implications of these findings are twofold. Firstly, they suggest that singing can be integrated into standard interventions aimed at addressing voice issues among school teachers, offering a promising avenue for enhancing voice care programs. Additionally, the study highlights the potential of the Music-based Voice Intervention Protocol (MusVIP) as a valuable addition to teacher voice care initiatives in the future. Moreover, if the results prove significantly positive, the adoption of MusVIP could extend beyond the realm of education to benefit professional voice users in various fields.

The ongoing COVID-19 pandemic has disrupted many programs and interventions that were previously conducted in physical settings. It is timely and necessary to explore the application of telecommunication technology to maintain the continuity of such interventions.

The data collected on the perceptions of ST towards telepractice provides valuable insights for researchers to identify the challenges and advantages of using telecommunication technology, and how it can be improved to provide effective interventions in the current era. Furthermore, data on the feasibility of using singing as a telepractice intervention will contribute to the development of music-based telepractice interventions not only in Malaysia but also globally.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

The literature review consists of five sections. The first section provides background information on school teachers and discusses the challenges they face. The second section focuses on the voice-related problems that teachers commonly experience. Moving on, the third section explores various preventative measures aimed at addressing these voice issues among school teachers. The fourth section delves into interventions centred around singing, while the final section examines the concept of telepractice.

2.2 School Teachers

In this study, School Teachers (ST) pertain to educators in primary or secondary schools. Their roles involve facilitating effective learning environments, ensuring clarity in instruction, and fostering student engagement (Derakhshan et al., 2021; Gunduz, 2016). Additionally, STs engage in extensive lesson planning to support seamless class execution and student comprehension (Derakhshan et al., 2021).

Professional development is integral for STs to enhance teaching practices and student outcomes. Training encompasses various aspects such as classroom dynamics, pedagogical content, and student socio-cultural development (Sancar et al., 2021). A major challenge faced by STs is work overload, leading to burnout and decreased effectiveness (Ai Nian et al., 2021; Kim, 2019; Van Vuuren, 2017).

Amidst the Covid-19 pandemic, STs faced heightened responsibilities, adapting to virtual teaching environments and assisting students and parents with digital tools (Chabbott et al., 2020). Additionally, they navigated safety protocols during in-person schooling, including social distancing and hygiene measures to prevent and decrease the contagious rate (Nathwani et al., 2021). Despite the effectiveness of these precautions, the crisis negatively impacted teacher well-being (Christmann et al., 2020; Sokal et al., 2021; Veis Ribeiro et al., 2020).

2.3 School Teacher's Voice Problems

2.3.1 Vocal Fatigue

Voice fatigue refers to feeling tired after prolonged talking and often states that continued talking requires much effort (Solomon, 2008). Moreover, they may report occasional raspiness or hoarseness, which tends to be more apparent at the end of a working day or with prolonged voice use (Gautam, Nayak, Devadas, et al., 2022). One of the most commonly complained voice symptoms by teachers was vocal fatigue. According to studies, the prevalence of vocal fatigue among teachers was between 42%-92% (Moreno et al., 2022).

Teachers often experience vocal fatigue due to various factors. Research suggests that teachers commonly misuse their voices during their workday. This misuse includes speaking loudly for extended periods, resorting to yelling to gain students' attention, and persisting in using their voices even when experiencing inflammation or strain. Additionally, teachers frequently engage in activities such as teaching, giving instructions, and conducting meetings, all of which require sustained vocal effort. These factors contribute to vocal fatigue and increase the risk of developing voice-

related issues among teachers. (Banks et al., 2022; Da Rocha et al., 2019; Yildiz et al., 2020).

Overall, the prevalence of vocal fatigue among teachers highlights the importance of effective vocal health management strategies for this population. Understanding the factors that contribute to vocal fatigue can help teachers take proactive steps to prevent and manage this condition, leading to better long-term vocal health and improved job satisfaction.

In addition to the factors mentioned, the COVID-19 pandemic has presented new challenges that have exacerbated the problem of vocal fatigue for school teachers. During the pandemic, teachers were required to use their voices differently than before, as classes switched from physical to virtual. They had to rely more on speaking to communicate with students and often had to speak louder to be heard over technical difficulties and distractions at home (Christmann et al., 2020). This change in vocal demand, coupled with the increased workload and stress caused by the pandemic, has led to a significant increase in voice problems among teachers (Chabbott et al., 2020; Nemr et al., 2021).

A recent study found that the prevalence of voice problems among teachers during the pandemic was significantly higher than before the pandemic (Moreno et al., 2022). The study also found that the prevalence of vocal fatigue had increased from 42% to 76%. The findings suggest that the pandemic has had a detrimental effect on the vocal health of teachers, which can impact their ability to perform their jobs effectively.

In conclusion, vocal fatigue is a prevalent problem among school teachers. It is essential to recognize the impact of voice problems on teachers and provide support to ensure they can continue to perform their duties effectively.

2.3.2 Voice Impairment

Voice impairment refers to any condition or disorder that affects the quality, pitch, loudness, or resonance of a person's voice. Unlike speech impairment, which primarily affects the articulation or production of speech sounds, voice impairment specifically pertains to abnormalities or difficulties in vocalization. This can include problems such as hoarseness, breathiness, raspiness, strain, or loss of voice. Voice impairment can result from various underlying causes, including vocal cord nodules or polyps, laryngitis, muscle tension dysphonia, neurological conditions, or vocal misuse or abuse (Shih et al., 2012).

Teachers do not fully know occupational safety and health development for voice. Many teachers choose to endure symptoms of voice impairment such as dry throat, increased effort to speak, breathy voice, hoarseness, and breathy voice (Alarfaj et al., 2022; Deborah et al., 2023; Sharp & Cook, 2022)

In addition to the prolonged and excessive use of their voices, various environmental factors within the school setting can also contribute to teachers' voice impairment. These include issues like dry classroom acoustics, excessively noisy classrooms, large class sizes, and outdated classroom equipment such as loud fans, air conditioning units, and computers. (Catherine, 2022; Lee et al., 2018; Munier & Farrell, 2016).

Voice impairment causes teachers to degrade in their work engagements bringing negative educational effects on students' performance (Nazari et al., 2020). According to research, 24.1% of teachers call in sick because of voice impairments. The number of days teachers were forced to take leave varied from a day to 2 weeks, causing a financial burden to the teachers and schools as substituted teachers were required while teachers were on sick leaves (Gautam, Nayak, & Devadas, 2022; Leão et al., 2015).

The attendance and academic performance of students can be influenced by the attendance of teachers, as indicated by research (Nusseck et al., 2020). Studies conducted by Leão (2015) demonstrate that students face challenges in processing and absorbing knowledge when taught by teachers with voice impairments.

Before the outbreak of covid 19, teachers were at a higher risk of developing voice impairment as they spoke louder than their usual conversational voice for long hours and often across a high level of classroom noise (Lee et al., 2018; Munier & Farrell, 2016; Redman et al., 2020). This condition worsens during this pandemic, regardless of a classroom setting or remote teaching from home. In a classroom setting, teachers were required to wear a face mask which attenuated the voice projection. Moreover, everyone in the classroom adhered to social distancing, and the teacher needed more effort in voice projection (Caniato et al., 2021; Veis Ribeiro et al., 2020). During the lockdown, teaching from home was inevitable. 65.8% of teachers reported using more effort to speak during remote teaching (Nemr et al., 2021).

2.3.3 Voice-Related Physical Symptoms

Very few teachers study to understand vocal behaviour better and acquire knowledge on vocal health. Some teachers treat vocal physical symptoms such as neck pain and sore throat and feel as if there is something stuck in the throat as a common problem in their teaching occupation and ignore the discomfort without the awareness that the pain may potentially lead to voice issues (Banks et al., 2022; Kooijman et al., 2005).

The literature review explores the range of physical symptoms experienced by teachers that can impact their vocal health. One common issue is neck pain. Neck pain can have a significant impact on vocal health and function, particularly for individuals who rely heavily on their voices in their profession, such as teachers. The muscles of the neck and upper back are intricately connected to the muscles involved in vocal production, including those in the larynx and throat. When these neck muscles are tense or strained due to factors like poor posture, repetitive movements, or stress, it can affect the overall coordination and control of the voice (Alshuhayb et al., 2022).

Teachers often experience neck pain as a result of maintaining static positions for prolonged periods while teaching, such as standing or sitting with their heads tilted forward to address students or look at classroom materials. This sustained posture can lead to muscle fatigue and tension in the neck and shoulders, which may indirectly impact vocal function. Tightness or discomfort in the neck muscles can restrict the natural movement of the larynx and surrounding structures, affecting vocal resonance, pitch control, and vocal projection (Alshuhayb et al., 2022; Cardoso et al., 2019).

Furthermore, neck pain can exacerbate existing vocal issues or contribute to the development of new ones. For example, individuals experiencing neck pain may unconsciously adopt compensatory vocal habits, such as speaking with excessive tension or strain, in an attempt to alleviate discomfort. These maladaptive vocal behaviors can place additional stress on the vocal folds and surrounding tissues, leading to symptoms like hoarseness, vocal fatigue, or even vocal cord nodules or polyps over time (Fu et al., 2023).

Sore throat is another frequent complaint among teachers. Teachers must project their voices to be heard over ambient noise in the classroom, repeatedly call out to gain students' attention, and deliver instructions or lectures for extended periods (Redman et al., 2022; Vertanen-Greis, Loyttyniemi, Uitti, et al., 2020). This constant strain on the vocal cords can result in irritation and inflammation of the throat tissues, leading to the sensation of pain, discomfort, or scratchiness. Classroom environments with dry air, allergens, or pollutants can worsen sore throat symptoms, as can viral or bacterial infections common in school settings (Lyberg Åhlander, 2011). Persistent sore throat can significantly impact a teacher's ability to perform their duties effectively. The discomfort and pain associated with sore throat can make speaking and vocalization challenging, leading to reduced clarity and volume of speech. Teachers may find it difficult to maintain students' engagement and attention during lessons, resulting in decreased teaching efficacy and student learning outcomes. Additionally, chronic sore throat can negatively affect teachers' overall well-being and job satisfaction, leading to increased absenteeism and burnout (Åhlander et al., 2014; Chen et al., 2022; de Brito Mota et al., 2019).

The sensation of a lump or foreign object lodged in the throat are often experienced by teachers (Kang et al., 2018). This persistent feeling of tightness or constriction in the throat can be unsettling, especially when there's no actual physical obstruction present. While the precise cause remains unclear, it's often associated with factors like muscle tension, heightened throat sensitivity, or stress (Shires & Dewan, 2022).

The sensation can interfere with daily activities such as swallowing, speaking, or even breathing comfortably. This discomfort may lead to increased anxiety and vocal strain, affecting their ability to communicate effectively in the classroom. Additionally, the persistent nature of this sensation can exacerbate stress levels, creating a cycle of discomfort and tension in the throat area (Fu et al., 2023; Shires & Dewan, 2022).

2.3.4 Emotional Well-Being

Teachers who have voice-related issues are prone to suffer from common mental disorders (CMDs). CMDs present as symptoms of anxiety, fatigue, sleep deprived, forgetfulness, irritability, difficulty concentrating, and somatic complaints (Barbosa et al., 2019; Christmann et al., 2020; Marques da Rocha et al., 2017). Studies in Malaysia have shown similar results, with teachers experiencing voice-related issues having a higher risk of CMDs. A study by Mohamed et al. (2018) found that 73.3% of the 300 teachers surveyed in Malaysia reported experiencing CMDs, with the most common symptoms being anxiety, depression, and somatic complaints. Another study by Yusoff et al. (2018) found that among the 246 teachers surveyed in Malaysia, those who experienced voice problems had a higher level of stress and were at a higher risk of developing CMDs.

These common mental disorders affect the social life of teachers. It causes the teacher to interact less with family and friends, become more self-conscious, and feel nervous whenever they have a conversation with others. The CMD caused by teachers' voice-related issues also strongly affects teachers' interaction with students. As a result, teachers may become less engaged and enthusiastic in their teaching, leading to a decline in students' academic performance (Yusoff et al., 2018).

When the number of COVID-19 cases spiked to 200 in March 2020, a movement control order (MCO) was implemented in Malaysia, leading to a sudden shift from physical to virtual classrooms. Teachers faced difficulties in adapting to new technology, keeping students engaged in a virtual classroom, and being overwhelmed by parents' and students' text messages (Yusoff et al., 2020). This sudden shift resulted in an increased workload and stress for teachers, leading to burnout, depression, and anxiety (Sokal et al., 2020).

The concerning link between voice-related issues and CMDs highlights the importance of promoting vocal health and providing support for teachers. This is particularly important in light of the additional stressors caused by the COVID-19 pandemic. By addressing teachers' vocal health concerns, we can help them maintain their mental and physical well-being and ensure that they can continue to effectively communicate with their students.

2.4 Preventive Actions for School Teacher's Voice Issues

Preventing vocal disorders among primary school teachers has become an increasingly important topic of study. Researchers have identified various approaches to preventing

vocal disorders, including both indirect and direct methods. Indirect approaches typically involve voice education programs, which aim to promote good vocal hygiene and increase awareness of potential voice problems. These programs often cover topics such as the physiology and anatomy of vocal production, abusive habits of voice use, causes and symptoms of voice disorders, reflux control, and hydration. Some programs also include basic therapeutic techniques and additional exercises (Fu et al., 2023; Niebudek-Bogusz et al., 2008).

Direct approaches to preventing vocal disorders involve vocal training programs that aim to change the vocal functioning of teachers. Such programs typically use a series of vocal techniques to strengthen and rebalance the subsystems involved in voice production. For instance, Resonant Voice Therapy and Vocal Function Exercises are two commonly used approaches for teachers' vocal training (Faham et al., 2015; Meier & Beushausen, 2019).

Resonance Voice Therapy is a technique that emphasizes achieving a balance between the oral and nasal resonance of the voice. The goal of RVT is to improve vocal efficiency, clarity, and comfort. The technique involves using a semi-occluded vocal tract (SOVT) exercises, such as straw phonation or lip trills, to facilitate resonance and promote healthy vocal function. The use of SOVT exercises is believed to promote a balance between the oral and nasal resonance, leading to improved vocal quality and reduced vocal strain (Macdonald et al., 2012).

Studies have shown that RVT is an effective approach for improving voice quality and reducing vocal strain among teachers. For example, a study by Meier and Beushausen

(2019) found that RVT led to significant improvements in voice quality, vocal endurance, and vocal function among teachers with voice problems. Another study by Lee et al. (2018) found that RVT was effective in improving the speaking voice quality of teachers with mild-to-moderate voice disorders.

Vocal Function Exercises, on the other hand, are a set of specific exercises that aim to target and strengthen the subsystems involved in voice production. VFEs were developed based on the concept of muscle tension dysphonia (MTD), which suggests that voice disorders can be caused by excessive muscle tension in the larynx. The exercises aim to reduce muscle tension in the larynx, increase flexibility and coordination of the vocal subsystems, and improve vocal function and endurance.

The VFEs protocol typically includes exercises for respiratory support, phonation, resonant voice, and agility. For example, exercises may include lip trills, humming, gliding from low to high pitch, and holding a note on a comfortable pitch. The exercises are often performed in a hierarchy of increasing difficulty and intensity to gradually build strength and coordination in the vocal subsystems (Stemple, 2014)

Research has shown that VFEs are an effective approach for improving voice quality, reducing vocal strain, and preventing vocal disorders among teachers. For instance, a study by Faham et al. (2015) found that VFEs led to significant improvements in voice quality, vocal function, and voice-related quality of life among teachers with MTD. Another study by Pasa et al. (2007) found that VFEs were effective in reducing vocal fatigue and strain among teachers with voice disorder.

Other approaches to preventing vocal disorders among teachers include the use of amplification devices, such as microphones, to reduce the strain on the voice, providing teachers with counselling and stress management techniques to address psychological factors that may contribute to vocal disorders, and examining the impact of dietary and lifestyle factors on vocal health. For instance, research has shown that consuming a diet rich in fruits and vegetables and engaging in regular physical activity can lead to better vocal health among teachers (Nazari et al., 2020; Pelegrín-García, 2011).

Overall, these various approaches to preventing vocal disorders highlight the importance of addressing both physical and psychological factors that may contribute to voice problems among teachers. By incorporating a comprehensive approach to vocal health, teachers can reduce the risk of developing vocal disorders and maintain their ability to communicate effectively with their students.

2.5 Music-Based Intervention for Voice

The exploration of music-based interventions designed to tackle voice fatigue, physical symptoms, and emotional well-being has garnered significant attention. Several music-based interventions have been developed to improve voice function, including Music Therapy-Assisted Speech and Voice Therapy (MT-SV), Voice Yoga and Voice Aerobics. This review aims to summarize recent studies on the efficacy of these interventions in improving voice function, reducing voice fatigue, and improving emotional well-being.

Music Therapy-Assisted Speech and Voice Therapy (MT-SV) is an intervention that combines music therapy and speech therapy techniques to improve voice function in individuals with voice disorders. MT-SV involves singing exercises, pitch-matching exercises, and vocal improvisation to improve voice function. Music therapy techniques are used to provide a supportive and creative environment for clients to explore their voice and improve their vocal skills.

Studies have shown that MT-SV can improve vocal loudness, pitch range, and phonation time in individuals with voice disorders (Fujimoto et al., 2016; Kim et al., 2019). A randomized controlled trial conducted by Fujimoto and colleagues (2016) found that MT-SV significantly improved vocal loudness and voice intelligibility in individuals with Parkinson's disease. The study also found that MT-SV led to improvements in depression and quality of life. Another study conducted by Kim and colleagues (2019) found that MT-SV improved phonation time, pitch range, and vocal function in individuals with voice disorders caused by vocal fold paralysis.

MT-SV has also been found to improve emotional well-being and quality of life in individuals with voice disorders. A study conducted by Choi and colleagues (2018) found that MT-SV improved quality of life and psychological well-being in individuals with voice disorders. Another study conducted by Kang and colleagues (2020) found that MT-SV improved quality of life and reduced anxiety and depression in individuals with voice disorders.

Voice Yoga is an intervention that combines yoga and vocal exercises to improve voice function. Voice yoga involves physical movements and breathing exercises to improve

posture, diaphragmatic breathing, and vocal control. These studies have shown that voice yoga can improve voice function and reduce voice fatigue in individuals with voice disorders (Nair et al., 2018; Truy et al., 2020).

A study by Nair et al. (2018) investigated the effect of voice yoga on voice function in individuals with functional dysphonia. The study involved 30 participants who underwent 12 sessions of voice yoga. The results showed significant improvement in vocal function, including improved phonation time, increased maximum phonation time, and reduced vocal fatigue.

Another study by Truy et al. (2020) examined the effect of voice yoga on voice function and emotional well-being in individuals with Parkinson's disease. The study involved 38 participants who underwent 8 weeks of voice yoga. The results showed significant improvements in phonation time, vocal loudness, and emotional well-being. Participants also reported reduced anxiety and improved self-esteem.

Overall, these studies suggest that voice yoga can be an effective intervention for improving voice function and emotional well-being in individuals with voice disorders. Voice yoga offers a non-invasive and low-risk approach to improving vocal function through physical movements and breathing exercises. However, more research is needed to determine the long-term effects and optimal duration of voice yoga interventions.

Voice Aerobics is a music-based intervention that combines vocal exercises and music to improve voice function, endurance, and overall physical and emotional well-

being. The program incorporates breathing exercises, vocal projection exercises, articulation exercises, and vocal endurance exercises.

Recent studies have shown that Voice Aerobics can improve vocal loudness, phonation time, and articulation in individuals with voice disorders. Hansen et al. (2018) conducted a study to evaluate the effectiveness of Voice Aerobics in improving voice function in individuals with Parkinson's disease. They found that the program led to significant improvements in vocal loudness and phonation time.

Voice Aerobics has also been found to improve emotional well-being and quality of life in individuals with voice disorders (Murray et al., 2019) conducted a study to evaluate the impact of Voice Aerobics on quality of life in individuals with Parkinson's disease. The study found that the program led to significant improvements in emotional well-being, social functioning, and overall quality of life.

Munch et al. (2020) conducted a study to evaluate the impact of Voice Aerobics on quality of life in individuals with voice disorders. The study found that the program led to significant improvements in emotional well-being, social functioning, and overall quality of life. The authors concluded that Voice Aerobics may be a valuable tool in the treatment of voice disorders, particularly for individuals who experience voice fatigue and reduced voice function.

Overall, these findings suggest that Voice Aerobics may be an effective intervention for improving voice function and emotional well-being in individuals with voice disorders. However, further research is needed to determine the long-term effects of

the program and to identify the most effective strategies for implementing it in clinical practice.

Moreover, singing interventions have emerged as effective strategies for addressing voice fatigue and promoting overall well-being across diverse populations. Studies by Meyer et al. (2017) and Tamplin et al. (2013) emphasize the therapeutic benefits of structured singing exercises and group singing sessions in improving vocal function and emotional well-being. Additionally, research by Cantarella et al. (2022) underscores the preventive and rehabilitative potential of singing exercises in reducing vocal fatigue among professional voice users, such as school teachers. These findings collectively highlight the transformative impact of music-based interventions on voice health and well-being, underscoring their importance in clinical practice and holistic voice care.

2.6 Telepractice

The integration of telepractice into the domain of speech-language pathology and audiology marks a pivotal shift in the approach to healthcare delivery, particularly in response to the challenges and restrictions imposed by the Covid-19 pandemic. Defined by The American Speech-Language-Hearing Association (ASHA, 2018) as the application of telecommunications technology to provide remote services, telepractice has emerged as an indispensable solution, enabling continuity of care when traditional in-person sessions are untenable. This innovation has proven especially crucial in light of mobility restrictions, such as those experienced in Malaysia during the Movement Control Orders (MCO) initiated in March 2020 and

again in specific states in January 2021, which underscored the critical necessity for adaptable healthcare modalities (Aziz et al., 2020; Smith et al., 2020).

Telepractice transcends mere convenience, addressing fundamental challenges of accessibility for those geographically distant from healthcare providers or constrained by mobility limitations. It also facilitates an enhanced collaborative environment, allowing for real-time observation and interaction among clinicians, clients, and, significantly, family members, thereby fostering a comprehensive approach to therapy and intervention. The method's adaptability is further demonstrated in its capacity to maintain service delivery amidst various circumstances, including client travel or practitioner mobility, and even in the aftermath of natural disasters, as evidenced following Hurricane Sandy (K. Golding-Kushner, personal communication, December 23, 2013).

However, the transition to telepractice is not without its hurdles. Technical issues, resistance from clients, ethical considerations, and the need for specialized training for practitioners are among the notable challenges that necessitate ongoing evaluation and adaptation of this service modality (Fong et al., 2020; Glover, 2020). Despite these challenges, the extension of telepractice into music-based therapies and interventions has illustrated its versatility and potential for broad applicability within speech-language pathology and audiology, although research in these areas, particularly concerning the use of singing as a therapeutic tool, remains in its infancy (Spooner et al., 2019; Vaudreuil et al., 2020).

Looking forward, the horizon of telepractice is bright with the promise of technological advancements. Innovations in mobile and tablet computing, serious games for educational and clinical purposes, simulation learning, and gesture-based computing are anticipated to dramatically transform the landscape of speech therapy (Williams, 2013). The advent of augmented reality, immersive virtual environments, and socially interactive robots promises a future where therapy is not only more engaging and interactive but also more immersive, offering experiences that transcend the conventional bounds of therapy.

In essence, telepractice represents a dynamic and evolving facet of speech-language pathology and audiology, characterized by its commitment to overcoming barriers to access, its flexibility in service delivery, and its potential to integrate cutting-edge technology for enhanced therapeutic outcomes. As it continues to develop, telepractice not only reflects the adaptability and resilience of healthcare providers in the face of unprecedented global challenges but also highlights an enduring commitment to innovation, accessibility, and excellence in client care.

CHAPTER 3

METHODOLOGY

3.1 Research Design

The current study aimed to evaluate the effect of Tele music-based voice intervention on school teachers (ST) who has voice symptoms in Malaysia. A quantitative approach was used to investigate and answer the research questions and interview was conducted to serve as a clearer explanation of the quantitative results.

The study design utilized an interventional, one-group, repeated measures research design. The independent variable for this study was Tele MusVIP, and the dependent variables were the evaluation of voice fatigue, voice impairments, voice-related physical symptoms, and emotional well-being. Data were statistically analyzed using repeated measure ANOVA to evaluate the significance of reported changes before and after the intervention.

Opting for a one-group design in this study aims to eliminate between-group variability, thus sharpening the focus on within-group comparisons. This methodological choice is predicated on the expectation that participants will exhibit consistent responses across the timeline of the study. By conducting a thorough pre- and post-intervention analysis within the same group, we anticipate revealing significant insights into the phenomenon at hand. Such an approach not only enhances our understanding by allowing for a direct comparison of changes over time within the same individuals but also potentially increases statistical power. This increase in

statistical power arises from the reduction of noise associated with between-group differences, thereby enabling a more precise assessment of the intervention's effects.

One-to-one interviews were conducted with the participants before the start of the intervention and after the intervention to establish a baseline of their voice. Data obtained from the interviews included the participant's perception of their voice problems, preference for songs, perception of singing as an intervention, and perception of Tele MusVIP. These data were interpreted and analyzed using a general inductive approach. Qualitative data offers insights that enhance the interpretation of the quantitative data, thereby strengthening the validity of the conclusions drawn.

The experiment was conducted for 12 weeks, with two hours per week based on the reference from the study by Tamplin (2017) and Ang (2019). The sessions were conducted online to avoid physical contact due to the rise of Covid-19 cases in Malaysia and to determine the effectiveness of tele music-based voice intervention.

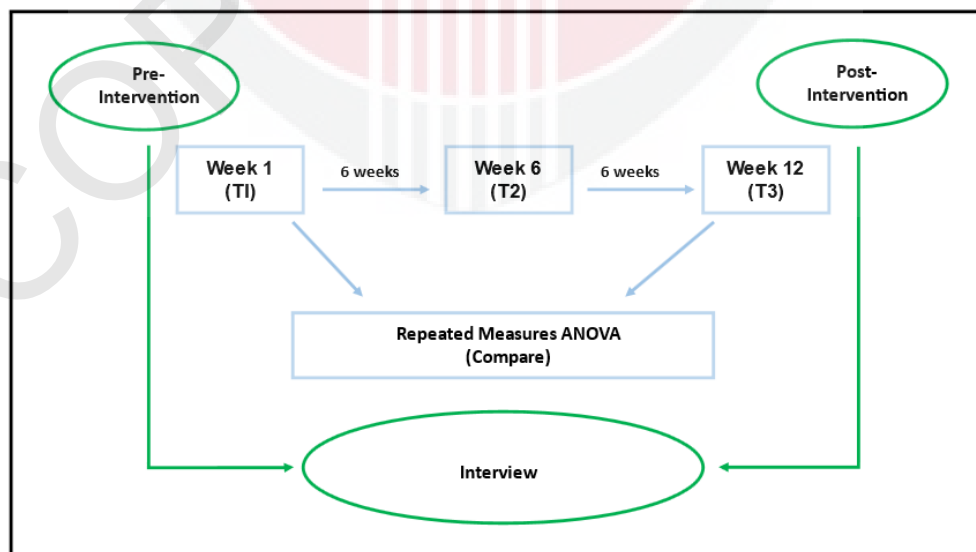


Figure 3.1 : Research Design of the Study

3.2 The Intervention Protocol

The Music-based Intervention Protocol (MusVIP) was developed by Dr. Ang Mei Foong, a highly skilled practitioner and pedagogue, and Dr. Indra Selvarajah, a medical music therapist. The protocol was developed to evaluate vocal amplitude, pitch range, respiratory rate, and quality of life related to voice in people with Parkinson's disease. MusVIP is based on theories of neuroplasticity and the Helping Skills Model (HSM) and consists of three major components: (1) Vocal Coaching, (2) Active Singing, and (3) the HSM.

The first component of MusVIP is Vocal Coaching, which involves structured diaphragmatic breathing exercises and vocal exercises designed to strengthen participants' ability to control their vocals in a relaxed manner. The second component is Active Singing, which involves short music incorporated with body movements to improve participants' selected physical coordination with music and preferred songs to achieve therapeutic objectives. The last component of the protocol is drawn from the Helping Skills Model, which aims to establish a trusting relationship between the researcher and participants and create an atmosphere in which the participant feels secure to explore their thoughts and feelings.

MusVIP was conducted in a group and ran for 12 consecutive weeks, with each week consisting of a 2-hour session. The first 30 minutes of the session focused on vocal warm-up and vocal techniques building through breathing exercises and vocal exercises, followed by a half-hour session focused on active group singing. The third half-hour session focused on songs and song text enunciations, and the last half-hour focused on recapitulations and repetitions of the activities of the day.

The elements of MusVIP are relevant to the aim of this research. One of the elements is breathing exercises, which have been shown to improve the entire phonatory mechanism (Lewandowski & Gillespie, 2016). Vocalize exercises, which are incorporated into MusVIP, have been shown to be effective in voice therapy techniques and singing techniques such as yawning, humming to feel the resonance, vocal siren, expanding pitch range, and maintaining good vowels. Finally, active singing incorporated with body movements has been used to improve physical coordination and can be used to release muscular tension for teachers who encounter voice symptoms (Kooijman et al., 2005; Tomlinson & Archer, 2015).

Table 3.1 : Weekly Execution Flow

5 min	General Greeting and Sharing
25 min	Group Breathing and Vocalizing Exercises During this part of the intervention, the participants were instructed to perform two types of exercises, namely group breathing and vocalizing. In group breathing, the researcher demonstrated deep breathing to the participants, and they were asked to inhale and expand their chest cavity, hold their breath for 5 seconds, and then exhale gradually with hissing using their abdominal muscles. The cycle of inhaling, holding, and hissing was repeated. The vocalizing exercises consisted of three steps: (1) a real yawn to stretch the muscles around the larynx, (2) a siren exercise to create a more focused voice, and (3) singing 2-3 types of vocalizing exercises accompanied by the researcher's piano. The level of difficulty for vocalizing increased throughout the weeks.
35 min	Short Song and Movement In this component, the researcher selected short songs based on pitch range, phrase length, song text complexity, and movement potentials. These songs were used to increase articulation on words and projection on resonance through good lip, tongue, and jaw coordination. Body movements were incorporated to relax tension on the body, allowing better control of airflow. on resonance through good lip, tongue, and jaw coordination. Body movements were cooperated to relax tension on the body allowing better control on air flow.
35 min	Songs of The Week Participants were given the choice to sing songs of their own preference or a preferred genre selected by the researcher. This section of the intervention aimed to elevate participants' moods through singing tunes they favoured.

Table 3.1 : Continued

15 min	General Run Through The researcher used short songs and the songs of the week to increase learning intensity and adjust participants' vocal techniques such as rhythm, intonation, dynamics, articulation, resonance, and breathing.
5 min	Concluding session (a) Do a summary and recap of the week and announce the activities on the following week. (b) Participants will be reminded of the importance of self-practice at home and encouraged to practice as often as possible.

3.3 Location and Sample Selections of the Study

The study was designed to operate entirely online in order to navigate the challenges posed by the escalating Covid-19 situation in Malaysia, enabling us to proceed with evaluating the effectiveness of a tele-music-based voice intervention without the risks associated with physical gatherings. This online format was particularly pertinent given our focus on the experiences of school teachers across Malaysia, who, like many around the globe, have increasingly turned to digital platforms for both teaching and professional development during the pandemic.

At the heart of the study was a carefully structured recruitment phase, emphasizing a screening process conducted through interviews. This screening was pivotal, not only in aligning with our primary research interest—the voice condition and emotional well-being of school teachers—but also in ensuring the integrity and relevance of our data. Key to this process was establishing that each candidate was a full-time teacher with a minimum of one year of teaching experience, ensuring they possessed a substantive connection to the professional teaching environment.

To address potential confounding factors, specific measures were implemented throughout the study. One key factor considered was the prior or concurrent use of voice therapy, which could independently influence outcomes. To eliminate this factor, participants who had received voice therapy during the study period were excluded. Similarly, variability in teaching workload and stress levels could have impacted the results. While it was impossible to control these variables entirely, we mitigated their effect by recruiting participants from diverse teaching contexts. We also collected baseline data to account for individual differences in voice condition and emotional well-being, allowing for a more accurate assessment of changes attributed to the intervention.

Employing purposive sampling enabled us to precisely target participants who not only met these specific criteria but were also likely to provide rich, nuanced insights into the phenomenon under investigation. The deliberate selection of participants ensured that our study was grounded in authentic experiences and perspectives, offering valuable insights into the targeted demographic.

To ensure the scientific rigor of our methodology, we leveraged GPower to calculate the necessary sample size for achieving a robust statistical power. Setting our study parameters to anticipate a moderate effect size, with a significance level of 0.05 and a power of 0.80, GPower recommended a sample size of 34 participants. This critical step was essential for shaping our recruitment strategy, ensuring the statistical significance and the potential for generalization of our findings.

Ethical considerations were paramount throughout the study, underscored by obtaining approval from the Ethics Committee for Research Involving Human Subjects (JKEUPM) at Universiti Putra Malaysia. This approval was a testament to our adherence to the ethical standards, encompassing comprehensive measures to ensure participant confidentiality and the secure management of data. All collected information, particularly sensitive audio and video recordings, was safeguarded in a password-protected repository, strictly accessible to the research team. This rigorous attention to ethical and methodological detail laid a solid foundation for our exploration into the effects of Tele MusVIP on voice and emotional well-being of school teachers, ensuring the study was conducted with integrity, from the meticulous participant selection to the ethical handling of data.

3.4 Measurements and Tools

3.4.1 Self-Administered Questionnaires

The measurement tool used in this study was the Voice Fatigue Index (VFI). Developed by Nanjundeswaran et al. (2015), the VFI is a psychometrically validated self-report questionnaire designed to identify individuals experiencing vocal fatigue (VF) and characterize their complaints. It has demonstrated strong test-retest reliability and reproducibility ($r=0.94$) and has been widely employed in previous studies, including those focusing on vocal fatigue among school teachers (Ala-Karvia et al., 2022; Guzman et al., 2022; Ilvia Contreras-Regatero et al., 2019). By utilizing the VFI, this study aims to accurately assess the extent of vocal fatigue experienced by school teachers and evaluate the effectiveness of the intervention in addressing this critical aspect of their vocal health.

In addition, the Voice Symptom Scale (VoiSS) was employed to validate a patient-derived inventory of voice symptoms. The VoiSS is a self-report questionnaire comprising 30 questions, with a total score of 120 points obtained across three subscales: voice impairment (60 points), emotional well-being (32 points), and voice symptoms (28 points) (Deary et al., 2003). For the purposes of this research, only the subscales related to voice-related physical symptoms and emotional well-being were utilized, as they are most relevant to the study objectives. The voice-related physical symptoms subscale assesses the presence and severity of symptoms related to voice, such as pain or discomfort, while the emotional well-being subscale evaluates the psychological impact of voice symptoms on individuals' emotional states. Each item was rated on a 5-point Likert scale, ranging from "never" (0) to "always" (4). The decision to focus solely on physical well-being and emotional well-being subscales was made to directly assess the effectiveness of the intervention in addressing these specific aspects of voice problems among school teachers. This approach aligns with the research aims of understanding the impact of singing interventions on the overall well-being of participants in the context of voice-related issues.

Both the Voice Fatigue Index (VFI) and Voice Symptoms Scale (VoiSS) are widely recognized assessment tools utilized to gauge the prevalence and severity of voice-related complaints. These tools offer valuable insights into the efficacy of voice interventions, providing reliable and efficient assessments. By incorporating these instruments, researchers can obtain a comprehensive evaluation of the targeted population's voice symptoms and emotional well-being. This holistic understanding is essential for effectively implementing voice interventions and addressing the specific needs of individuals experiencing voice-related issues

3.4.2 Interview Questions

In the pre-intervention phase, the researchers documented basic demographic details such as age, gender, email, location of the school, and years of service. In addition to these details, important objectives were collected, including teachers' perception of their voice, perception of singing as an intervention for voice, and teachers' music preference.

The interview questions were divided into three parts to collect data for the above objectives. The first part of the interview focused on teachers' perception of their voice condition. Teachers were asked to rate their current voice condition on a Likert scale of 1-10, with 1 being poor and 10 being excellent. They were also asked if their voice condition affects their social interactions. The second part of the interview examined teachers' thoughts on singing as an intervention and their experience singing in a group. The researchers aimed to understand the teachers' perspectives on singing as a tool to improve their voice quality and whether they had any prior experience singing in a group.

The last part of the interview aimed to understand the teacher's preferred music and their expectations from the intervention sessions. This helped the researchers to tailor the music-based intervention to suit the teachers' music preferences and meet their expectations. By gathering this information, the researchers aimed to ensure that the intervention was personalized, relevant, and engaging for the teachers.

Table 3.2 : Pre-Intervention Interview Questions

Part A	A1	Would you please describe your current voice conditions?
	A2	How would you rate your current voice condition? Poor 1 2 3 4 5 6 7 8 9 10 Excellent
	A3	In what ways your voice condition affects your interaction with others?
Part B	B1	Have you attended any group singing sessions before? (if yes) What are the elements that attract you?
	B2	What is your perception of singing as an intervention to treat voice problems?
Part C	C1	What are the elements of the songs that attract you?
	C2	What are some of the songs you like?
	C3	What are some of your expectations from the intervention?

The post-intervention interview questions aimed to gather feedback from the participants after 12 weeks of the intervention. The first part of the questions remained the same as in the pre-intervention stage to assess whether there were any differences between the pre and post-intervention periods. In this section, participants were asked about their current voice condition and how they would rate it on a Likert scale of 1-10.

The second part of the interview questions focused on gathering feedback about the Tele MusVIP intervention and the participants' experiences with singing as an intervention. Participants were asked to share their thoughts on the effectiveness of the intervention, the convenience of the online format, and any challenges they faced during the sessions. They were also asked to provide feedback on the singing component of the intervention, including whether they found it helpful in improving their voice and reducing vocal fatigue.

The last part of the questions aimed to explore participants' plans for using what they learned during the intervention in their professional and personal lives. Participants were also asked to provide any additional feedback on the intervention and suggestions for improvements.

By collecting participant feedback, the study aims to determine the effectiveness of Tele MusVIP as an intervention for improving the voice and emotional well-being of school teachers. The feedback gathered in the post-intervention stage will help identify any improvement areas and guide future research on this topic.

Table 3.3 : Post-Intervention Interview Questions

Part A	A1	Would you please describe your current voice conditions?
	A2	How would you rate your current voice condition? Poor 1 2 3 4 5 6 7 8 9 10 Excellent
	A3	In what ways your voice condition affects your interaction with others?
Part B	B1	Does singing help you to improve your speaking voice? (if yes) how? (if no) why?
	B2	How is your speaking voice immediately after the intervention?
	B3	What are the pro and cons for the intervention to be conducted online?
Part C	C1	Does the intervention meet your expectation?
	C2	Are there any additional feedback?

3.5 Procedures of Data Collection

The data collection process in this study was carefully designed to ensure accurate and comprehensive results. Recruitment for the study began four weeks before the intervention, with a recruitment flyer distributed online through various channels, including Facebook, WhatsApp, various teachers' groups on WhatsApp, and the Ez

learning website. Interested teachers registered as participants by filling out a Google form, and interviews were arranged with each participant.

Before the intervention, participants were provided with a briefing on the intervention's purpose, duration, content, possible benefits, and risks online. Consent was obtained from each participant, and questionnaires were administered to establish baseline data. This was followed by a pre-intervention interview in which participants were asked prepared questions regarding their perception of their voice condition, perception of singing as an intervention, and their music preferences.

The Tele MusVIP intervention was conducted as a group intervention through Zoom for 12 weeks, with each session being recorded. To encourage participation from teachers, two classes were conducted on Friday from 3 pm to 5 pm and Sunday from 2 pm to 4 pm. The rationale behind having two groups was to cater to teachers from different states in Malaysia, who have different weekend days off. Additionally, this allowed for consistency of participation in the intervention, as teachers had busy schedules during the MCO period.

The participant count was kept at less than 25 for each session to ensure a manageable group size. This allowed for better participant management and ensured that each participant received individual attention during the intervention. In addition to the weekly intervention sessions, a short video on vocal warm-up exercises and short songs was uploaded each week to help participants revise what they learned during the intervention. On the 6th week and 12th week of the intervention, data from VoiSS and VFI questionnaires were collected from all participants identically.

After the intervention, a post-intervention interview was conducted within a week to gather feedback from the participants. The interview was 30 minutes long, and participants were asked questions related to their voice condition, their perspective on Tele MusVIP, and their feedback on the intervention. The data collected from these interviews helped to evaluate the effectiveness of the intervention and provide insights into the participants' experience with Tele MusVIP.

3.6 Data Analysis

For this study, the primary focus of data analysis is on quantitative methods, complemented by qualitative insights to provide a holistic understanding of the MusVIP intervention's impact. Quantitative data derived from the Voice Fatigue Index (VFI) and Voice Symptom Scale (VoiSS) questionnaires were meticulously analyzed using descriptive statistics to summarize the data and inferential statistics to make predictions or inferences about the population from which the data were sampled. Central to this analysis was the use of repeated measures ANOVA, comparing data from pre-intervention (T1), co-intervention (T2), and post-intervention (T3) stages. This statistical technique aimed to quantify the MusVIP intervention's effects on various dependent variables (DVs), including voice fatigue, voice impairments, physical voice-related symptoms, and emotional well-being. This quantitative analysis is instrumental in revealing temporal changes in voice parameters among participants.

Complementing the quantitative analysis, qualitative data garnered from pre- and post-intervention interviews offered valuable context and depth. Initially, pre-intervention interviews established a baseline of participants' voice conditions, musical preferences, and perceptions of singing and the Tele MusVIP as an intervention.

Subsequently, post-intervention interviews explored changes in perception and experiences following the intervention. This qualitative data was analyzed through a general inductive approach, categorizing information into themes and sub-themes to unearth patterns and insights about the intervention's subjective impact on participants.

By integrating quantitative and qualitative analyses, this study provides a comprehensive evaluation of the MusVIP intervention, combining statistical evidence with personal testimonies to assess the intervention's efficacy thoroughly. The findings, presented through clear, concise tables, and figures offering a detailed account of the intervention's effects, with subsequent chapters discussing these results in relation to the study's research questions and objectives. This approach not only enriches the study's findings but also underscores the importance of a multifaceted analysis in understanding the complex effects of music therapy interventions on voice parameters and participant perceptions, laying the groundwork for practical applications and future research.

CHAPTER 4

RESULTS AND FINDINGS

Table 4.1 : Social-Demographic on Research Participants

Factors		Frequency (n)	Percent (%)
Gender	Female	36	92.3
	Male	3	7.7
Age	20-30	8	20.5
	30-39	19	48.7
	40-49	9	23
	50 -60	3	7.8
Ethnicity	Chinese	36	92.3
	Indian	2	5.12
	Bumiputra	1	2.56
School	Primary	37	94.87
	Secondary	2	5.1
Self-Reported Voice Symptoms (Before Intervention)	Voice fatigue	23	58.9
	Sore throat	15	38.5
	Voice strain	12	30.8
	Hoarseness	11	28.2
	Pitch Break	9	23.1
	Breathy voice	6	15.4

51 participants were initially enrolled in this experimental research through a Google form, but four participants withdrew from the study before the start of the intervention. Two participants cited language barriers, while two others had medical issues that prevented them from participating. In addition, five participants were unable to complete the intervention due to overwhelming school work, while three others had personal reasons that prevented them from completing the study. Therefore, a total of 39 participants successfully completed the 12-week intervention and provided complete data for analysis.

Of the 39 participants, 36 were female (92.3%) and three were male (7.7%). Their ages ranged from 22 to 55 years old, with a mean age of 38 years old ($SD=6.13$). In terms of ethnicity, the majority of the participants were Chinese (92.3%), while two were Indian (5.12%) and one was Bumiputra (2.56%). These teachers came from different states across Malaysia, including Kuala Lumpur, Selangor, Penang, Johor, Sarawak, Sabah, Kedah, Perak, and Negeri Sembilan. A total of 37 participants (94.87%) were primary school teachers, while two were secondary school teachers (5.1%). They had served in schools for as little as one year and as long as 34 years.

Before the start of the intervention, participants were asked about their most common symptoms when teaching over the past three months. The most commonly reported symptom was voice fatigue, which was experienced by 23 participants (58.9%). Other reported symptoms included sore throat (38.5%), voice strain (30.8%), hoarseness (28.2%), voice breaks (23.1%), and breathiness (15.4%). Multiple answers could be selected based on the participants' experiences.

4.1 Data Analysis Results

The independent variable in this study was Tele MusVIP, which stands for Telecommunication Music-based Voice Intervention Protocol. Meanwhile, the dependent variables included vocal fatigue, voice impairments, voice-related physical symptoms and emotional well-being. To measure the dependent variables, two validated questionnaires were used, namely the Voice Fatigue Index (VFI) and Voice Symptom Scale (VoiSS).

The data obtained from the dependent variables were analyzed using both descriptive and inferential statistics. In descriptive statistics, the frequency, percentage, and standard deviation of the data were measured. Meanwhile, in inferential statistics, one-way repeated measures were used to determine the significant differences between means, and partial eta squared was observed. The dependent variables were measured three times at three specific points throughout the 12 weeks of the intervention. The first measurement was taken within a week before the start of the intervention (T1), the second measurement was taken on the 6th week of the intervention (T2), and the last measurement was taken within one week after the intervention (T3).

Apart from quantitative data, this study also collected qualitative data. The qualitative data was collected twice, within one week before the start of the intervention and within one week after the intervention. The aim was to find out the participants' perceptions of their voice and voice-related problems, as well as their perceptions of Tele-MusVIP. The data obtained from the interviews was analyzed, coded, and themed to provide a deeper understanding of the quantitative data and collect experiences from the participants.

Overall, this study aimed to explore the effectiveness of Tele MusVIP as an intervention for teachers' voice problems. The findings from this study can potentially contribute to the development of new and effective methods of voice care programs for teachers. The quantitative data will provide statistical evidence of the effectiveness of Tele MusVIP as an intervention, while the qualitative data will provide insights into the experiences and perceptions of the participants.

4.1.1 The Effects of Tele MusVIP on Voice Fatigue

A Vocal Fatigue Index questionnaire was administered to the participants at three different times: pre-intervention, co-intervention, and post-intervention. The participants filled out the questionnaire at T1 to establish the baseline of their voice, and again at T2 (6th week) and T3 (12th week) to determine if there were any significant changes in the mean score for voice fatigue.

Top of Form



Figure 4.1 : Mean Score of Voice Fatigue

The results of the study are presented in Figure 4.1, which displays the mean scores of the factors related to voice fatigue over the course of the intervention. The lower the score, the lower the indication of voice fatigue. The mean score of the scale decreased over time, indicating a reduction in voice fatigue experienced by the participants. The mean score at T1 was 2.202 with a standard deviation of 0.75, while the mean score at T2 was 1.756 with a standard deviation of 0.833. Finally, at T3, the mean score further decreased to 0.981 with a standard deviation of 0.77. This suggests a significant

improvement in the participants' vocal condition and a reduction in their experience of voice fatigue.

Table 4.1: One-way Repeated Measure ANOVA on Voice Fatigue

		Multivariate Tests ^a					
	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.580	25.570 ^b	2.000	37.000	.000	.580
	Wilks' Lambda	.420	25.570 ^b	2.000	37.000	.000	.580
	Hotelling's Trace	1.382	25.570 ^b	2.000	37.000	.000	.580
	Roy's Largest Root	1.382	25.570 ^b	2.000	37.000	.000	.580

a. Design: Intercept

b. Within Subjects Design: Tele MusVIP

Exact statistic

Table 4.2 presents the results of the one-way repeated measures ANOVA test, which compares the mean scores of voice fatigue at T1, T2, and T3. The mean score at T1 was 2.202 (SD=0.75), while at T2, it was 1.756 (SD=0.833), and at T3, it was 0.981 (SD=0.77). The test result showed a positive significant effect of MusVIP on voice fatigue, with Wilks' Lambda=.420, $F(2, 37) = 25.570$, and $p = .000$ ($p \leq 0.05$). The effect size of Tele MusVIP was moderate, with a partial eta squared value of .580, as suggested by Cohen's guidelines for effect sizes (.02=small, .05=moderate, .08=large, .014=very large effect). These findings indicate that MusVIP has a significant positive effect on reducing voice fatigue among teachers.

4.1.2 The Effects of Tele MusVIP on Voice Impairments

Voice impairments was one of the factors generated from the VoiSS questionnaire. There were 14 items drawn from the self-administered questionnaire concerning voice impairments. The 5 points Likert scale from VoiSS ranged from 0=Never,

1=Occasionally, 2=Some of the time, 3=Most of the time, and 4=Always. One-way repeated measurements were taken to determine if significant improvements were comparing mean scores from T1, T2, and T3 for each item.

Table 4.2 : Items for Voice Impairment

Items	Wilks' Lambda	F	Sig
1. Do you have difficulty attracting attention?	0.728	6.901	0.003
2. Do you have problems singing?	0.593	12.714	0.000
3. Is your voice hoarse?	0.628	10.971	0.000
4. When talking in company do people fail to hear you?	0.810	4.334	0.20
5. Do you lose your voice?	0.782	5.152	0.011
6. Do you have a weak voice?	0.763	5.739	0.007
7. Do you have problems talking on the telephone?	0.906	1.930	0.159
8. Do you find the effort of speaking tiring?	0.606	12.017	0.000
9. Do you have difficulty competing against background noise?	0.716	7.345	0.002
10. Are you unable to shout or raise your voice?	0.726	13.435	0.000
11. Does the sound of your voice vary throughout the day?	0.743	6.395	0.004
12. Does your voice sound creaky and dry?	0.673	8.977	0.001
13. Do you feel you have to strain to produce voice?	0.696	8.090	0.001
14. Does your voice 'give out' in the middle of speaking?	0.334	6.187	0.005

Table 4.3 reviewed the one-way repeated measure ANOVA test results for all 14 items concerning voice impairments. Based on the outcome of the test, 12 items showed positive significance to the results with ($p \leq 0.05$), and 2 items were not significant.

The significant items were item 1, do you have difficulty attracting attention? ($F=6.901$, $p=0.003$), item 2, do you have problems singing? ($F=12.714$, $p=0.000$), item 3, is your voice hoarse? ($F=10.971$, $p=0.000$), item 5, do you lose your voice? ($F=5.152$, $p=0.011$), Item 6, do you have a weak voice? ($F=5.739$, $p=0.007$), item 8, Do you find the effort of speaking tiring? ($F=12.017$, $p=0.000$), Item 9, do you have

difficulty competing against background noise? ($F=7.345$, $p=0.002$), item 10, are you unable to shout or raise your voice? ($F=13.435$, $p=0.000$), item 11, does the sound of your voice vary throughout the day? ($F=6.395$, $p=0.000$), item 12, does your voice sound creaky and dry? ($F=8.977$, $p=0.001$), Item 13, do you feel you have strain to produce voice? ($F=8.090$, $p=0.001$) item 14, Does your voice ‘give out’ in the middle of speaking? ($F=6.187$, $p=0.005$),

The items that were not significant include item 2, when talking in the company, do people fail to hear you? ($F=4.334$, $p=0.20$) and item 7, do you have problems talking on the telephone? ($F=1.930$, $p=0.159$)

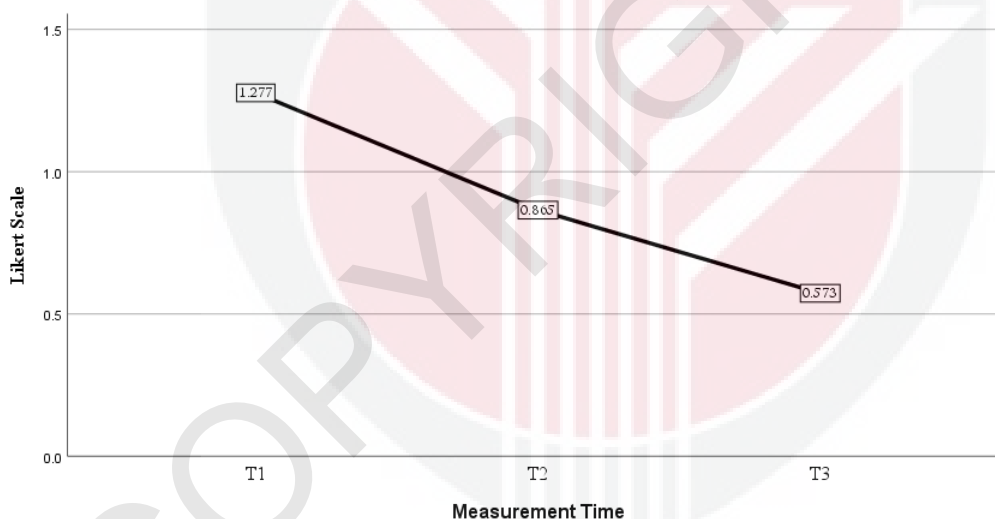


Figure 4.2 : Mean Score on Voice Impairments

Figure 4.2 showed the mean results of voice impairment decrease from T1 ($M=1.277$, $SD=0.527$) to T2 ($M=0.865$, $SD=0.507$), further reduction in T3 ($M=0.57$, $SD=0.646$). There was a significant decline in the mean score for voice impairments, suggesting the voice impairments issue was lessened throughout the Tele MusVIP

Table 4.3 : One Way Anova on Voice Impairments

		Multivariate Tests^a					
	Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Intercept	Pillai's Trace	.481	17.115 ^b	2.000	37.000	.000	.481
	Wilks' Lambda	.519	17.115 ^b	2.000	37.000	.000	.481
	Hotelling's Trace	.925	17.115 ^b	2.000	37.000	.000	.481
	Roy's Largest Root	.925	17.115 ^b	2.000	37.000	.000	.481

a. Design: Intercept

b. Within Subjects Design: Tele MusVIP

Exact statistic

Based on the outcome of the one-way repeated measures ANOVA test, with Wilks' Lambda = .519, $F(2,37) = 17.115$, and a p-value of .00 ($p \leq .05$), it can be concluded that Tele MusVIP had a significant effect on teachers' voice impairment-related issues. The result showed a small to moderate effect size with a partial eta squared of .481, as proposed by Cohen (.02=small, .05=moderate, .08=large, .14=very large effect). These findings suggest that Tele MusVIP could be an effective intervention for addressing voice impairment in teachers.

4.1.3 The Effects of Tele MusVIP on Voice-Related Physical Symptoms

Voice-related physical symptoms were also assessed through the Voice Symptoms Scale (VoiSS), which consisted of 7 items. These items included throat infection factors, such as swollen glands, sore throat, chest pain, ancillary symptoms like phlegm, blocked nose, and throat clearing. One-way repeated measurements were taken to compare the mean scores of each item from T1, T2, and T3. The purpose of these measurements was to determine if there were significant improvements in the

voice-related physical symptoms of the participants after the Tele MusVIP intervention.

Table 4.3 Items for Voice-Related Physical Symptoms

Items	Wilks' Lambda	F	Sig
1. Is your throat sore?	0.728	6.902	0.003
2. Do you cough or clear your throat?	0.738	6.572	0.004
3. Does it feel as if there is something stuck in your throat?	0.687	8.438	0.001
4. Do you have swollen glands?	0.910	1.836	0.173
5. Do you have a lot of phlegm in your throat?	0.666	8.457	0.001
6. Do you have a blocked nose	0.843	3.443	0.043
7. How often do you get throat infections?	0.583	13.239	0.000

Table 4.3 reviewed the one-way repeated measures ANOVA test results for all 7 items concerning physical-related symptoms. Based on the outcome from the results, 6 of the items were significant, and 1 item was not significant.

The significant items were item 1, is your throat sore? ($F=6.902$, $p=0.003$), Item 2, do you cough or clear your throat? ($F=6.572$, $p=0.004$), Item 3, does it feel as if there is something stuck in your throat? ($F=0.687$, $p=0.001$), item 5, do you have a lot of phlegm in your throat? ($F=8.457$, $p=0.001$), Item 6, do you have a blocked nose? ($F=13.239$, $p=0.000$). and item 7, how often do you get throat infections? ($F=13.239$,

$p=0.000$). The items that were not significant were item 4, do you have swollen glands? ($F=1.836$, $p=0.173$).

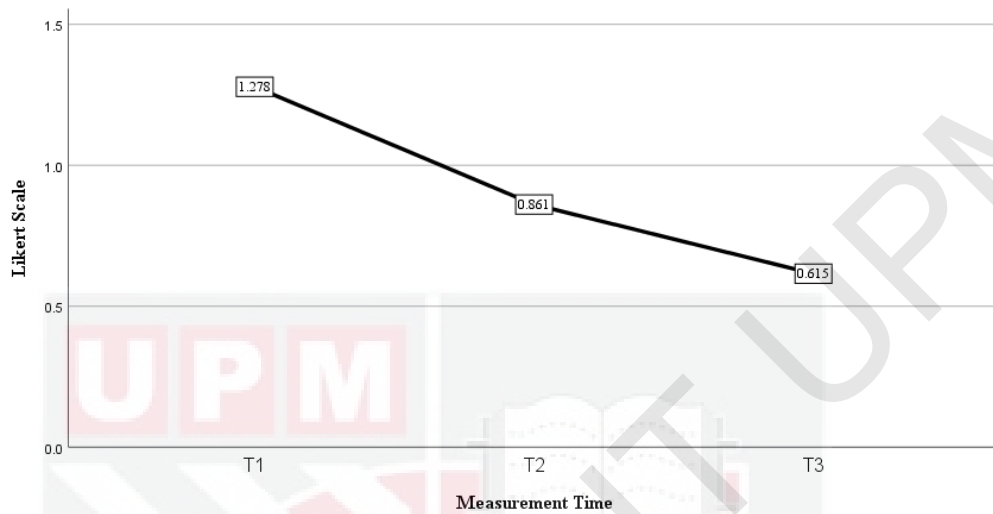


Figure 4.3 : Mean Score on Voice-Related Physical Symptoms

Figure 4.3 displays the results of the effect of the intervention on voice-related physical symptoms. The mean score for physical-related symptoms at T1 was ($M=1.278$, $SD=0.552$), indicating a relatively high level of physical symptoms experienced by the participants at baseline. However, after the intervention, the mean score declined to ($M=0.861$, $ST=0.535$) at T2, suggesting a significant improvement in the physical symptoms experienced by the participants. Moreover, the mean score further declined to ($M=0.615$, $SD=0.408$) at T3, indicating that the participants experienced even fewer physical symptoms after the intervention.

Table 4.4 : One-Way Repeated Measure ANOVA on Voice-Related Physical Symptoms

Multivariate Tests ^a							Partial Eta Squared
Effect	Value	F	Hypothesis df	Error df	Sig.		
Intercept	Pillai's Trace	0.490	17.797 ^b	2.000	37.000	.000	.490
	Wilks' Lambda	0.510	17.797 ^b	2.000	37.000	.000	.490
	Hotelling's Trace	0.962	17.797 ^b	2.000	37.000	.000	.490
	Roy's Largest Root	0.962	17.797 ^b	2.000	37.000	.000	.490

Exact statistic a. Design: Intercept

a. Design: Intercept

b. Within Subjects Design: Tele MusVIP

Exact statistic

Table 4.4 provides the one-way repeated measures ANOVA test results for voice-related physical symptoms, including throat infections such as swollen glands, sore throat, chest pain, and ancillary symptoms such as phlegm, blocked nose, and throat clearing. The results indicated that there was a significant improvement in voice symptoms after the Tele MusVIP intervention, with a p-value of 0.00 ($p \leq 0.05$), and Wilks' Lambda was 0.510, $F(2, 37)$ was 17.797.

The voice-related physical symptoms showed significant improvement, such as soreness, cough, feeling as if something stuck, phlegm, and throat infections. The partial eta squared of the result was 0.490, indicating a close to moderate effect size as proposed by Cohen. (.02=small, .05=moderate, .08=large, .14=very large effect).

4.1.4 The Effects of Tele MusVIP on Emotional Well-Being

The emotional well-being of the participants was a crucial factor evaluated in the study, and it was measured by 8 items in the VoiSS questionnaire. Each item used a 5-point Likert scale, ranging from 0 to 4, where 0 indicated "Never," and 4 indicated

"Always." The scale was used to assess the emotional state of the participants in relation to their voice, and lower scores indicated better emotional well-being.

Repeated measurements were taken to compare the mean scores of each item from T1, T2, and T3 to determine if there were significant improvements. This allowed the researchers to evaluate the effectiveness of Tele MusVIP on the emotional well-being of the participants.

Table 4.5 : Items for Emotional Well-Being

Items	Wilks' Lambda	F	Sig
1. Do you feel miserable or depressed because of your voice problem?	0.725	7.009	0.003
2. Are you embarrassed by your voice problem?	0.850	3.260	0.050
3. Does your voice problem make you feel stressed and nervous?	0.865	2.895	0.048
4. Does your voice problem put a strain on your family and friends?	0.867	2.831	0.072
5. Do people seem irritated by your voice?	0.889	2.307	0.114
6. Does your voice make you feel incompetent?	0.115	5.361	0.009
7. Are you ashamed of your voice problem?	0.910	1.822	0.176
8. Do you feel lonely because of your voice problem?	0.928	1.441	0.250

Table 4.5 reviewed the one-way repeated measures ANOVA test results for all 8 items concerning emotional well-being. Based on the outcome from the results, 4 were not significant, and 4 were significant. The significant results were item 1, do you feel miserable or depressed because of your voice problem? ($F=7.009$, $p=0.003$), item 2, are you embarrassed by your voice problems? ($F=3.260$, $p=0.050$), item 3, does your voice problem make you feel stressed and nervous? ($F=2.895$, $p=0.048$) and item 6, does your voice make you feel incompetent? ($F=5.361$, $p=0.009$)

The results that were not significant include item 4, does your voice problem put a strain on your family and friends? ($F=2.831$, $p=0.072$), item 5, do people seem irritated by your voice? ($F=2.307$, $p=0.114$), item 7, are you ashamed of your voice problem? ($F=1.822$, $p=0.176$) and item 8, do you feel lonely because of your voice problem? ($F=1.441$, $p=0.250$).

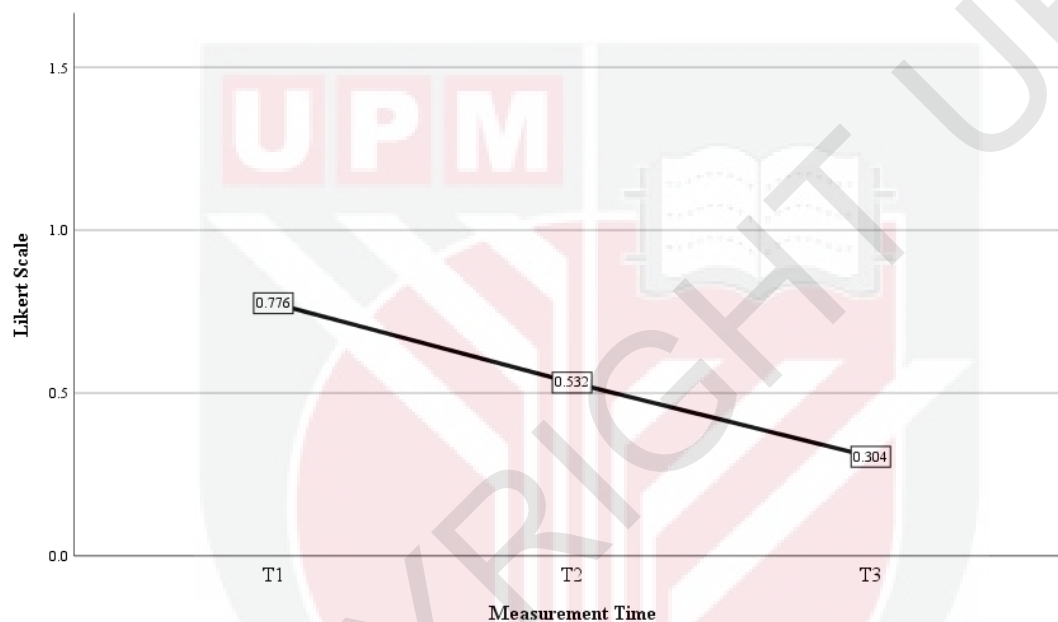


Figure 4.4 : Mean Score on Voice Related Emotional Well-Being

Based on Figure 4.4, there was a slight decline in the mean score for voice-related emotional well-being from T1 to T3. At T1, the mean score for emotional well-being was $M=0.776$, with a standard deviation of $SD=0.695$. The mean score then decreased to $M=0.532$ at T2, with a standard deviation of $SD=0.605$. The decline in emotional well-being continued at T3, where the mean score was $M=0.304$, with a standard deviation of $SD=0.485$.

It is important to note that the decline in emotional well-being may not necessarily indicate a negative outcome, as lower scores on the Likert scale indicate greater positivity in emotional well-being. Therefore, it can be interpreted that the intervention had a positive impact on the emotional well-being of the participants.

Table 4.6 : One-Way Repeated Measure ANOVA on Emotional Well-Being

Effect	Value	F	Hypothesis df	Error df	Sig.	Partial Eta Squared
Pillai's Trace	.208	4.858 ^b	2.000	37.000	.013	.208
Wilks' Lambda	.792	4.858 ^b	2.000	37.000	.013	.208
Hotelling's Trace	.263	4.858 ^b	2.000	37.000	.013	.208
Roy's Largest Root	.263	4.858 ^b	2.000	37.000	.013	.208

a. Design: Intercept

b. Within Subjects Design: Tele MusVIP

Exact statistic

Based on the results of the one-way repeated measure ANOVA test shown in Table 4.6, the Wilks' Lambda value was 0.792, F statistic was 4.858, and the p-value was 0.013 ($p \leq 0.05$). The small effect size with a partial eta squared of .208 suggested that Tele MusVIP had a positive impact on emotional well-being of ST. These results demonstrate that the intervention significantly improved the emotional aspects of ST's voice-related experiences.

Table 4.7 : Perception of Participants on Their Voice and Voice Related Problems (Pre-and Post-Intervention)

Theme	Codes (Pre)	Participants Reference	Total Reference	Theme	Codes (Post)	Participant Reference	Total Reference
Voice Condition after teacher for a day	- Throat feels tight - Voice tired - Taste blood while speaking - Voice feels hoarse - Feel like there is something in the throat - Voice clear	8 9 1 3 4 7	34	Voice Condition after teacher for a day	- Voice feels less tired - Voice feels less tight - Doesn't taste blood anymore - No difference from before - Voice clear - Voice okay	5 2 1 3 8 3	22
Voice (Feedback from others)	- Soft without microphone - Words are sometimes unclear - Sound like a duck - Very loud - Very clear	3 2 1 3 6	15	Voice (Feedback from others)	- Voice got louder	2	2
Emotion	- Frustrated when I have to repeat - Don't feel like talking after class - Lack of confidence in communicating with students - Feels that they have a horrible voice	2 8 2 3	15	Emotion	- Frustrated when I have to repeat - Develop more confidence in voice - No difference	1 4 2	7
Gadget	- Must rely on the microphone - Doesn't have to use a microphone	14 5	19	Gadget	- Must rely on the microphone - Can use less when there is no battery - Don't have to use a microphone	12 3 8	23
Social distancing	- Students are far apart and have to raise their voice	2	2	Singing	- Improve in singing, not speaking	1	1
				Additional responsibility	- Have to do recording, uses more voice	1	

Table 4.7 summarizes the participants' feedback on their voice and voice-related problems before and after the intervention. During the pre-intervention, a set of questions were asked to understand participants' voice condition better. The first question was, how was the teacher's voice condition after teaching for a day? 9 participants' voices felt tired after teaching for a day, 8 participants felt tight in their throats, 4 felt like there was something in the throat, 3 felt hoarse, and one often tasted blood while speaking. Participants also reported on their voice feedback from others; 6 of the participants' voices were clear to others, 3 of the participants mentioned that they were known to have a loud voice, 3 had a soft voice without the microphone, 2 participants' articulation of words were unclear and one sounded like a duck. Participants mention how they feel about their voice; 8 participants don't feel like talking after class, 3 think that they have a horrible voice, 2 feel frustrated when they have to repeat what they say, and 2 lack confidence in communicating with students. In terms of the use of the gadget, 14 participants mentioned that they must rely on the microphone, and 5 didn't have to use a microphone in class. 2 participants said because of social distancing, students were further apart from each other, and they often have to raise their voice.

Furthermore, the same set of questions was asked in the post-intervention interview to learn about participants' voice and their voice-related problems. The results were rather positive. There were fewer numbers of participants who suffered from voice problems after the intervention. 8 participants' voices were clear after they taught for a day, 5 participants mentioned that they felt less tired, 3 participants' voices were okay, 2 participants feel less tight in their voices, 1 participant doesn't taste blood anymore, and 3 participants felt there was no difference. 2 participants mentioned that their voice

sounded louder to others. 4 participants developed more confidence in their voice, 2 participants felt no difference before and after the intervention, and one felt frustrated when they had to repeat what they said. The number of participants who relied on the gadget in class has decreased. 12 participants must rely on the microphone, 8 participants do not have to use the microphone in class, and 3 participants mentioned they could afford not to use the microphone when there is no battery without suffering from the consequences of not using a microphone in class. One participant mentioned the improvement of singing skills, not speaking, and 1 mentioned having additional responsibility during the pandemic, where the participant has to use more voice by recording for students.

Table 4.8 : Participants Perception on Tele MusVIP

Theme	Codes	Participant's reference	Total reference in themes
Voice quality	- Voice became louder after warm-up	1	3
	- Clearer pronunciation	2	
Breathing Techniques	- Breathe in before speaking to make voice less strain	6	9
	- Support voice before speaking to feel less strain	3	
Mood	- Look forward for Sunday to come	4	38
	- Feel happy	15	
	- Full of laughter	3	
	- Relax	4	
	- Feel encouraged to sing	3	
	- Feel good	1	
	- Full of positive vibe	5	
	- Release stress	3	
Session was done virtually	- Good, easy to access from anywhere	26	54
	- Prefer face to face	7	
	- Good during the pandemic	9	
	- It's interesting	4	
	- Feels okay	3	
	- Connection sometimes unable	5	
Singing	- Friends commented singing improved	1	6
	- Feels got more breathe when singing	2	
	- Still cannot reach some high notes	1	
	- Inspire me to sing more	2	

Table 4.8 : Continued

Satisfaction with song preferences	- Like the songs chosen	11	27
	- The songs are quite unique	3	
	- Quite okay	8	
	- One song is a bit high, and cannot reach	1	
	- Like the Jekyll and Hyde song	3	
	- Never get bored singing them	1	
Voice condition after intervention	- Feels like voice open, can sing more	5	12
	- Can speak louder after the intervention	2	
	- Voice feels dry after intervention	3	
	- Voice feels a bit tight after the intervention	2	
Length of the intervention	- 2 hours too long, one and a half better	2	15
	- 2 hours is just nice	6	
	- 3 months is not enough	6	
	- It is quite hard to commit for 3 months	1	
Video Recording Exercises (Homework)	- Practice while driving to work	3	14
	- Only get to practice 2-3 times a week	3	
	- Didn't practice most of the time	5	
	- Sing along while cooking	1	
	- Good warm-up before class	2	
Awareness	- Drink more water during teaching	3	13
	- Try to yell less	1	
	- Remember to take a breath before speaking	9	

Table 4.8 shows that Tele MusVIP helped improve participants' voice quality, 2 participants mentioned that they have clearer pronunciation, and one participant's voice got louder after the voice was warmed up. 9 participants commented on the breathing techniques, 6 participants felt their voice were less strained when they breathed in more, and 3 participants felt their voice was less strained when they speak with support. 38 participants reported their mood was affected positively during the intervention; 15 feels happy, 5 felt that is full of a positive vibe, 4 feels relaxed, 4 looks forward for Sunday to come, 3 feels that the intervention released stress, 3 feels encouraged to sing, and 3 feels that is full of laughter. The majority has a positive

response to the session being done virtually; 26 mentioned that it's easy to be accessed from anywhere, 9 mentioned that it is good during the pandemic to have a session as such, 4 thinks is interesting and 3 feel it's okay. However, there was opposite feedback about it being done virtually as well. 7 participants mentioned that they preferred face-to-face and 5 mentioned that their connections were unstable from time to time. 6 participants commented on their singing and 27 participants mentioned song choices. There was positive and negative feedback on their voice condition after the intervention; 5 mentioned that they feel voices opened up more and they are able to sing for a longer period after the intervention. 2 mentioned that they can speak louder after the intervention, 3 participants voice feels dry after the intervention and 2 participant feels tight.

15 participants commented on the length of the intervention. 6 participants mentioned that 3 months is not enough, 6 participants think that 2 hours is just nice, 2 participants think 2 hours is too long and 1 mentioned that is hard to commit for 3 months. Video recordings were given to participants to practice; 5 participants didn't practice most of the time, 3 practiced while driving to work, 3 only get to practice 2-3 times a week, 2 participants mentioned that it was a good warm-up before class and 1 sing along while cooking. Lastly, 13 participants mentioned that the intervention brings awareness to the participants on the need of taking care of their voices. 9 mentioned that they remember to take a breath before speaking. 3 participants drink more water while they are teaching and 1 participant try to yell lesser during class.

4.2 Summary of Finding

51 participants were enrolled in this research, and 39 participants completed the intervention. The majority of the participants (94.87%) were primary school teachers, with only a few being secondary school teachers (5.1%). They resided in nine different states in Malaysia, including Kuala Lumpur, Selangor, Penang, Johor, Sarawak, Sabah, Kedah, Perak, and Negeri Sembilan. All of the participants served for a minimum of one year and as long as 34 years in their respective schools.

Data on voice fatigue, voice impairment, voice-related physical symptoms, and emotional well-being were collected from the participants through two self-administered questionnaires. The questionnaires were collected before the start of the intervention, on the 6th week of the intervention, and the 12th week of the intervention and were analyzed using one-way repeated measure ANOVA. Qualitative research was also collected in this study through pre-intervention and post-intervention interviews to gain an in-depth understanding of participants' perspectives on their voice and voice problem as well as their feedback towards Tele MusVIP.

A one-way repeated measure ANOVA revealed that the effects of Tele MusVIP on voice fatigue were significantly positive. The result was shown as follows: Wilks' Lambda=.420, $F(2, 37) = 25.570$, $p = .000$ ($p \leq 0.05$), with a moderate effect size, multivariate partial eta squared =.580. The mean score for voice fatigue decreased from T1 ($M=2.202$, $SD=0.75$), T2 ($M=1.756$, $SD=0.833$) to T3 ($M=0.981$, $SD=0.77$), indicating a decrement of voice fatigue.

A one-way repeated measure ANOVA revealed that the effects of Tele MusVIP on voice impairments were significantly positive. The result was shown as follows: Wilks' Lambda =.519, $F(2,37)=17.115$, $p=.00$ ($p \leq .05$) with a small to moderate effect size, multivariate partial eta squared=0.481. The mean score for voice impairments decreased from T1 ($M=1.277$, $SD=0.527$), T2 ($M=0.865$, $SD=0.507$) to T3 ($M=0.57$, $SD=0.646$), indicating the decrement of voice impairments.

A one-way repeated measure ANOVA revealed that the effects of Tele MusVIP on voice-related physical symptoms were significantly positive. The result was shown as follows: Wilks' Lambda=0.510, $F(2, 37)=17.797$, and $p\text{-value}=0.00$, ($p \leq 0.05$) with close to moderate effect size, multivariate partial eta squared=0.49. The mean score for voice-related physical symptoms decreased from T1 ($M=1.278$, $SD=0.552$), T2 ($M=0.861$, $SD=0.535$) to T3 ($M=0.615$, $SD=0.408$), indicating the decrement of voice-related symptoms after the completion of the intervention.

A one-way repeated measure ANOVA revealed that the effects of Tele MusVIP on voice-related emotional well-being were significantly positive. The result was shown as follows: Wilks' Lambda=0.792, $F(2, 37)=4.858$, and $p\text{-value}=0.013$ ($p \leq 0.05$) with small effect size, multivariate partial eta squared=0.208. The mean score was slightly decreased for voice-related emotional well-being T1 ($M=0.776$, $SD=0.695$), T2 ($M=0.532$, $SD=0.605$) to T3 ($M=0.304$, $SD=0.485$). indicate the slight improvement in voice-related emotional well-being after the completion of the intervention.

Overall, the results of this study suggest that Tele MusVIP has potential to use as an intervention for improving the voice-related problems experienced by primary school teachers in Malaysia. The intervention was able to significantly reduce voice fatigue, voice impairments, voice-related physical symptoms, as well as slightly improve emotional well-being. Additionally, the qualitative feedback from participants was mostly positive, with participants finding the exercises helpful and enjoyable.

The study also highlights some limitations that should be addressed in future research. One limitation is the relatively small sample size, which may affect the generalizability of the findings. Another limitation is the lack of a control group, which makes it difficult to determine if the improvements observed were solely due to the intervention or if other factors were involved. Future studies should aim to address these limitations and further investigate the effectiveness of Tele MusVIP for improving voice-related problems in teachers.

In conclusion, this study provides evidence that Tele MusVIP is a promising intervention for improving the voice-related problems experienced by primary school teachers in Malaysia. The findings of this study have important implications for the development of interventions aimed at promoting vocal health among teachers, which may ultimately lead to improved teaching effectiveness and student outcomes.

CHAPTER 5

DISCUSSION, IMPLICATIONS, LIMITATIONS OF STUDY AND RECOMMENDATION FOR FUTURE RESEARCH

5.1 Introduction

The results of this study indicate that Tele MusVIP is an effective intervention for improving voice-related issues among school teachers in Malaysia. The one-way repeated measure ANOVA tests conducted on voice fatigue, voice impairments, physical symptoms related to voice use, and emotional well-being all showed statistically significant improvements after the completion of the intervention. The effect sizes were moderate to small, indicating that the intervention had a meaningful impact on the participants' voice-related issues.

The qualitative data collected through pre- and post-intervention interviews provided additional insights into the participants' perceptions of their voice-related problems and the effectiveness of Tele MusVIP in addressing those issues. The participants reported feeling positive about the exercises provided in the intervention, particularly the breathing exercises, and found the intervention to be enjoyable and helpful. The majority of the participants had positive feedback on the virtual format of the intervention, although some participants mentioned interruptions due to internet connection issues and the feeling of dryness and tightness in their voice after the intervention.

The findings of this study have implications for the implementation of Tele MusVIP as an intervention for school teachers in Malaysia. The positive results suggest that Tele MusVIP could potentially be implemented on a larger scale to improve the voice

health of school teachers; leading to better teaching outcomes and overall job satisfaction. However, further research is needed to determine the generalizability of the results and the feasibility of implementing Tele MusVIP on a larger scale.

In conclusion, the findings of this study suggest that Tele MusVIP is an effective intervention for improving voice-related issues among school teachers in Malaysia. The data from quantitative analysis and the contextual information from qualitative data provides a comprehensive understanding of the impact of the intervention, and the results have implications for the implementation of Tele MusVIP on a larger scale. This chapter will discuss and elaborate further on the results."

5.1.1 Discussion on the Findings of Vocal Fatigue

The study hypothesized that Tele MusVIP would result in significant changes in the mean score for vocal fatigue after weekly sessions from pre-intervention (T1) to co-intervention in the 6th week (T2) and from T1 to 12 weeks after intervention (T3). The findings showed a decrease in the mean score for vocal fatigue from pre- to post-intervention. Specifically, the analysis of the study showed that the mean score decreased from T1 (M=2.20, SD=0.75) to T2 (M=1.756, SD=0.833) and further decreased to T3 (M=0.98, SD=0.77). The overall decrease in mean score from pre- to post-intervention was 0.4476, ranging from 'sometimes' to 'almost never'. The results indicated that the participants' voices felt less fatigued after going through the 3-month Tele MusVIP intervention.

The results of this study are consistent with previous research that has found yawning exercises to be effective in reducing vocal fatigue. According to Colton (2011),

yawning lowers the larynx dramatically, which can reduce laryngeal tension and stretch laryngeal muscles, leading to relief of vocal fatigue. Furthermore, siren exercises and sliding notes up and down within a comfortable range have been shown to improve signs of voice fatigue and vocal resonance, which are key factors in maintaining healthy voice use (an Castillo-Allendes et al., 2020; Barnish et al., 2016)

Voice fatigue is a common issue among school teachers, and it can negatively impact their teaching quality and social interactions with others (Cantarella et al., 2022; Mansouri et al., 2021). Thus, the results of this study suggest that Tele MusVIP could be a valuable tool in a comprehensive voice care program for school teachers, helping to prevent vocal problems and promote healthy voice use.

Overall, these findings highlight the potential benefits of Tele MusVIP for school teachers, and provide insight into effective exercises that can be incorporated into voice care programs. However, further research is needed to confirm these findings and explore the long-term effects of Tele MusVIP on vocal fatigue and other voice-related issues.

5.1.2 Discussion on the Findings of Voice Impairments

The findings of this study suggest that Tele MusVIP has a positive effect on voice impairments, which is one of the most common voice-related problems faced by school teachers (Mansouri et al., 2021) The results also align with previous studies that have shown the effectiveness of voice therapy techniques such as diaphragmatic breathing, posture adjustment, and physical warm-up in improving voice impairments (Colton et al., 2011b; Desjardins & Bonilha, 2020; Franco et al., 2014).

The use of diaphragmatic breathing during the Tele MusVIP intervention could have improved voice functioning and decreased the risk of voice impairment (Desjardins & Bonilha, 2020). This breathing technique provides adequate respiratory support, which is essential for optimal voice production and helps in maintaining a more adaptive and optimal voice production (Colton et al., 2011)

Posture adjustment may have also played a role in decreasing voice impairment, as evidenced by studies that show a significant difference in spine posture measures between speakers with and without voice disorders (Cardoso et al., 2021). Furthermore, studies using MRI have shown a significant change in head and neck tension when someone hums a note, indicating the potential impact of posture on voice production (Manning & Blanchet, 2014).

Physical warm-ups may also contribute to reducing voice impairment. According to Cardoso et al. (2021), physical warm-ups can release tension in the body, neck, and shoulders, leading to relaxation of laryngeal muscles and improved phonation. Therefore, incorporating these techniques in a voice care program for school teachers could potentially prevent and reduce voice impairments.

In summary, the findings of this study support the effectiveness of Tele MusVIP in improving voice impairments among school teachers, possibly due to the use of diaphragmatic breathing, posture adjustment, and physical warm-up during the intervention. These techniques align with previous studies that have shown their effectiveness in improving voice-related problems. Thus, incorporating these

techniques in a voice care program could potentially benefit school teachers and prevent voice-related problems.

5.1.3 Discussion on the Findings of Voice-Related Physical Symptoms

To elaborate further on the findings, it seems that the interventions applied in Tele MusVIP, such as voice exercises, played a crucial role in reducing voice-related physical symptoms. Several studies have shown that vocal function exercises can improve the physical sensation of discomfort in the throat (Castillo-Allendes et al., 2020; Meier & Beushausen, 2019).

Another potential reason for the decline in physical symptoms may be due to the mindfulness techniques used in Tele MusVIP. These techniques help the participants develop awareness of their vocal habits and help prevent them from overusing their voices, leading to physical discomfort (Aziz et al., 2020). Through this awareness, teachers may also learn to use their voices more efficiently, reducing physical strain, and ultimately decreasing physical symptoms related to voice use (Guzman et al., 2022).

Overall, the results of this study suggest that the application of Tele MusVIP, combining vocal exercises and mindfulness techniques, may be an effective approach to reduce physical symptoms related to voice use in school teachers. As voice-related physical symptoms can negatively impact teacher's work and quality of life, the findings provide important implications for the development of voice care programs and interventions for school teachers.

5.1.4 Discussion on the Findings of Voice-Related Emotional Well-Being

Tele MusVIP yields a significant improvement in voice-related emotional well-being. The result shown in graph 4.4 indicates a slight decrease in the mean score from T1(M=0.776), T2(M=0.532) to T3(M=0.304). Compared to other variables measured in this research, the improvement in emotional well-being was less. This result may be explained by the fact that the intervention was done during the second year of the Covid-19 pandemic, whereby classes were still partially online. With the support of a microphone, the teacher felt less self-conscious about their voice (Alarfaj et al., 2022).

The items concerning voice-related emotional well-being were run through one-way repeated measure one by one. As a result, shown in Table 4.4, some of the items were not significant. One of it was; does your voice problem put a strain on your family and friends ($F=2.831$, $p=0.072$). A possible explanation for this might be that during the intervention, the teacher's voice problem may not be as severe as before but it can cause strain on family and friends. The feedback from participants can support this explanation during the interview. Participants reported that their voice condition improved because they did not need to yell as much while classes were conducted online. And during the pandemic, the model of learning in school has changed, STs were only required to teach half of what they usually do, and the other half was coursework.

On the contrary, according to Table 4.4, some items have significant changes. The items raised the question, do you feel miserable or depressed because of your voice problem ($F=7.009$, $p=0.003$), and does your voice problem make you feel stressed and nervous ($F=2.895$, $p=0.048$). A possible explanation might be that as teachers better

understand their voice use and become more confident, they feel less miserable and stressed about their voice problem (Sharp & Cook, 2022).

5.1.5 Discussion of the Findings from the Interview

5.1.5.1 Perception of School Teachers on Their Voice and Voice-Related Problems

After looking through the responses from the participants and comparing raw data collected from pre and post-intervention interviews, it is shown that there was more positive feedback after the completion of the intervention. During the pre-intervention interview, 9 participants complained that their throat feels tired sometimes after a day of teaching but 5 of them mentioned that the tiredness reduces during the post-intervention interview; 2 participants mentioned their voice got louder after the intervention and 4 feels that they develop more confidence in their voice. Through the feedback in the post-intervention interview, we can also see that the reliance on the microphone has decreased from 14-12.

Although this observation through the raw data cannot prove the effectiveness of Tele MusVIP, it can thus, while preliminary, suggest a positive possibility for Tele MusVIP to be used to improve voice quality and emotional well-being in people who suffered from voice problems. At the same time, the qualitative data collected helped to complement some of the quantitative findings in this study. The feedback from the participants are very valuable, forming an integral part of the learning process. It provides the opportunity to understand further if the participants find the intervention beneficial, primarily when physical measurements were not used in this study. Direct

feedback also help the researcher to narrow the gap between actual and desired performance.

5.1.5.2 School Teacher's Feedback on Tele MusVIP

The feedback received from school teachers regarding Tele MusVIP was predominantly positive. Many found the intervention enjoyable and looked forward to attending it weekly. Some participants noted an improvement in their pronunciation and an increase in vocal volume. Additionally, participants found the breathing techniques to be helpful in reducing voice strain while speaking. They also appreciated the songs chosen for the intervention, which motivated them to practice singing.

Furthermore, participants reported that their voices felt more open after the intervention, allowing them to speak louder or continue singing. The majority of feedback on the online format of the sessions was positive, with participants indicating that they had become accustomed to the virtual sessions during the pandemic. Some participants did report negative feedback, such as dryness and tightness in their voices after the intervention.

The feedback obtained from participants in this study is valuable, as it suggests that Tele-MusVIP is an enjoyable and feasible music-based intervention that encourages participants to strengthen their voices and increase awareness of vocal health. Although there were a few negative comments, the majority of feedback pointed to the effectiveness of Tele MusVIP in addressing teachers' voice problems, particularly in relation to breathing support, voice discomfort, and volume. Among the singing

techniques introduced to participants, the breathing technique was cited as the most helpful.

The ongoing issue of school teachers experiencing voice discomfort is particularly relevant during the pandemic, as studies have shown that teachers' stress levels have increased. The positive feedback from participants indicates that Tele MusVIP may be a potential option for introducing voice care programs for school teachers, offering an enjoyable and purposeful intervention to address vocal health.

5.2 Implication

The theoretical implications of Tele MusVIP are significant. This study supports the notion that the principles of neuroplasticity and the HSM model can be used in the development of music-based interventions to improve vocal health. The results suggest that Tele MusVIP is a feasible and effective way to incorporate these principles and provide an alternative to traditional voice care programs.

Methodologically, this study contributes to the growing body of research on music-based interventions for voice care. The use of an online platform to deliver the intervention shows that technology can be used to reach a wider audience and provide a convenient option for participants. Furthermore, the study highlights the importance of collecting feedback from participants to gain a better understanding of the effectiveness and feasibility of interventions.

Practically, the implications of Tele MusVIP are significant for school teachers in Malaysia and potentially other countries. With the ongoing issue of voice discomfort

among school teachers, Tele MusVIP can serve as a viable option for improving vocal health. The positive feedback from participants suggests that Tele MusVIP is not only effective in improving voice-related parameters but also enjoyable and motivating for participants. The intervention's incorporation of breathing techniques and singing activities can also help to reduce vocal strain and increase vocal stamina, which is crucial for teachers who spend long hours speaking in the classroom. The following section will present a brief discussion on both theoretical and practical implications.

5.2.1 Theoretical Implication

In the theoretical section of this research, the theories of neuroplasticity, the HSM model were used to support the variables, execution, and manner of this study. The use of these theories proved successful in executing MusVIP virtually, as demonstrated by the findings of this study.

The concept of neuroplasticity, as defined by Demarin (2014), refers to the brain's remarkable ability to adapt to new situations by changing, remodeling, and reorganizing its neural networks. This capacity underpins learning, recovery, and the formation of new habits, making it a critical principle in the interventions.

Tele MusVIP leverages this principle by incorporating singing as a tool to stimulate complex cognitive processes related to voice production. Singing activates multiple regions of the brain, including those involved in motor control, auditory perception, and emotional regulation. By engaging these areas, the program facilitates changes in the neural network, promoting the remodeling necessary for developing healthier and more efficient voicing habits.

One of the aspects of Tele MusVIP is the incorporation of physical movements, such as coordinated breathing exercises, postural adjustments, and gestural activities during singing. These movements are specifically designed to activate and strengthen the motor and sensory pathways linked to the neural networks involved in voice production and physical coordination. The integration of movement enhances the brain's ability to form new neural connections, improving communication between motor and auditory regions and fostering better synchronization and functional connectivity.

Additionally, Tele MusVIP introduces diverse musical styles and tempos, challenging the brain to adapt to new patterns and rhythms. This variability enhances the brain's ability to reorganize itself, as it encourages flexibility and strengthens neural pathways. Combined with physical singing activities, these elements stimulate the electrically excitable neural networks, aligning with the theory of neuroplasticity proposed by Voss et al. (2010).

By combining physical movements with cognitive and auditory exercises, Tele MusVIP provides a comprehensive approach to the intervention. This integration not only supports the formation of new neural connections but also reinforces existing ones, resulting in both immediate improvements in voice function and long-term benefits in vocal health. By aligning physical movements with neural network engagement, Tele MusVIP exemplifies an effective application of neuroplasticity in voice therapy.

On the other hand, HSM theories emphasize the importance of creating conditions that foster a strong bond with respondents, helping them understand their problems and explore potential solutions. In Tele MusVIP, the researcher focused on building trust and establishing a connection with the participants, which played a crucial role in the success of the intervention.

Before the intervention began, the researcher conducted an initial interview with each participant. This interview provided an opportunity to understand their voice issues, concerns, and goals for the intervention. It also helped set the stage for a productive and supportive relationship. Following this, at the beginning of each intervention session, the researcher greeted participants with casual chitchat. These friendly interactions helped create a comfortable environment, allowing participants to feel more at ease and open to engaging in the session.

As a result of these efforts, many participants attended the weekly sessions with enthusiasm. They expressed confidence in singing individually and addressing their voice issues because a safe, non-judgmental space has been created. Furthermore, participants appreciated the researcher's ongoing encouragement, especially when they encountered challenges. These responses demonstrated the strong bond of trust and support that was essential to the intervention's success.

5.2.2 Practical Implications

This study identifies that many school teachers in Malaysia are suffering from voice fatigue as well as physical symptoms like sore throats and the sensation of something stuck in the throat. This is a significant issue, as teachers are responsible for educating

the future generation and require vocal health to do so. The findings of this study highlight the need for increased awareness among teachers regarding vocal hygiene and voice use while teaching. It is also essential for school authorities, such as principals and policymakers, to provide workshops, talks, or programs for teachers to understand their voice use better.

This research had a dropout rate of less than 25%, and participants were consistent in their attendance. Additionally, the participants showed significant improvement in their voice after the 3-month intervention, indicating the potential of Tele MusVIP as an alternative to voice care programs for teachers. This is particularly significant, given the challenges associated with direct approaches to voice care programs, such as the consistency of attendance and active participation in voice exercises during sessions.

Originally designed as a viable treatment option for people with Parkinson's Disease, MusVIP has shown potential as a risk reduction program for voice disorders. The program may not only benefit school teachers but also professional voice users who use heavy voice loading daily, such as sales assistants, gym instructors, and customer service representatives. The research findings have implications for experts in the field of vocal health, such as singing instructors, speech pathologists, or researchers, who are actively seeking ways to improve vocal health awareness and care. Furthermore, these findings extend the potential implications to experts in software development or app creators, who could investigate the creation of telepractice or teletherapy programs.

In the current digital world, the use of online interventions adds significant value, particularly for individuals with limited access to in-person treatment options. The online delivery of MusVIP allows for greater flexibility and convenience, enabling participants to engage in health programs from the comfort of their homes. This is especially beneficial in a time when digital platforms are increasingly integrated into daily life, offering a sustainable and accessible alternative to traditional face-to-face therapy. The ability to reach a wider audience, regardless of geographic location, makes online interventions a powerful tool in addressing vocal health on a larger scale.

Finally, this study has demonstrated the feasibility of online music-based and singing-based interventions, providing additional reference for habilitation and rehabilitation programs that include music or singing in the future. The rise of digital health tools enhances the potential for personalized and effective care, allowing interventions like MusVIP to be tailored to individual needs and delivered remotely. Overall, the findings of this study have important implications for the vocal health of school teachers and other professional voice users, as well as potential applications in the field of telepractice and teletherapy.

5.3 Limitations of Study and Recommendation for Future Research

There were a number of limitations in this study. Firstly, the study was conducted as a one-group repeated measure study, which meant that the same participants were involved in the intervention every week. While this approach helped reduce individual differences between participants and required fewer people to participate in the study, it limited the ability to compare the efficacy of Tele MusVIP to other interventions or

no intervention at all. Future research that includes a control group would help strengthen the evidence for the effectiveness of Tele MusVIP.

Secondly, the data collected in this study was self-administered, meaning that the reliability and validity of the data relied solely on the honesty of the participants when answering the questionnaire. Additionally, there was no control over the environment in which the participants answered the questionnaire, which could have introduced potential biases or inaccuracies. Future studies could use physical tools for data collection to obtain more precise numerical data.

Thirdly, although this study explored the efficacy of Tele MusVIP on several voice-related parameters, it did not delve deeper into specific factors such as the severity of voice issues in relation to the age group of students that teachers teach or the length of time that teachers have been teaching. Further research could be conducted to better understand the voice status of school teachers in these specific contexts.

Fourthly, participants were encouraged to practice on their own throughout the week, but the accuracy of reported home practice and the duration of each participant's practice could not be verified by the researcher. This limitation could have affected the overall efficacy of Tele MusVIP, as some participants may not have practiced enough or correctly, leading to less improvement in their voice-related parameters.

Finally, the intervention was conducted online, which required participants to have strong internet access and access to a laptop or mobile phone with a holder. Participants in areas with poor internet access or limited access to technology may have been excluded from participating in the study. Future research could involve

collaboration with organizations such as the Ministry of Education to ensure that all teachers, regardless of their location or access to technology, can participate in interventions aimed at improving their vocal health.

In summary, the limitations of this study suggest several areas for improvement in future research. First, incorporating a control group would allow for a more accurate evaluation of the effectiveness of Tele MusVIP by comparing it to other interventions or no intervention at all. Second, using physical tools for data collection in future research could increase the reliability and validity of the data collected. Third, conducting more comprehensive research to understand voice status in specific contexts could lead to more targeted interventions to improve vocal health. Fourth, finding better ways to verify participants' home practice would allow for a more accurate evaluation of the efficacy of Tele MusVIP. Finally, ensuring accessibility for participants regardless of their location or access to technology would help to increase the generalizability of the findings. Addressing these limitations would improve the reliability and validity of future research on Tele MusVIP and ensure that school teachers can benefit from interventions aimed at improving their vocal health.

CHAPTER 6

SUMMARY AND CONCLUSION

6.1 Summary of Study

This chapter summarizes the use of Tele MusVIP, the research problems and research objectives, the research methodology, and the major findings of the effects of MusVIP on voice fatigue, voice impairments, voice-related physical symptoms, and voice-related emotional well-being. It also includes the findings conducted through interviews to understand school teachers' perceptions of their voice and voice-related problems, as well as their feedback on the perception of Tele MusVIP.

6.1.1 Summary of Tele MusVIP

Theoretical frameworks are essential in developing and understanding an intervention's effectiveness, and this study utilized three theoretical frameworks. The first framework is the theory of neuroplasticity, which states that the brain is capable of reorganizing and changing its neural connections based on new experiences. In the context of Tele MusVIP, the theory of neuroplasticity is used to support the idea that school teachers can learn and adopt healthy vocal techniques through the intervention.

The second framework is the helping skills model (HSM), which is often used in counseling and therapy settings to facilitate positive change. HSM emphasizes the importance of establishing a collaborative relationship between the intervention provider and the participant, with the goal of empowering the participant to make positive changes. Tele MusVIP incorporates HSM by emphasizing the importance of school teachers' active participation and engagement in the intervention and

establishing a supportive and collaborative relationship between the researcher and the participants.

Tele MusVIP was designed to include three main components: Vocal Coaching, Active Singing, and HSM Model. Vocal Coaching focuses on providing school teachers with vocal techniques and exercises to improve their voice quality and reduce vocal strain. Active Singing includes singing exercises that help school teachers develop their vocal skills while enjoying the process. HSM Model is incorporated throughout the intervention to facilitate a supportive and collaborative environment that empowers school teachers to take an active role in improving their vocal health.

Overall, by incorporating these three theoretical frameworks, Tele MusVIP offers a comprehensive and holistic approach to improving school teachers' vocal health. The intervention's design and implementation aim to provide school teachers with practical techniques and skills, as well as the knowledge and confidence to maintain healthy vocal habits in the long term.

6.1.2 Summary of the Research Problems and Objectives

Teachers use their voices intensively in their profession, and this has been an ongoing and widely discussed issue. The outcome of the intensive use causes teachers to suffer from various voice problems such as voice fatigue, hoarseness, sore throat and more. These problems have affected teachers' quality of teaching and engagement with students, colleagues, friends and family, causing secondary co-morbidities such as anxiety, sleep deprivation, forgetfulness, difficulty concentrating and fatigue.

Voice education programs promoting vocal hygiene and vocalization practice for teachers have been done vastly in foreign countries. Still, one that uses music-based intervention on school teacher's voice problems is limited and the use of music-based intervention in a virtual setting is also limited.

The objectives of this study were to find out if group singing are able to provide benefit for ST voice problems and voice-related emotional well-being. Meanwhile, the researchers were also interested to find out ST's perspectives on their voice and voice problems and the ST perspective on the use of Tele MusVIP to develop a more thorough singing-based voice care program conducted physically and virtually for local ST.

6.1.3 Summary of Research Methodology

The research uses an interventional, within-group, repeated measure design. The dependent variables evaluated in this research were voice fatigue, voice-related physical symptoms and voice-related emotional well-being. The data collected on these variables were measured 3 times at pre, co and post-intervention and statistically analysed with repeated measure ANOVA. This study involves a small section of the qualitative component, and the data was obtained through pre and post-intervention interviews.

Tele MusVIP was conducted for 2 hours weekly for 12 weeks. 39 ST from different parts of Malaysia participated in this study and attended the intervention virtually. The data on voice fatigue, voice impairments, voice-related physical symptoms and emotional well-being were collected on week 1. The data collected served as the

research's baseline, the second measurement took on week 6, T2, and the data for the same variables were taken on week 12 T3. The data was analysed using SPSS with repeated measure ANOVA to detect if there is a significant difference in mean score pre-and post-intervention. Specific Items for voice impairments, voice-related physical symptoms and emotional well-being were run through repeated measure ANOVA to allow further discussion on the effect of group singing in voice.

Interviews were conducted individually in a virtual setting a week before the start of the intervention and within a week after the the end of the intervention. Pre-intervention interview aims to find out teachers' perspective on their voice and their voice problems before they get into the intervention. The post-intervention interview seeks to determine if ST's perspective on their voice and voice problem changes and receive immediate feedback from the participants about Tele MusVIP. The qualitative data obtained through the interview was analysed, coded and themed. The results were presented in Chapter 4.

6.1.4 Summary of the Major Findings

This study suggests that Tele MusVIP is a feasible music-based voice intervention for ST, with benefits observed in three parameters: voice fatigue, voice impairments, voice-related physical symptoms, and emotional well-being. The results from the Repeated Measure ANOVA showed that Tele MusVIP had a positive significance on ST's voice fatigue issue ($p = .000$, $p < 0.005$) and voice-related physical symptoms ($p = 0.00$, $p < 0.005$). However, Tele MusVIP did not significantly affect ST's voice-related emotional well-being ($p\text{-value} = 0.13$, $p < 0.005$).

During the pre-interview sessions, many participants shared about their voice condition after teaching for a day. Many mentioned feeling tiredness and tightness in their throat, and 4 participants felt something stuck in their throats. Although they experienced voice complaints, many STs ignored them and tried to drink more water, only seeking medical attention if they experienced physical pain, hoarseness, or voice loss.

In the post-intervention interview, participants were asked the same questions about their voice condition after teaching for a day. There was some positive feedback, with 5 participants feeling less voice fatigue and 2 participants feeling less tightness in their throat. Some participants mentioned thinking of the researcher and the intervention when they experienced voice discomfort, indicating an increased awareness of voice use and discomfort among STs. However, 3 participants reported no change in their voice after the intervention, and 1 participant mentioned an improvement in their singing voice but not their speaking voice.

Participants were also asked to provide feedback on Tele MusVIP. After reviewing the feedback, more positive feedback was found than negative. Most participants enjoyed the intervention and found it helpful, with 9 participants specifically mentioning the benefits of the breathing techniques. Some participants mentioned their voice becoming louder, and others reported feeling less strain while speaking. However, 3 participants mentioned their voice feeling dry after the intervention, and 2 participants reported feeling a little tightness in their voice.

Overall, this study supports the use of Tele MusVIP as a feasible music-based voice intervention for STs, with positive benefits observed in several voice-related parameters. While some participants did not report any improvements in their voice, the majority had positive feedback about the intervention. The study also highlights the importance of increasing STs' awareness of voice use and discomfort, and the potential of Tele MusVIP to improve STs' vocal health.

6.2 Conclusion

In conclusion, this study provides evidence supporting the effectiveness of Tele music-based voice intervention (MusVIP) in addressing common voice symptoms and related physical symptoms among school teachers in Malaysia. The positive feedback received from the participants further highlights the potential of MusVIP in improving voice-related emotional well-being.

Moreover, this study sheds light on the perceptions of school teachers towards their voice and the importance of healthy voice use and voice techniques. Participants became more aware of the benefits of MusVIP in reducing their voice symptoms and were encouraged to make changes in their voice use.

The adaptation of MusVIP to Tele MusVIP in response to the Covid-19 pandemic has also provided an opportunity for geographically distant participants to participate in the intervention, while also maintaining a safe social distance during the pandemic.

This study contributes to the limited research on telepractice for music-based voice intervention and provides preliminary findings on the effectiveness of Tele MusVIP.

The significance of Tele MusVIP is not limited to school teachers, but can also be applied to other fields requiring voice care systems.

In conclusion, Tele MusVIP presents itself as a feasible, cost-effective, and sustainable intervention for individuals experiencing voice-related symptoms. The implications of this study suggest the need for further research to explore the full potential of Tele MusVIP and to improve voice care systems in various fields.



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APPENDICES

Appendix A

Respondent's Information Sheet and Consent



**JAWATANKUASA ETIKA UNIVERSITI UNTUK
PENYELIDIKAN MELIBATKAN MANUSIA (JKEUPM)
UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG,
SELANGOR, MALAYSIA**

FORM 2.4: RESPONDENT'S INFORMATION SHEET AND INFORMED CONSENT FORM

Please read the following information carefully and do not hesitate to discuss any questions you may have with the researcher.

1. STUDY TITLE :

The Effects of Tele Music-based Voice Intervention Protocol (Tele MUSVIP) on Vocal Fatigue, Speech Impairment, Voice-Related Physical Symptoms and Voice-Related Emotional Well-being of School Teachers in Malaysia.

2. INTRODUCTION:

We are interested in investigating the benefits of group singing for school teachers in Malaysia, specifically in relation to their voice problems and voice-related emotional well-being. The research details are outlined in this document. It is crucial that you understand the purpose of this research. Please take your time to carefully read and consider this information before deciding whether you are willing to participate. If anything is unclear or if you require further information, please do not hesitate to ask the study staff. Once you feel adequately informed and wish to participate, please sign the informed consent form.

Participating in this study is voluntary, and you have the right to withdraw at any time. If you choose to withdraw, any data collected from you prior to your withdrawal will still be used for the study.

The primary objective of this study is to assess the effectiveness of Tele MusVIP in addressing vocal problems experienced by school teachers, as well as improving their voice-related emotional well-being.

This research is necessary to provide local empirical data on the efficacy of music-based vocal interventions in improving the voice problems and emotional well-being of school teachers in Malaysia. The findings could lead to the development of an affordable and feasible voice care program for school teachers in the future.

In Malaysia, approximately 50 subjects will be participating in this study. The entire study will span a duration of 12 weeks, with a weekly time commitment of 2 hours for your participation.

This study has received ethical approval from the Jawatan Kuasa Etika UPM (JKEUPM).

Please initial here if you have read and understood the contents of this page_____

3. WHAT WILL YOU HAVE TO DO?

The entire procedure will take 2 hours per week for 12 consecutive weeks. The first half of each session will focus on vocal warm-up and vocal techniques. The following half-hour session will concentrate on active group singing, which involves singing short songs with body gestures and learning to control your voice to produce suitable tones for the song's stylistic requirements. The third half-hour session will emphasize song and song text enunciations, while the final half-hour session will be dedicated to recap and repetition. Clear instructions will be provided by a professional vocalist.

The research procedure requires you to complete two questionnaires: the Voice Fatigue Index (VFI) and the Voice Symptom Scale (VoiSS) at the beginning, middle, and final sessions of the study.

You will be interviewed one week before the intervention and during the final session when the intervention concludes. The duration of the interview is approximately half an hour, and it will be conducted online between you and the researcher. The interview will be recorded, but access to the video will be limited to the researchers. Anonymity will be ensured by assigning numbers to each research participant. Participants' privacy will be maintained in all published and written data resulting from the study.

4. WHO SHOULD NOT PARTICIPATE IN THE STUDY?

The exclusion criterias of this study are as below:

1. Part-time teachers.
2. Teachers who are currently under going training
3. Teachers who have taught less than a year
2. Receiving speech therapy or other behavioral therapies during their participation in this study.

5. WHAT WILL BE THE BENEFITS OF THE STUDY:

(a) TO YOU AS THE SUBJECT?

The potential benefits of the participation include free singing lessons from a professional vocalist and a better awareness in vocal health and learn how to strengthen your voice mechanism

(b) TO THE INVESTIGATOR?

Investigator will receive data on the effectiveness of singing as an intervention on improving teachers voice symptoms and the feasibility of telepractice for music-based intervention.

Please initial here if you have read and understood the contents of this page_____

6. WHAT ARE THE POSSIBLE RISKS?

The preliminary studies conducted did not reveal any significant risks associated with the intervention. The results of this research will determine whether the intervention effectively improves the voice symptoms experienced by teachers or if they remain unchanged

7. WILL THE INFORMATION THAT YOU PROVIDE AND YOUR IDENTITY REMAIN CONFIDENTIAL?

This study involves audio and video recording of your interviews and sessions with the researcher. Rest assured that your name or any other identifying information will not be associated with the transcripts. Only the research team will have access to listen to or view the recordings. The recordings will be used solely for the purpose of improving professional standards through research.

Participants' privacy and anonymity will be strictly maintained in all published and written data resulting from the study. Once the research is completed, the outcomes will be shared with the participants

8. WHO SHOULD YOU CONTACT IF YOU HAVE ADDITIONAL QUESTIONS DURING THE COURSE OF THE RESEARCH?

If you have any concerns or questions regarding this research study, please feel free to reach out to the primary investigator, Ms. How Dim Sy, at 0123316388 or via email at gs53348@student.upm.edu.my. You may also contact the supervisor of the study, Dr. Ang Mei Foong, by emailing meifoong@upm.edu.my. They will be available to address any inquiries and provide further clarification. Your feedback and input are important to us, and we encourage open communication throughout the research process.

Please initial here if you have read and understood the contents of this page_____

9. CONSENT

I Identity Card No.
address.....
.....hereby voluntarily agree to take part in the research stated
above *(clinical /drug trial/video recording/ focus group/interview-based/ questionnaire-based).

I have been informed about the nature of the research in terms of methodology, possible adverse effects and complications (as written in the Respondent's Information Sheet). I understand that I have the right to withdraw from this research at any time without giving any reason whatsoever. I also understand that this study is confidential and all information provided with regard to my identity will remain private and confidential.

I* wish / do not wish to know the results related to my participation in the research

I agree/do not agree that the images/photos/video recordings/voice recordings related to me be used in any form of publication or presentation (if applicable)

* delete where necessary

Signature
(Respondent)

Signature
(Witness)

Date

Name

I/C No.

I confirm that I have explained to the respondent the nature and purpose of the above-mentioned research.

Date

Signature
(Researcher)

Appendix B

Letter of Research Ethics Approval from JKEUPM



PEJABAT TIMBALAN NAIB CANSOLOR (PENYELIDIKAN DAN INOVASI)

OFFICE OF THE DEPUTY VICE CHANCELLOR (RESEARCH AND INNOVATION)

Rujukan kami : UPM/TNCPI/RMC/1.4.18.2 (JKEUPM)

Tarikh : 29 June 2021

Dr. Ang Mei Foong
Department of Music
Faculty of Human Ecology
Universiti Putra Malaysia
Serdang, Selangor

Dear Madam/Sir,

RESEARCH PROJECT: THE EFFECTS OF TELE MUSIC-BASED VOICE INTERVENTION PROTOCOL (MUSVIP) ON VOCAL FATIGUE, VOICE IMPAIRMENT, VOICE RELATED PHYSICAL SYMPTOMS AND EMOTIONAL WELL-BEING OF SCHOOL TEACHERS IN MALAYSIA.

REFERENCE NO: JKEUPM-2021-221

RESEARCHER : HOW DIM SY
SUPERVISOR : DR. ANG MEI FOONG

The Ethics Committee for Research involving Human Subjects of University Putra Malaysia (JKEUPM) has studied the proposal for the above project and found that there were no objectionable ethical issues involved in the proposed study.

Please find the list of documents received and reviewed with reference to the study and committee members who reviewed the documents (as attached).

Notwithstanding above, we will not be responsible for any misconduct on the part of researcher in the course of carrying out the research.

Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.

Thank you.

“WITH KNOWLEDGE WE SERVE”

Sincerely yours,

PROF. DR. ZAMBERI SEKAWI
Chair
Ethics Committee for Research involving Human Subjects
Universiti Putra Malaysia

Pejabat Timbalan Naib Canselor (Penyelidikan dan Inovasi), Universiti Putra Malaysia, 43400 UPM Serdang, Selangor Darul Ehsan, Malaysia
Pejabat Timbalan Naib Canselor (P&I) 603-89471002 : 603-8945 1646, Pejabat Pentadbiran TNCPI 603-89471608 603-8945 1673,
Pejabat Pengarah, Pusat Pengurusan Penyelidikan (RMC) 603-8947 1601603-8945 1596, Pejabat Pengarah, Putra Science Park (PSP)
603-8947 1291 603-8946 4121 <http://www.tncpi.upm.edu.my>.

**ETHICS COMMITTEE FOR RESEARCH INVOLVING HUMAN SUBJECTS
(JKEUPM)**

UNIVERSITI PUTRA MALAYSIA

Research title	: The Effects of Tele Music-Based Voice Intervention Protocol (MUSVIP) On Vocal Fatigue, Voice Impairment, Voice Related Physical Symptoms and Emotional Well-Being of School Teachers in Malaysia.
Study Site	: Malaysia
JKEUPM Ref No.	: JKEUPM-2021-221
Researcher	: How Dim Sy
Supervisor	: Dr. Ang Mei Foong

Documents received and reviewed with reference to the above study:

1. Ethics Application Form, Version 1 dated 10/4/2021
2. Respondent Information Sheet & Consent (English), Version 1 dated 10/4/2021
3. Proposal (English), Version 2 dated 21/6/2021
4. Questionnaire/Interview (English), Version 1 dated 10/4/2021
5. Curriculum Vitae of:
 - a. Dr. Ang Mei Foong
 - b. Dr. Indra Selverajah
 - c. How Dim Sy

The University Research Ethics Committee, Universiti Putra Malaysia (JKEUPM) operates in accordance to the ICH-GCP Guidelines.

Decision by JKEUPM:

- ☒ Approved
- ☒ **Permission MUST BE OBTAINED from the respective hospitals/ institutions before conducting the research**
- ☐ Disapproved

Please note that the approval is **VALID UNTIL 29 JUNE 2022**

Researchers should comply with the following:

- I. Complete a Study Final Report upon study completion (Form 3.2).
- II. Ethical approval is required in the case of amendments/ changes to the study documents/ study sites/ study team.
- III. Applicable for Clinical Trial Studies and Clinical interventional Studies only: Progress Report has to be submitted to JKEUPM at every 6 months from the date of approval (Form 3.1). Report occurrences of all Serious Adverse Events (SAEs), Suspected Unexpected Serious Adverse

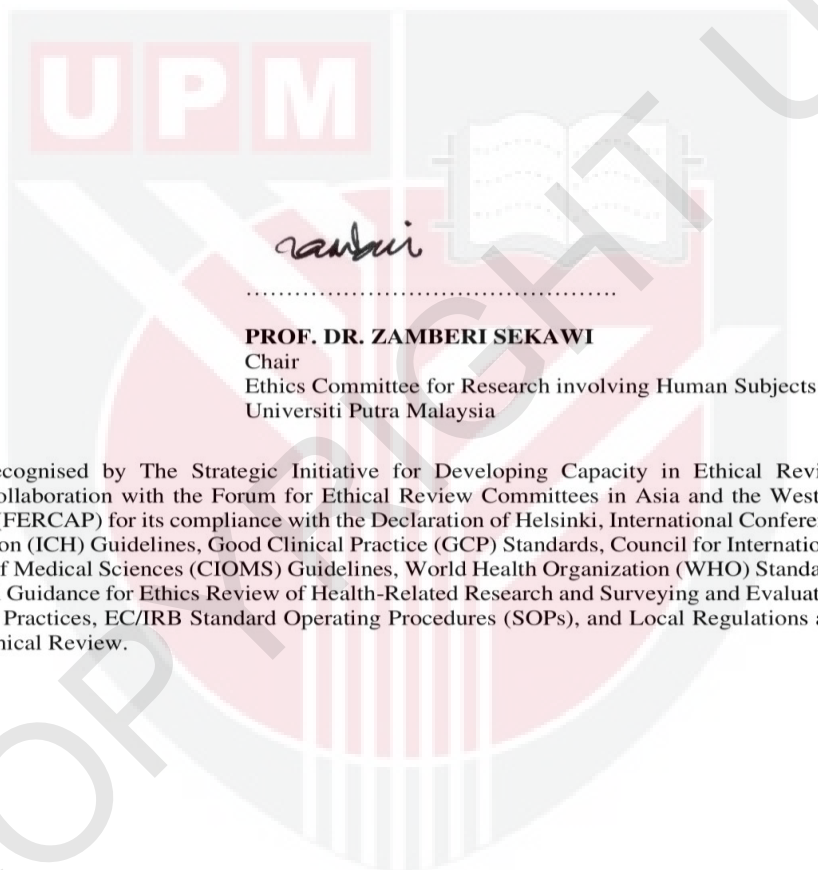
Reaction (SUSARs) and Protocol Deviation/ Violation at all JKEUPM approved sites to JKEUPM. SAEs are to be reported within 15 calendar days from awareness of event by investigator. Initial report of SUSARs are to be reported as soon as possible but not later than 7 calendar days from awareness of event by investigator, followed by a complete report within 8 additional calendar days.

The required forms can be obtained from the Ethics Committee for Research Involving Human Subjects (JKEUPM) website (<http://www.tncpi.upm.edu.my/faiildokumen>).

Date of Approval: 29 June 2021

Members of the JKEUPM who reviewed the documents:

- i. Primary Reviewer: Dr. Asmah Ismail
- ii. Informed Consent Review: Dr. Suhainizam Muhamad Saliluddin



JKEUPM is recognised by The Strategic Initiative for Developing Capacity in Ethical Review (SIDCER) in collaboration with the Forum for Ethical Review Committees in Asia and the Western Pacific Region (FERCAP) for its compliance with the Declaration of Helsinki, International Conference on Harmonization (ICH) Guidelines, Good Clinical Practice (GCP) Standards, Council for International Organizations of Medical Sciences (CIOMS) Guidelines, World Health Organization (WHO) Standards and Operational Guidance for Ethics Review of Health-Related Research and Surveying and Evaluating Ethical Review Practices, EC/IRB Standard Operating Procedures (SOPs), and Local Regulations and Standards in Ethical Review.

Appendix C

Pre-Intervention Interview Questions

Tele Music Based Voice Intervention Protocol (Tele MusVIP)

Name : _____

Date : _____

- Part A**
- A1 Would you please describe your current voice conditions?
 - A2 How would you rate your current voice condition?
Poor 1 2 3 4 5 6 7 8 9 10 Excellent
 - A3 In what ways your voice condition affects your interaction with others?
- Part B**
- B1 Have you attended any group singing sessions before? (if yes)
What are the elements that attract you?
 - B2 What is your perception of singing as an intervention to treat voice problems?
- Part C**
- C1 What are the elements of the songs that attract you?
 - C2 What are some of the songs you like?
 - C3 What are some of your expectations from the intervention?

Appendix D

Post- Intervention Interview Questions

Tele Music Based Voice Intervention Protocol (Tele MusVIP)

Name : _____

Date : _____

- Part A**
- A1 Would you please describe your current voice conditions?
 - A2 How would you rate your current voice condition?
Poor 1 2 3 4 5 6 7 8 9 10 Excellent
 - A3 In what ways your voice condition affects your interaction with others?

- Part B**
- B1 Does singing help you to improve your speaking voice?
(if yes) how? (if no) why?
 - B2 How is your speaking voice immediately after the intervention?
 - B3 What are the pro and cons for the intervention to be conducted online?

- Part C**
- C1 Does the intervention meet your expectation?
 - C2 Are there any additional feedback?

Appendix E

Questionnaire (1)

Vocal Fatigue Index (VFI)

Part 1

1.	I don't feel like talking after a period of voice use	0	1	2	3	4
2.	My voice feels tired when I talk more	0	1	2	3	4
3.	I experience increased sense of effort with talking	0	1	2	3	4
4.	My voice gets hoarse with voice use	0	1	2	3	4
5.	It feels like work to use my voice	0	1	2	3	4
6.	I tend to generally limit my talking after a period of voice use	0	1	2	3	4
7.	I avoid social situations when I know I have to talk more	0	1	2	3	4
8.	I feel I cannot talk to my family after a work day	0	1	2	3	4
9.	It is effortful to produce my voice after a period of voice use	0	1	2	3	4
10.	I find it difficult to project my voice with voice use	0	1	2	3	4
11.	My voice feels weak after a period of voice use	0	1	2	3	4

Part 2

1.	I experience pain in the neck at the end of the day with voice use	0	1	2	3	4
2.	13. I experience throat pain at the end of the day with voice use	0	1	2	3	4
3.	My voice feels sore when I talk more	0	1	2	3	4
4.	My throat aches with voice use	0	1	2	3	4
5.	I experience discomfort in my neck with voice use	0	1	2	3	4

Appendix F

Questionnaire (2)

Voice Symptoms Scale (VoiSS)

1.	Do you have difficulty attracting attention?	Never	Occasionally	Some of the time	Most of the time	Always
2.	Do you have problems singing?	Never	Occasionally	Some of the time	Most of the time	Always
3.	Is your throat sore?	Never	Occasionally	Some of the time	Most of the time	Always
4.	Is your voice hoarse?	Never	Occasionally	Some of the time	Most of the time	Always
5.	When talking in company do people fail to hear you?	Never	Occasionally	Some of the time	Most of the time	Always
6.	Do you lose your voice?	Never	Occasionally	Some of the time	Most of the time	Always
7.	Do you cough or clear your throat?	Never	Occasionally	Some of the time	Most of the time	Always
8.	Do you have a weak voice?	Never	Occasionally	Some of the time	Most of the time	Always
9.	Do you have problems talking on the telephone?	Never	Occasionally	Some of the time	Most of the time	Always
10.	Do you feel miserable or depressed because of your voice problem?	Never	Occasionally	Some of the time	Most of the time	Always
11.	Does it feel as if there is something stuck in your throat?	Never	Occasionally	Some of the time	Most of the time	Always
12.	Do you have swollen glands?	Never	Occasionally	Some of the time	Most of the time	Always
13.	Are you embarrassed by your voice problem?	Never	Occasionally	Some of the time	Most of the time	Always
14.	Do you find the effort of speaking tiring?	Never	Occasionally	Some of the time	Most of the time	Always
15.	Does your voice problem make you feel stressed and nervous?	Never	Occasionally	Some of the time	Most of the time	Always
16.	Do you have difficulty competing against background noise?	Never	Occasionally	Some of the time	Most of the time	Always

Please Turn Over →

17.	Are you unable to shout or raise your voice?	Never	Occasionally	Some of the time	Most of the time	Always
18.	Does your voice problem put a strain on your family and friends?	Never	Occasionally	Some of the time	Most of the time	Always
19.	Do you have a lot of phlegm in your throat?	Never	Occasionally	Some of the time	Most of the time	Always
20.	Does the sound of your voice vary throughout the day?	Never	Occasionally	Some of the time	Most of the time	Always
21.	Do people seem irritated by your voice?	Never	Occasionally	Some of the time	Most of the time	Always
22.	Do you have a blocked nose?	Never	Occasionally	Some of the time	Most of the time	Always
23.	Do people ask what is wrong with your voice?	Never	Occasionally	Some of the time	Most of the time	Always
24.	Does your voice sound creaky and dry?	Never	Occasionally	Some of the time	Most of the time	Always
25.	Do you feel you have to strain to produce voice?	Never	Occasionally	Some of the time	Most of the time	Always
26.	How often do you get throat infections?	Never	Occasionally	Some of the time	Most of the time	Always
27.	Does your voice 'give out' in the middle of speaking?	Never	Occasionally	Some of the time	Most of the time	Always
28.	Does your voice make you feel incompetent?	Never	Occasionally	Some of the time	Most of the time	Always
29.	Are you ashamed of your voice problem?	Never	Occasionally	Some of the time	Most of the time	Always
30.	Do you feel lonely because of your voice problem?	Never	Occasionally	Some of the time	Most of the time	Always

BIODATA OF STUDENT

Dim Sy obtained her undergraduate degree in voice performance from Aletheia University in Taiwan. She was a recipient of the International Students Scholarship and Academic Distinction Scholarship, graduating with First-class honours from Aletheia University.

Since her return, Dim Sy has actively explored innovative methods of teaching singing, conducting workshops, and delivering talks on improving vocal performance and vocal health. Additionally, she imparts her expertise in Aural Skills and Ear Training at the Malaysian Institute of Art, aiming to establish a solid foundation for students on their path to becoming professional musicians.

In addition to her role as an educator, Dim Sy is an active performer and researcher. She has organized and performed in local concerts promoting opera and art songs from various cultures. Her strong passion for research in the prevention of voice disorders through singing has motivated her to pursue a postgraduate degree at University Putra Malaysia. During the pandemic, Dim Sy utilized her skills and knowledge to lead a 6-month virtual choir for aging voices, aiding them in combating pandemic fatigue and enhancing their vocal health.

PUBLICATION

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